

## Proceedings of the 2007 MIT LINC Conference

### Technology-Enabled Education: A Catalyst for Positive Change



October 28-30 October 31 and November 1

Amman, Jordan Dubai, U.A.E.

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#### FORWARD

On October 28, 2007, the Fourth International Conference of MIT's Learning International Networks Consortium (LINC) convened at the King Hussein Bin Talal Convention Center on the Dead Sea in Jordan. This was the first LINC conference to be held outside of Cambridge, and Her Majesty Queen Rania of Jordan, esteemed Patron of LINC-Jordan, participated in the Opening Ceremonies. Over 500 participants from over 40 different countries attended these Opening Ceremonies, with over 400 in attendance the following day. On October 31, the conference moved to Dubai for an Executive Session, attended by the Patron of LINC-Dubai, His Highness Sheikh Maktoum bin Mohammad bin Rashid Al Maktoum, Chairman of the Dubai Technology and Media Free Zone Authority. The 18 keynote speakers represented a world-class assemblage of experts in e-Learning, and they discussed the potential of state-of-the-art educational technology to deliver compelling learning environments to school children, university students and life-long learners. Case studies were presented from many countries.

Due to its location in the Middle East, the conference attracted broad participation from educators and ICT-related businesses in the region. Participants included over 150 Jordanian professors and approximately 100 Jordanian high school math and science teachers, whose participation was sponsored by MIT. In addition, large numbers of educators traveled from neighboring countries and territories including Algeria, Egypt, Gaza, Iran, Iraq, Israel, Kuwait, Lebanon, Oman, Saudi Arabia, Turkey, the U.A.E. and the West Bank. The location also made it easier for African educators to attend, as there were participants from Botswana, Kenya, Nigeria, Rwanda and Tanzania.

These *LINC 2007 Conference Proceedings* include the talks of all 18 keynote speakers, as well as the 51 papers that were presented in parallel sessions and in a Paper Fair venue. LINC 2007 was the first LINC conference to invite paper submissions, and the response from over 60 educators worldwide was exciting indeed. The submitted papers covered a wide range of subjects, including papers in such categories as "Technology-Enabled Education in Jordan," "E-learning in Medicine," and "Open Source Innovations." Throughout the four-day conference, keynote speakers and invited presenters mixed and mingled; best practices were shared and new collaborations were established.

It is our belief that these *Proceedings* contain a wealth of information on the state of technology-enabled education around the world today – information unavailable anywhere else. In these pages, keynote speakers and paper presenters alike share e-Learning successes and challenges from their respective countries, all focused on the same objective: to modernize and reform education with the goal of strengthening their nations and improving the lives of their citizens. The spirit of LINC 2007 was well summed up in the following quote of Raul Medina-Mora whose "Enciclomedia" has revolutionized Mexican education in grades five and six:

As a community of educators, researchers, and technologists, MIT LINC 2007 showed us a glimpse of what is possible in the near future: an ambitious goal to bring learning opportunities to everyone through the smart use of technology.

We are grateful indeed to everyone who attended the conference and contributed to this document.

We want to say some Thank-You's to those who made the LINC 2007 Conference possible.

Her Majesty Queen Rania Al-Abdullah of Jordan generously agreed to serve as Jordan LINC Conference Patron. And His Highness Sheikh Maktoum bin Mohammad bin Rashid Al Maktoum, Chairman of the Dubai Technology and Media Free Zone Authority, served as Dubai LINC Conference Patron. We thank them both for their enthusiastic support and personal participation in the LINC 2007 conference. Without their public commitments and the enduring support of their highly professional staffs, LINC 2007 would not have been the success that it was.

Next, we thank all of the attendees who attended either in Jordan or Dubai or in both venues, over 600 in total. This shows the interest in technology-enabled education in the Middle East region and in the world. Thank You to the attendees for making the time in their busy lives to share several days with us and to share their interest and expertise in technology-enabled education. We all learned from each other.

And Thank You to over 50 professionals who created papers and prepared presentations, all the papers now available in this proceedings. LINC Presenters: Thank You!

There are many financial sponsors of LINC, and we thank them all: first, the company whose charter Platinum \$100,000 donation launched LINC 2007 and made all of this possible, led by Dr. Milad Sebaaly, UKS: Universal Knowledge Solutions. Milad and UKS we thank you; Academia Management Solutions International (AMSI), Alpha-Creative (both Silver Sponsors); Pfizer Corporation, Intel, The Municipality of Amman, The Sloan Foundation of New York, Jordan Telecom ("Orange") – all Bronze sponsors; and local donors: Jordan Social Association of Retired Servicemen and Veterans; Philadelphia Tourist Transport Co., Information Technology Association of Jordan; our tireless and superlative event organizers - Hermes Arabia led by Bashir Daoud; our local academic host: The University of Jordan; and our distant academic host: MIT.

In Amman, there was the hard-working LINC Jordanian Organizing Committee, chaired by Dr. Said Jahama (General Manager E-Learning Arabia) and co-chaired by Ms. Rana Abuzeid Qubain (Country Manager Jordan, Universal Knowledge Solutions) and with Honorary Chair Dr. Senator Adnan Badran. In addition to Dr. Badran, there were two additional Honorary Members: His Excellency Dr. Khaled Toukan, The Jordanian Minister of Education, and His Excellency Ahmad Al Imyan. The regular members were: Prof. Ahmad Abdel-Aziz Sharieh, Acting Dean, King Abdullah II School for Information Technology, The University of Jordan; Dr. Mazen Alougili, Associate Professor, Political Department, Mutah University; Professor Al-Zoubi A Y, Electronics Engineering Department, Princess Sumaya University for Technology; Dr. Mohammed Ali Akour, Educational Technologist & Psychologist, Computer Education Department, College of Information Technology, Al al-bayt University; Ms. Luma Atallah, Jordan Education Initiative; Samir Bataineh, Professor Dean/Faculty of Computer & IT, Jordan University of Science and Technology; Dr. Hanan M. Ibrahim, Head of the Regional Operations Unit, Enhancement of Quality Assurance & Institutional Planning at Arab Universities, United Nations Development Program; Hania Maraqa, Senior Master Planner, Amman Master Plan, BearingPoint Jordan; Yousef Torman, Executive Director, Jordanian Universities Network (JUNet); and Dr. Mustafa Yaseen, Dean - Faculty of Information Technology, Al-Ahliyya Amman University. Thank you all for your wonderful work in Jordan! In particular, Dr. Said, Rana, Dr. Badran, we could not have done it without you.

With a bi-located international conference, organization was more involved than usual. To address this issue, LINC 2007 also benefited from a Regional Organizing Committee, chaired by Dr. Milad Fares Sebaaly, CEO – Levant Region, Universal Knowledge Solutions, Dubai. This committee had three other officers: Nada El Marji (Deputy Chair), Director, Sales & Marketing, Universal Knowledge Solutions, Dubai; and with Rouba Chidiac, Executive Assistant, Technology World Company, Beirut, Lebanon and also with Jocelyne Haddad, Administration Manager, Middle East Centre, Manchester Business School Worldwide, Dubai. The regular members of the Regional Organizing Committee were Dr. Kholoud H. Alnajjar, College of Education, Public Authority for Applied Education and Training, Kuwait; Dr. Mohamad Baka, Abu-Dhabi Water and Electricity Authority, United Arab Emirates; Fawzi Baroud, Notre Dame University, Louaize, Lebanon; Dr. Eesa Bastaki, Dubai Silicon Oasis Authority, Government of Dubai and Chairman - IEEE-UAE; Dr. Haissam Haidar, Balamand University, Lebanon; Dr. Ali Kandari, Kuwait University, Kuwait; Dr. Fouad Mrad, American University of Beirut, Lebanon. We thank them all, especially for all the great work they did in organizing the Dubai Executive Session part of LINC 2007. Finally, the Dubai Executive Session did not have the services of a professional event organizer, so special thanks to all on the Regional Organizing Committee who pitched in to make it a success. In addition, we'd like to thank Edwin W. Rayess (Regional Manager, JSS Foundation, Dubai Knowledge Village) for his numerous hours of dedicated work to make this all happen in Dubai.

Finally, there is the MIT team, of faculty, students and professional staff who have contributed countless hours to the planning of LINC. In particular, I'd like to single out the MIT administration for their support, represented at LINC 2007 by MIT Chancellor Phillip L. Clay. And to my assistant, Ms. Patty Eames who answered thousands of emails and undertook scores of other planning activities. To my former assistant who has become an untiring LINC volunteer, Ms. Carol Sardo. Our MIT lawyer for LINC who had a 'Can-Do' attitude to make things happen, Ms. Richelle Nessralla; and last but certainly not least, the editor of the LINC conference proceedings for LINC I, II and III, and who with her tireless dedication has in effect become Associate Director of LINC, my wife, Elizabeth Murray.

Richard C. Larson, LINC Founder and Director July 2008

Richard C. Larson Engineering Systems Division Founder and Director of LINC MIT

I am delighted that LINC is taking place here at the King Hussein Bin Talal Convention Center On the Dead Sea. As you may know, the official Opening Ceremony takes place later today at 12:00 noon in the presence of Her Majesty Queen Rania of Jordan, esteemed patron of LINC 2007 in Jordan. At that time, we will have official welcoming remarks and the framing of the LINC Conference.

Now I would like to take this opportunity to say a few thank you's to those who have made this conference possible. First of all, it is all of you who are present here today, and I think that once everyone gets off the busses and gets here sometime this morning, our records will show that there are over 400 registrants for the conference - by far the largest of the four LINC conferences that we have had! So thank you for making the time in your busy lives to share these days with us and to share your interest and expertise in technology-enabled education. We will all learn from each other. Many of you have expertise that we would like gain, and hopefully we can share best practices.

We have over 50 submitted papers and prepared presentations. These are available on CD's that can be obtained outside in the hallway. Also available in the hallway is a list of last-minute cancellations and schedule changes that you may want to see. So of course, we want to thank all the LINC presenters for working very, very hard in meeting the deadlines and getting their LINC papers in. Those papers will be presented in the eight parallel sessions – four this afternoon and four tomorrow afternoon.

Next I want to thank the LINC Jordanian organizing committee chaired by Dr. Said Jahama and co-chaired by Ms. Rana Qubain, and with Honorary Chair, Senator Adnan Badran, plus ten additional committee members, most of whom are here today. We could not have done it without the Jordanian Organizing Committee, and I would like to have a round of applause.

There are many sponsors of LINC because putting together a two-country conference such as this takes lots of time, energy and financial resources. We thank all of the sponsors including: AMSI, Alpha Creative - both Silver sponsors; Pfizer Corporation, Intel, the Municipality of Amman, Jordan, the Sloan Foundation, Jordan Telecom (sometimes know as Orange) - all bronze sponsors. We also have had local donors such as the Jordan Association of Retired Servicemen and Veterans, the Philadelphia Tourist Transport Company, the Information Technology Association of Jordan, and our tireless event coordinator, Hermes Arabia, led by Bashir Daoud. Of course, I want to extend a big thank you to our local academic host, the University of Jordan, and to our distant academic host, my home, MIT in Cambridge, MA.

However, last but certainly not least, let me salute the company whose platinum donation launched the LINC 2007 Conference and made all of this possible, led by Dr. Milad Sebaaly of Universal Knowledge Solutions (UKS). To Milad Sebaaly and UKS, we offer a huge and heartfelt thank you for making all this possible.

Finally, there is the LINC team of professional, faculty and volunteer staff who have contributed countless hours to the planning of this conference. First, I would like to single out the MIT administration for their support, represented here today by MIT Chancellor, Phil Clay. Next is my assistant, Ms. Patty Eames, to whom many of you have emailed several dozens of times. Also there is my former assistant, Ms. Carol Sardo, who has come back to LINC to help out with the conference in a major way. I don't want to forget our MIT lawyer for LINC, Richelle Nasralla, who has a can-do attitude that helps make difficult things happen. And last but not least, let me thank the editor of the Conference Proceedings for LINC 1, 2, and 3, all of which are on our LINC web site as PDF downloadable files, who with her tireless dedication has in effect become the associate director of LINC - my wife, Liz Murray.

With that, we are ready to begin the conference. Remember that this is not the real Opening Ceremony but kind of a pre-Opening Ceremony. Now we will move on to Panel #1 for a discussion of best practices by the rectors of several renown virtual universities from various parts of the world.



# OPENING CEREMONIES OF LINC 2007

# **CONVENED IN JORDAN AND DUBAI**

### Dr. Ahmad Majdoubeh Professor of English and Dean of the Faculty of Arts Director - Office of International Relations and Programs The University of Jordan

Your Majesty, Queen Rania, Patron of the Conference, your Excellencies, honorable guests, esteemed participants, university professors and school teachers - welcome to the MIT LINC 2007 Conference on Technology-Enabled Education, which will be yet another milestone in the history of eLearning. The presence of so many active stakeholders, scientists, scholars, researchers, education and business leaders, university professors, and yes, school teachers and some students, and the momentum of this immense intellectual capital are vital indeed for the positive change this event is intent on achieving. Since its establishment in 1865, the Massachusetts Institute of Technology has alone done very much for New England, for America and for the world. With international partners, from our country, our region and beyond, MIT, which through eLearning, is opening itself to the globe as in no other time before, will certainly do a lot more. Alone we survive. Together we thrive.

Welcome to the Hashemite Kingdom of Jordan where technology-enabled education and education at large is not only developing as in no other time before, but also progressing and prospering in many respects, due to the profound vision of His Majesty, King Abdullah the Second and to his meticulous follow-up strategies and due to Her Majesty, Queen Rania's tireless efforts and unwavering determination to inject vigor and vitality into our educational system, and I should add, glamour and meaning into the lives of those involved in it, through launching and lending support to extremely pertinent, creative and timely educational initiatives. It is significant to mention in this context that Her Majesty's visit to MIT in May gave a big boost to efforts to hold this significant conference in this part of the world.

Once upon a time, Boston - a city established by immigrants - was proudly referred to by its founders in 1630 and by others later, as a "City upon a Hill". Today, due to the presence of MIT, Harvard and other fine universities and schools, it still is that city. Similarly, under its founders, the Hashemites, Amman, which is often referred to as a city of immigrants, is also a city upon a hill. In fact, originally there were seven hills! What MIT and Massachusetts have done for America and the globe with respect to education and knowledge, Amman, which includes the University of Jordan, at the foot of whose hills we are meeting today, has done a lot and is doing a lot for the country and for the region, with respect to education, information and peace.

Our first speaker, deputizing for His Majesty the King, and for the Minister of Education and Higher Education and Scientific Research, who is on an official mission outside the country, is Secretary General of the Ministry of Education for Education and Technical Affairs, Professor Tayseer Al-Nahar, who will provide us with a picture of some of what our Ministry and universities have done in this sphere of technology-enabled learning.

#### Dr. Khaled Toukan Minister of Education and Higher Education Hashemite Kingdom of Jordan

Remarks presented by Dr. Tayseer Al-Nahar Secretary General of the Ministry of Education for Education and Technical Affairs

Your Majesty, Queen Rania, esteemed Patron for LINC 2007, distinguished guests, conference participants, colleagues and friends. Before beginning the address, I would like to convey the sincere apologies of His Excellency, Dr. Khaled Toukan for his unavailability to make these opening remarks today due to the fact that he is in another commitment. He has asked me to convey his message of strong support for the event and for your deliberations. It is a pleasure and a great privilege for me to deliver on behalf of His Excellency, Dr. Khaled Toukan.

It is a great pleasure to welcome all of you to this important gathering at this time when we in the Hashemite Kingdom of Jordan have made significant strides in the development of ICT based business ventures and the infusion of ICT as a tool for learning and education. Under the inspired and visionary leadership of His Majesty, King Abdullah the Second and Her Majesty, Queen Rania, and based on the outcomes of the Vision Forums in 2002, expansive and visionary programs of educational transformation have been initiated at the basic and secondary education levels through the Education Reform for Knowledge Economy Project and the Jordan Education Initiative, both of which have contributed in concert to the considerable progress of the development and implementation of a renewed curricula with the inclusion of Blended eLearning in a number of key subjects, such as Mathematics, Science, Arabic, English as a foreign language and ICT. At the same time, the Ministry has actively pursued connectivity to schools, purchase and deployment of a large number of PC's and laptops, renovation of computer and science labs and multi-purpose rooms to support eLearning and eTeaching, and we have also invested heavily in the training and re-training of teachers for the new curricula, ICT skills, new pedagogical methodologies and assessment strategies. In international tests, Jordan students scored very well in relation to the Arab region in 2003, and the preliminary results of PISA 2006 are very encouraging.

In general terms, the curriculum has been renewed to become more relevant and conducive to the needs of students in terms of general and specific outcomes that are based less on knowledge and content and more on the skills and competencies of activity-based learning in the modern world. At the same time, we have consciously sought to insure a balance in the curricula with our historical and cultural setting and our values, beliefs and traditions.

In higher education, we have also taken a number of significant steps with respect to the implementation of technology-enabled learning through a renewal of the entire technological infrastructure and initiation of several important innovations in a number of programs in several universities. It is important to note that an overall strategy has been put in place for the higher education sector. From 2007 - 2012, the overall aim of the strategy is to make the sector more relevant in programs, processes and products and hence more competitive both regionally and internationally. One major component of the

program is devoted entirely to technical and technological education, within which the expansion of eLearning is a key element.

Throughout the LINC 2007 Conference and the various sessions, we look forward to hearing about similar experiments, ventures, ideas and approaches in the context of ICT and eLearning as well as continuing to share our experience with experts and colleagues. Exploration, innovation, testing of new ideas and implementation for sustained change and improvement is not just an imperative; it is a defining principle of the integral spirit and purpose of education for continuous learning and for the eventual success of everyone's individual contribution to the progress, growth and stability of civil society and the economy.

I wish to extend my sincere appreciation to the organizers of the event for deciding to hold it here in Amman and for all honored and distinguished guests and participants for making the commitment to be here. I also wish to thank my friends and colleagues from MIT, my alma mater for their efforts. And finally, and very importantly, I recognize out loud Her Majesty Queen Rania for the privilege of her royal patronage and wholehearted support.

Thank you very much.

#### Dr. Phillip Clay Chancellor and Professor of City Planning MIT

Your Majesty Queen Rania, your excellencies and distinguished guests. It is with great pleasure that I am here representing MIT. MIT is delighted to have been present at the creation of LINC, and we continue to treat it as one of our major contributions to education. I am appreciative of the leadership that Professor Larson has shown as I am appreciative of the work of other members of his planning group.

Education is an important issue in all of our countries, and the urgency of education could not be any stronger than it is now, and it will be stronger as the years pass. It goes without saying that telecommunications and communications technologies will play a critical role in making the progress that will be so critical in the years to come. But what I want to say now in the wake of statistics that are sometimes difficult and resources often being scarce, that there is an existence proof that this kind of initiative—represented by educational technology and communications technologies—that these kinds of programs do work.

So I want to share a personal story that will give you some reason to understand why I feel passionately. I grew up in the southern part of the U.S. in the 1950's and 1960's. That part of the country at that time was much behind the rest of the country in terms of education. And some of you will remember that it was during this period that the U.S. found itself in great competition with the Soviet Union after the Soviet Union had launched Sputnik.

There are a number of things that were done to move our country forward, but one of the things that was done was to use education technologies and communications technologies—the one at the time being cable television—to bring first class education to areas that did not have it. And I was one of the students in a place that did not have it! I can remember the great experience three times a week going to lectures from the university in biology and history that were designed to move our part of the state into a leadership position with the rest of the state and with the country.

Now I did just fine, but I want to emphasize those things that were meaningful to me then, that you might find powerful now. First of all, I had the opportunity to have the best instruction available at the time. The faculty members who were teaching these courses to all of the students in high schools in rural North Carolina were among the best teachers in the state. They were master teachers, and we were told that we were all getting the same exams—so an A wherever you were, was an A; it was not an A in the country versus an A in the city—it was just an A.

Second, I understood and I was always told that education is the great leveler. Education is the way for persons to rise to their own levels against a common standard and to demonstrate their useful roles in society. Accordingly, this program was affirming to a poor country boy who somehow thought that the folks from the city were smarter. It was

also an affirmation that anyplace could be in the mainstream of education. All that was needed was to bring the mainstream to whatever stream students were found!

And finally, this training was a connection to the broader world. I left that course feeling that I was as well prepared as anyone, irrespective of where they were located. Technology was a way of taking what was below standard as a way of moving us to the standard.

Those compelling experiences to me and to the 1960's remain compelling today. So I am grateful that I can be a part, and that MIT can be a part, of an activity that seeks to make this promise of education available to students all around the world. I will speak this afternoon in more detail about this, but I want to thank Queen Rania for being a patron for this important initiative. And, I want to thank all of you from wherever you come in the world for your assistance in advancing this.

When Queen Rania, and later Princess Sumaya, visited MIT, we were very excited about the deep understanding that they expressed about the challenges facing education in this part of the world. But more than that, we were impressed by their commitment to be agents for change. We appreciate that support and we appreciate the opportunity for us to gather here in Jordan.

Thank you very much.

### Dr. Khalid Al-Karaki, President University of Jordan Amman, Jordan

Remarks presented by Dr. Dia-Elddin Arafeh Vice President for Development, Planning and Quality Assurance University of Jordan

Your Majesty Queen Rania, honorable and distinguished guests, colleagues and participants, ladies and gentlemen. I have the great honor bestowed on me on behalf of the President of the University of Jordan, Professor Khalid Al-Karaki, to speak here today and to say a few words to this foremost and imminent group of experts in this gathering of the Learning International Networks Consortium Conference, LINC. On this note, I should mention that LINC is **bold** in its missions and aims. It is the result of an initiative from MIT to provide quality education apart from the geographic boundaries through the usage of computer technologies. This conference, which is the fourth in its series, is held for the first time in the Middle East. It provides an excellent opportunity for all to share experience and gain useful insights into the business of e-learning for the new economy. The program for this year, with its theme, "Technology-enabled Education: A Catalyst for positive Change," focuses on international cooperation between countries in e-learning, open learning resources and technology. This vision is no less clear today. Our combined efforts and joint commitments, co-operations and technology transfers to be used in education equip us well to address the global challenges of tomorrow.

I am obviously pleased to see that the University of Jordan has been chosen to be the host for this conference. The University of Jordan was first to be established in 1962. It is now one among the 10 public universities and 15 private universities in Jordan. At present, there are 18 faculties, 13 scientific centers and 1200 faculty members offering more than 250 programs to 38,000 students, of whom 12% are graduate students. The international dimension is increasingly important, and the diversity of the university includes 77 nationalities with foreigners at 10% of the student body. The university is involved in expertise projects, scientific and technological research, and provides training for experts as well as auditors. The diversity of the fields and programs at the university allows students to get high quality, comprehensive and professional education in high competency-recognized fields.

Ladies and gentlemen, the contribution at this conference from different universities and schools within the Kingdom reflects the deep commitment of this country to international development and collaboration in the increasingly important field of distance education. The global enterprise-wide initiatives enable endeavors to create new values in the new economy, as the success of business and economics hinges on how well they can leverage ICT technology, knowledge, skills, creativity, and insight to induce social and economic development and create new wealth.

To this end, allow me to express my deep appreciation to Her Majesty Queen Rania for her great efforts and support of education and for serving as patron of this conference. I would also like to thank those who have already devoted so much time to this process and who have worked so hard in organizing this conference. I wish you success in achieving the objectives of the conference. Have a very good day, and God bless you all.

### Dr. Richard C. Larson Engineering Systems Division Founder and Director of LINC MIT

Your Majesty Queen Rania, esteemed patron of LINC 2007, distinguished guests, LINC conference participants, colleagues and friends. Welcome to MIT LINC 2007! We thank you all for coming from near and far to spend these days with us. At latest count, you --- the LINC participants present here today, represent 35 different countries! We are honored to have each and every one of you here with us, as we learn from each other over the days ahead.

LINC's credo is this: "With today's computer and telecommunications technologies, every young person can have a quality education regardless of his or her place of birth". Bringing quality education to underserved communities, especially in developing countries, can be truly transformative, and in many parts of the world, networked computers are facilitating this transformation. It is possible that the Internet's ultimate big success story will be worldwide access to quality college-level education. So it is fitting that the theme of LINC 2007 is "Technology-Enabled Education: A Catalyst for Positive Change."

It used to be that a nation's wealth lay buried beneath mountains and plains, in the form of gold, silver, diamonds, oil and gas. In today's information-rich world, a nation's wealth is buried between the ears of its citizens. Some of the most developed countries today have very few natural resources other than the knowledge of their highly educated citizens.

Most countries in the developing world cannot afford huge "brick and mortar" investments in higher education. They need a far less expensive way to bring quality education to their young people. The problem extends beyond money. Often 30 to 50 percent of a developing country's population is under 25 years of age. Such population surges have overwhelmed traditional colleges and universities. Qualified professors are far too few in number, and decades are required to grow their ranks.

The solution is the Internet, providing worldwide educational content that can be easily shaped and adapted for local use with local teachers. MIT has provided leadership in offering such educational content, providing free-of-charge the contents of its 1,800 courses. MIT has extended this revolutionary OpenCourseWare (OCW) initiative to video content as well, providing over 400 video-on-demand lectures by famous and not-so-famous people on *MITWorld*. And some developing nations – including Mexico, Pakistan and China – are leading by doing higher education via the Internet.

So that everyone can share best practices in this emerging yet fragmented field, MIT has decided to hold this international conference on e-Learning in a center of change itself – the Middle East. During these next few days, MIT's Learning International Networks Consortium (LINC) will hold its annual conference in Jordan and Dubai, its 4<sup>th</sup> conference and first held away from MIT. LINC is an all-volunteer effort started at MIT in 2001, with a focus on e-Learning and – more broadly – technology-enabled education in developing countries. LINC participants are leaders from industry, governments,

foundations and universities. We are thrilled and honored that Her Majesty Queen Rania is Patron of LINC in Jordan. Jordan now has a special computer called a 'Mirrored Server' containing all of MIT's OCW content. Building from Her Majesty's recent visit to MIT, the intention is to create additional "mirrored servers" at other universities in Jordan and to explore additional cooperative initiatives as well.

The Dubai portion of the LINC conference will be an Executive Session, focused on strategic directions, with Patron, His Highness Sheikh Maktoum bin Mohammad bin Rashid Al Maktoum, Chairman of the Dubai Technology and Media Free Zone Authority.

Today we have with us many professors from Jordanian universities. We honor your presence and we hope to learn much from you. Could you please all stand up? A round of applause please! You will hear many papers from these distinguished professors, relating to technology-enabled educational initiatives they are undertaking here in Jordan.

Our young people are so valuable to us, to our future. Her Majesty has shown her commitment to young people. Their success in pre-college education is critical. High school graduates are the inputs to our colleges and universities. Their commitment to learning is established years before they enter college. In that light, we are also thrilled to have many Jordanian high school teachers with us here today. Could you please all stand up? Another round of applause please! You will be hearing about one of Jordan's major educational investments, the JEI – Jordan Educational Initiative.

The list of countries participating is long, including speakers from the extended Middle East – reaching from Algeria to Pakistan, from the U.A.E. to Turkey. And, from further away, speakers from China, Kenya and Mexico are describing their e-Learning programs.

What will be reported at the LINC conference is path breaking. Consider MIT's "I-Labs," where a student at an under-equipped African university can set up a lab experiment on her Internet browser, press 'Return," and have the actual experiment performed at MIT, with results emailed back on an Excel spreadsheet. Or consider the Virtual University, "Monterrey Tech," Mexico, which has optimized the pedagogical model for Internet course delivery and in so doing has garnered dominant market share of e-Learning throughout Latin America. The list is long, and time here is tightly limited. But the direction is clear: developing countries are leveraging the vast multiplicative capability of the Internet to bring quality education to their peoples. Ultimately, we will all be richer --- in so many ways – as a result.

Could it be that a shared urgent interest in education might offer other benefits as well? Some of the true treasures of the United States are its resident research universities, where students from virtually every country on the planet attend classes and do research – in total harmony. Might it be that e-shared educational resources across international boundaries could replicate some if not all of this collaborative, peaceful vision? Only time will tell. But today we are here, collaborating, as one step towards this vision...

I would like to conclude these opening remarks with two brief lessons in physics. The first I will do, live, using PowerPoint. The  $2^{nd}$  is different. I want you to judge.



# PANEL ONE

# **VIRTUAL UNIVERSITIES**

#### The Role of Distance Education in Opening Opportunities in Developing Countries

Ing. Patricio Lopez del Puerto, Rector The Virtual University of Tecnologico de Monterrey Monterrey, Mexico

Today I want to talk about what we have done at the Monterrey Institute of Technology or "Monterrey Tec" as we call it in Mexico - in using technology, especially to help the poorest people of our country. First of all, however, I would like to give you a glimpse of who we are so that you can better understand just what we are doing. Monterrey Tec is a private institution based in Monterrey, Mexico, in the northeast part of the country. We are privately funded and independent of any political or religious affiliations. We have no governmental support, but are supported by twenty-six non-profit organizations around the country, and our 556-person Board of Trustees is the "Who's Who" of Mexican business people. We have grown from the original campus in Monterrey to many locations in Mexico – Mexico being approximately two million square kilometers in size.

Over the past sixty-four years, we have developed four different kinds of educational systems. We have our traditional system, which includes 33 campuses with over 8,000 faculty members and more than 90,000 students. In this system, we offer the traditional face-to-face education and we offer the same curriculum that you could find in any fine institution around the world, at the undergraduate, Masters and Ph.D. levels. Many years ago, because of our wide geographical dispersion, we decided to try to provide quality higher education, especially a Masters degree education, for our own faculty in the 33 different campuses. To achieve that goal, we began what today is called the Monterrey Tec Virtual University. In its eighteen-year history, the Virtual University has gone through a series of transformations from being a Masters degree program only, to offering undergraduate, high school, continuing education and social programs. I will devote part of my presentation to discussing how the Virtual University has grown and what is happening in that university today.

Then, just this year, we decided to go to the lower end of the economic spectrum in Mexico and we created a network of social incubators that we group together into what we call the "Institute for Sustainable Social Development." This initiative is just beginning, and we are not yet through one semester - but we believe that it will grow pretty rapidly. We already have 19 centers up and running and plan to have 100 going by late 2008.

So what I have described to you is the Monterrey Tec system as a whole. However, first, just to give you an idea of the importance of Monterrey Tec within Mexico, I am going to talk about its 33 campuses and its impressive alumni. Nineteen percent of the CEO's of the 200 largest corporations in Mexico are Monterrey Tec alumni. Also, twenty-five percent of the state governors in the country are Monterrey Tec alumni. We do not know whether this is good or bad, but that is a fact! Sixty-eight percent of Monterrey Tec alumni own their own businesses or work for a family business twenty years after graduation. Thus, you can see that we have a significant entrepreneurial spirit, fueled by a compulsory entrepreneurial program that every student has to take. The alumni statistics I cited are the result of this program. Finally, these alumni numbers are especially impressive in light of the fact that Monterrey Tec provides only three percent

of higher education in Mexico. It does have a very good representation, and I think that we are recognized as the leading private university not only in Mexico, but perhaps also in Latin America.

Every ten years, Monterrey Tec redefines its mission as an institution, and when we do this, we have to take into consideration what our students and what our alumni are doing. For 2005, this is how the mission reads:

### We want to educate people

- With integrity, high ethical standards, and a humanistic and social science perspective
- To be internationally competitive in their professional fields
- As citizens committed to the development of their community's well-being

Having this as a mission, we had to find an educational model based on that mission that would allow us to accomplish it. We decided to incorporate not only what we already provided for our students – that is, professional skills and global competitiveness - but we also had to develop in them ethical attitudes and values, leadership and entrepreneurship, an international perspective, and a social responsibility and humanistic perspective. As you can see, this is an ambitious mission, and we have tried to put all of these elements together in our students through a series of programs that I am going to talk about. Unfortunately, I do not have time to discuss them in depth. But these are the types of programs that we have put into place in order to accomplish the goals of the mission statement.

One thing we soon found that needed to be changed was the educational model. As you know, the traditional educational model in many of our countries was, and still is, a teacher-centered model in which the professor is at the center of the educational experience, and the students simply move around him or her. In this model, the teacher is the one who has the knowledge and will transfer it to the students. We have found that this model does not work, especially when you want to develop higher skills. So we moved to a student-centered model in which the faculty member is very important but there are other resources that are available for the students to use and to learn from. So the students play a much more active role in this approach.

We have found that when you move into a more constructivist approach to learning, you get a higher attention rate and greater interest from the students. For this reason, we have tried to move all of our educational systems to this more constructivist approach in which we can engage the students through peer teaching, practice, discussion groups, demonstrations, etc. At the same time, this approach has less lecturing, reading or audiovisual presentations. Studies have shown that with those more passive presentation approaches, one can only hope for a retention rate of 5-20%. For example, if I were to give you a quiz after this talk, you would probably only retain about 5% of what I have said because we are not engaging in a more active discussion approach, which we will probably do later in this meeting.

At Tecnologico de Monterrey, how we use the technology depends on what we are doing. In the Tec's traditional educational system, we have a series of resources, such as: the library; discussion groups; classroom sessions; as well as some specialized software. The students interact with all these resources, as well as with the faculty member, mainly via electronic facilities, even though the faculty member may be in the same building or room. Now moving from the traditional educational system of the university to the Tec Milenio system, the model is a little bit different. Tec Milenio is a new system that provides face-to-face education for students who need to work while they study or to study while they work -- however you want to say it. This educational system in five years has grown very rapidly to 37 campuses, almost 1,000 faculty members and more than 20,000 students so far. In this system, we have a faculty member developing the course and then we have a facilitator actually delivering it. So we have the interaction of the student - usually a lower income student who is working full-time - with a local facilitator who is backed up by all the material developed by the full faculty member at Monterrey Tec.

I will not talk about the Tec Milenio model too much longer, but it is a very interesting model and a very useful one I believe for developing countries. I say this because the traditional role of a faculty member - preparing the delivery of a course and evaluating the students' performance – has been separated into three separate entities. The preparation is done by a "course factory," as we familiarly call it (comprised of full-time Ph.D. people very highly prepared in their disciplines), along with instructional designers, digital designers and graphics designers - all of whom work together on preparing the course. Then the course itself is delivered with the help of a facilitator to the students. This facilitator has not participated in the preparation of the course because he or she does not have the credentials for that and does not participate in the evaluation of the students. That evaluation is centralized, using computer facilities. So as we say, we grade the student and the facilitator at the same time, and the facilitator's grade depends on how well his or her students do on the final examination. We actually sometimes base salaries or bonuses to the facilitator on how well the students did at the end of the semester in this centralized evaluation system. So as you can see, it is a novel kind of educational system that allows us to make high quality education available rapidly and for a very low initial cost. All we need to do when we go to a new city is to develop a new set of facilitators who do not need to have high academic credentials and who can be trained rapidly in the process of tutoring Tec Milenio students.

Now I would like to talk about what we are doing in the Virtual University. I am going to speak quickly about four things here: 1) mission; 2) course design; 3) delivery process; and 4) programs offered. The mission is "to offer quality using innovative models, collaborative learning and advanced information technology, in order to contribute to the development and advancement of Spanish-speaking communities."

We have a large number of people who work to contribute to the fulfillment of this mission. Every course that we design to be delivered by the Internet is made by a team of people led by the professor, but incorporating instructional designers, graphic designers, audiovisual producers, web programmers and support staff. All of these people meet together for about 12 weeks in order to produce a one-semester long course for an undergraduate or graduate program. In order to deliver it, we have the student at the center of the system who is interacting with the tutor, the academic counselor and the professor - but of course the professor may have a thousand students so he may not have time to have an interaction with each student. However, there is one tutor for every 25 students, and they are somewhat like T.A.'s in the U.S. They are the real people that work in this learning process. In addition, we make available to the students a number of

learning resources -- technological resources such as multi-media, online discussion groups – and all of these are set up along a technological learning platform. We use several platforms that are commercially available. And of course we have to deliver all the ancillary services like administration, registration, etc. also on the Internet.

The programs that we offer include undergraduate courses, graduate courses, continuing education programs, and social development programs. The undergraduate courses that we offer are mainly for our own consumption. That is, if we have a very good faculty member on one campus, we use that technology to take this faculty member to a different campus using the technology. And for this, we sometimes use our own satellite delivery, linking all of our 33 campuses. So we can have the professor and the tutor remotely located, while the facilitators are local on every campus. The students interact with different technologies and they also receive the professor's links or transmissions using satellite delivery. That is how one of these courses usually takes place. Also, we have some language courses that are fully on the Internet, without local facilitators.

At the graduate level, the model is slightly different. These courses are fully and only online. We offer 12 Masters degree programs in which both the professor and the tutor are in contact via the Internet with the student - who is of course an older student in the Masters degree programs. There is an academic counselor that helps the students move through the institution and through all the technological services available to them in order to acquire the knowledge. What we are offering these graduate students from Monterrey Tec are Masters degrees in the most common disciplines and some that are not so common but are very popular, such as the Masters in Ethics. Also, there is a large number of elementary school teachers in Mexico taking the Masters degree in Education or in Educational Technology. We even have a PhD. degree program in Educational Innovation that we teach online. We have some joint and dual degree programs with leading universities, mainly in the U.S. Thunderbird University is the leading university in international management, and we have a Masters degree in Educational Technology with UBC in Canada. We are currently working to secure collaboration with the Arizona State College Masters program in Innovation and Business Development and with the Carnegie Mellon Masters program in Management of Information Technologies.

In the Continuing Education Programs, we offer two approaches. One is a Corporate University approach, which is a system through which we help organizations to align their training with their business goals. This approach covers a series of standard topics that might be required by these organizations to develop meaningful skills and knowledge in their employees.

In the Social Development Programs, we offer several programs for the poorest people in our country. Some years go, we noted that we are really good at teaching the more wealthy people in Mexico using technology. We wondered if we could do the same for the poorest people in the country. We were discouraged at the beginning. People said that could not be done, but we proved them wrong. It can be done and it can be very successfully done! We have a high school program that we teach from Monterrey, and the distant students of this high school program are tutored by Monterrey Tech students. Our Tec students work as online tutors with students in remote communities that are enrolled in the high school program. We have other social programs in which we may not necessarily have any of our Tec students serve as tutors, but the online students are tutored by a group of people who work for us.

So just what do we offer in the Social Programs. We offer programs for different entities around Mexico, including national development educational programs, programs for elementary school teachers, for school managers. There is a series of courses that are fully online, and we have close to 300,00 educators enrolled in this series of courses - Mexico being a large and diverse country. And one very good thing about this series is that we have a multiplicative effect because once a teacher gets trained, they can take care of other teachers. For example, some of them go for Masters degree programs while others go through professional development programs. We make what we call "Academies by Discipline," so that teachers share best practices with each other with the help and coordination of a number of them who have completed their Masters degree program. The net effect of this is that you can very soon reach an improved quality of education delivered by a large number of teachers via a relatively low number of teachers who have enrolled in a Masters degree program. Similarly, for public officials, we offer courses on topics we think they may need to learn. In this area, we have a large number of programs, some offered with the help of the World Bank.

Finally, I would like to discuss the Community Learning Centers. These are centers spread around the country, and also outside Mexico, to teach the very low income people. The current number of these learning Centers as of yesterday is 1896. Most of them are in Mexico, but we also have 142 in the U.S. and 25 in other countries in Latin America. This is because poor Hispanic people are not only found in Mexico. The Community Learning Center Program is a big effort to access very isolated villages in Mexico. These villages have satellite delivery, (Internet only, not video), and we are offering courses for the family, for the children, and for the parents. It is very rewarding to observe that after these people discover the Internet, they come to see themselves as belonging to a larger population, discovering just how big the world is. The living conditions in these isolated places are very difficult. In one of these places, the most difficult thing to negotiate is to give us a bucket of water every day so that the people will wash their hands before using the keyboards. For them, one bucket of water was really too much to give because of the scarcity of water resources in some of these areas. So this is how we reach them, with a series of programs. The web site for these courses is: www.cc.org.mx It is not easy to reach all these isolated populations, but we believe that the effort has worked. We have had a lot of experiences with this and we have made a lot of mistakes. However, we are willing to share the experiences and the mistakes with you, whether you want to avoid some of the things we have done wrong or take advantage of the things we have accomplished with all these projects.

# The African Virtual University: Working with 27 Countries, across Boundaries and Language Barriers in Anglophone, Francophone and Lusophone Africa

Dr. Bakary Diallo, Rector African Virtual University Nairobi, Kenya

Good morning. I am very happy to be here this morning to talk about the African Virtual University (AVU). I began working with AVU two years ago, and it has been six months now that I have been rector. AVU was a concept created by the World Bank ten years ago to enhance distance learning in Africa. The plan of my presentation is as follows: 1) a discussion of AVU; and 2) a focus on Open Educational Resources (OER) at the African Virtual University – the successes, challenges and future direction of OER in Africa.

As just mentioned, AVU was initially launched by the World Bank in 1997, ten years ago. AVU has been supported by the World Bank, CIDA, Ausaid, DflD, AfDB as well as other foundations. During the past ten years, the AVU has gone through different periods in its development. The first was 1997-2002, during which period all technology and content was delivered from the World Bank in Washington. In 2002, AVU moved to Africa and became based in Kenya where the headquarters are located. Then in 2005, we set up a regional office in Dakar, Senegal in order to better serve West Africa. Now the organization is focused on sustainability. It has been a funded project for ten years and now it has to be a sustainable organization.

So what are our assets at AVU? Our greatest asset is the ability to work across borders and language groups, in Anglophone, Francophone and Lusophone. Lusophone, referring to Portuguese Africa. This is a unique capability and a unique experience. As you know, after colonization, Africa was divided into small states, and now Africa would like to foster regional integration through education. AVU is ideally suited to assist with that integration.

We are currently working with the largest network in Africa of Open Distance and e-Learning, which we refer to as ODeL. We are established in more than 27 countries and we work with more than 53 partner institutions, mainly universities and higher education institutions. At this time, we are working mainly in Sub Saharan Africa – west, south and east Africa. Northern Africa will be our next step, and we are currently speaking with educators in Egypt and Libya about this collaboration. Just yesterday, I was talking at the conference with Professor Nabil Sabry from the French University of Egypt. We would like to begin working with that university.

Because we are now moving toward organizational sustainability, we have recently revised our mission. The AVU mission is:

To facilitate the use of effective Open Distance and eLearning (ODeL) methodologies in African tertiary education institutions.

We are actually the leader in Pan Africa when it comes to open distance and e-learning education. We are not a private institution because we are owned by the African states and we are delivering a public service. The expertise that we have developed over the past ten years is as follows:

- Building and managing a large consortia of African educational institutions;
- Designing and implementing multinational education projects;
- Developing African-based educational content;
- Enhancing capacity in African tertiary education institutions (ODeL centers, training, consultancies);
- Developing and implementing Open Education Resources (OER) strategy.
- Delivery of ODeL programs:
  - Degree and diploma programs
  - Short professional courses in computer science, languages & journalism
- Digital library
- Past achievements

- Brokering, purchasing and distributing of bandwidth in bulk for cost effectiveness.

- Coordinating the development of a portal for teacher education in Sub Saharan Africa (TESSA)

The third point above, developing African-based educational content, is very important. When the World Bank initially set up AVU, it used to get all content from different universities in the West - in the States, in Canada, in Australia and in Europe - and deliver them to the African continent. We now want to develop African-based content that fits African needs and is delivered by African universities.

Of course, the main challenge in Africa if you want to do e-Learning is the problem of connectivity. This is the major challenge facing us. Universities could have computers and everything else that is needed for e-Learning, yet many African countries do not have what is required in terms of technological infrastructure for the Internet. Therefore, in order to achieve what we wanted, we had to work and deliver what was needed - in other words, be an Internet provider. We supported that in more than 20 universities in Africa.

We also have considerable expertise in the area of quality assurance for distance learning. Some of the questions that I heard following the previous talk involved the role of the facilitator with the content and how to determine whether students are really learning the material. At AVU, we have a comprehensive program of excellence and quality assurance for each of the courses and programs that we deliver.

In addition, we are engaged in educational policies and in IT policies. In a presentation yesterday by Intel, they talked about educational policy. What was discussed is true in Africa where we absolutely have to mainstream what we are doing through the Ministers

of Education, through the respective educational systems, in order to receive their stamps of approval. This is very important. We are also involved with IT policies because those policies are lacking in most African countries.

Now I would like to discuss the AVU learning architecture. What we have for delivery of OdeL in Africa is what we call a Blended Mode of Delivery. What this means is that we do distance learning and e-Learning always with the understanding that what is most important in Africa is to be able to reach different categories of students – the haves and the have-nots. This is true because we do not want to be just like the other universities, providing high quality courses just for those students who can access the Internet. So what we have is a continuum extending from those students who learn "under a tree", all the way to those students who have high-speed Internet. Therefore, what we do in our mode of delivery is to make sure in the same course, the same program, that all types of students along the continuum can have access to our courses. For example, those students learning "under the tree" may have occasional access to a computer and to the Internet. In that case, we would supplement the online courses or programs with print materials and with opportunities to interact with fellow students and professors at AVU learning centers located at several universities. In our delivery mode, we use print-based, computer-based, email, chatroom, online forum, integrated learning systems, mobile learning, and distributed educational virtual classrooms. This delivery architecture must take into account every type of student – from those within a low technological context to those within a high technological context.

Now I would like to focus on the AVU initiatives currently underway in the area of Open Educational Resources (OER's). Here first I would like to thank MIT for inviting us to participate in various initiatives over the past ten years. Also, since 2005 we have been involved in an initiative with MIT OpenCourseWare (OCW) and we have an ongoing project whose main objective is to raise awareness in Africa about OCW. The main project objectives of this initiative are as follows:

- Raise awareness of MIT OCW;
- Facilitate the usage of MIT OCW;
- Initiate the process of creating African based communities of practice for Open Distance and e-Learning (ODeL).
- Provide research feedback data on the access and use of the OpenCourseWare in the context of an African institution.

Two institutions were selected for the pilot phase of this project in 2005, the University of Nairobi in Kenya and the University of Addis Ababa in Ethiopia. The activities carried out at these universities included: setting up OCW mirror sites; cultural sensitization workshops; OCW awareness campaigns; and access to learning support materials. This project has been ongoing now for two years. In terms of the project's current status, students and academic staff at both institutions continue to access OCW materials for learning and teaching. However, Addis Ababa University has no server to track usage and monitor access of the OCW content, and while the University of Nairobi does have a server, tracking usage and monitoring access is not currently being done.

So what are the lessons learned in this project? Most of the objectives set out have been successfully achieved. Yet due to a temporary logistical hitch, the process of creating African based Communities of Practice for ODeL in collaboration with MIT OCW did

not kick off. We hope that this will be achieved in the future. In addition, the provision of support materials, (i.e., textbooks), expected from MIT was not carried out. Also, there has been no further installation of the mirror sites at any other university in Africa. This is still possible with future cooperation.

Moving on, at AVU we have a conceptual framework and architecture for Open Educational Resources. This is very important. As you know, the OER movement now is so big, and African universities and African educational systems could significantly benefit from them. However, we need to look at how they can benefit. We at AVU do not think it is appropriate just to deliver content to Africa, content that is not contextualized and therefore, does not respond to the needs of Africans. For this reason, we want not only to receive content from elsewhere but also to create, organize, disseminate and utilize OER's on the African content. AVU's OER framework and architecture seeks the development of a dynamic, rational and comprehensive strategy for collaborative partnerships for African higher education and training institutions. The objectives of AVU's OER policy are as follows:

- Facilitate increased participation in the creation, organization, dissemination and utilization of OERs;
- Address issues pertaining to epistemological, ideological, cultural and social relevance for the African context;
- Reduce technological challenges;
- Enable institutions to participate actively so that they drive and own the process in terms of form content, structure and orientation.

To date, we have done quit a lot to improve OER access and utilization in Africa. We participated in the UNESCO International Institute for Educational Planning OER Forum. We held the first AVU Vice Chancellors' Conference in November 2006 in Nairobi Kenya with representation from more than 20 countries. At this conference, we were quite successful in educating participants about OER and sensitizing them to OER issues as relates to the African continent.

Now I would like to talk about our biggest project, which is the AVU Teacher Education Project. It is a multinational initiative involving ten countries - Ethiopia, Kenya, Madagascar, Mozambique, Senegal, Somalia, Tanzania, Uganda, Zambia and Zimbabwe. This project is funded by the African Development Bank (AfDB) and the United Nations Development Programme (UNDP) and has the following objectives:

- Strengthen the capacity of the AVU and a network of institutions coordinated by the AVU
- Deliver and manage quality ICT assisted education and training opportunities in 10 selected African countries

The project hopes to benefit the ten participating countries in the following areas:

- Improve the quality of teaching and learning in mathematics and science through the use of ICTs;
- Increase the number of teachers for mathematics, science, and basic computer science

- Develop and promote research in teacher education
- Promote regional integration and strengthen relevant partnerships with other teacher education initiatives in Africa and globally.

The project will include enrollment of 9,600 teacher trainees in the first year of implementation in ten countries. It will also include the training of 72 university staff members in module authoring for ODeL programs, and the training of 12 staff members in program implementation, management, evaluation and reporting. In addition, there will be development of policy guidelines and curriculum conceptualization for the program. As of today, this project is more than 50% implemented, and we have developed 29 ODeL teacher training modules, with 25 additional modules at an advanced level of completion. In mid-November of this year, we will begin the third phase of the project and complete the training module development.

The links between our teacher training program and the OER movement are outlined below:

- Establishment of a community of practice in Teacher Education working virtually from different countries
- Subject Matter Experts (SMEs), made use of OER during the authoring process
- All authors signed off on the creative commons agreement;
- The future of TE materials as OERs is under discussion with participating universities
- The AVU is managing the IPR on behalf of the participating universities

Finally, in addition to this Teacher Training Program, we are working with the Open University of the United Kingdom on the TESSA Project that also involves teacher education. In addition, we have an agreement with Curtin University to use their online materials for the degree program and business studies diploma materials, and have a similar agreement Utroiversisté the Laval's (Qcompete)r-sciendeine program in Francophone Africa.

Looking to the future, below are what we see as the major challenges to the use and creation of OERs on the African continent:

- *OER Sensitization*: with OER being a relatively new concept, sensitization campaigns should be conducted for the movement to gain momentum.
- *Technological Infrastructure*: availability of infrastructure is still a big challenge and usage of OERs requires access to computers and connectivity.

Marine Fibre Optic cable around the African continent is expected to provide affordable connectivity and bandwidth.

• *Funding <u>OER@AVU</u>*: Initial funding came from Hewlett Foundation, and AVU now requires additional funding for continuity.

- Policies and Licensing of OERs
- Institutional governing bodies africa to articulate a governance structure for OERs.
- Quality Assurance of OERs; Need to adopt stringent peer review process to ensure quality of OERs

We at AVU look forward to continuing our ongoing partnerships with other organizations in the creation and usage of OERs. This includes our work with the Commonwealth of Learning and also with the South African Institute of Distance Learning (SAIDE), our partner in the AVU OER strategy. We also look forward to working with Merlot around creation of the Merlot African Network and with UNESCO in participating in their OER awareness raising network.

Thank you.

#### **Education in Your Bag: Technology Put it There**

Dr. Naveed Malik, Rector Pakistan Virtual University Lahore, Pakistan

A very good morning to all! The theme of the LINC 2007 Conference is "Technology-Enabled Education: A Catalyst for Positive Change." When I looked at this theme, I had to consider the fact that the Virtual University of Pakistan (VUK) has only been in existence for five years and is thus still a "baby" within the academic world. However, in those years, we have had some successes and we do have many lessons learnt - to share with others as well as some practices that we do believe are best practices. Therefore, I thought this would be a valuable topic for discussion. In addition, I would like to discuss the PANdora Project that we have been conducting for the past 2 1/2 years. It is in its third year now and it has been an extremely interesting academic and learning experience for us as far as distance education is concerned in the Asian region.

First I am going to talk very briefly about the issues facing the delivery of tertiary education in developing countries and distance education as a possible solution for the problems. I ask that you bear with me as this discussion will be more Asian-region centric rather than worldwide. We will also identify the challenges for modern distance education, using the example of the PANdora experience. The name PANdora comes from the fact that there was a preliminary study done in the region about the issues facing the introduction of modern distance learning technologies, including infrastructure issues, acceptance issues, credential issues, quality assurance issues, etc. After this preliminary study, the whole thing looked more like a Pandora's Box rather than providing any clear answers, and therefore the project was formulated to look into all of those issues. Following this discussion, I will present the Virtual University of Pakistan model as a case study, sharing the lessons that we have learned.

The basic issues facing us – especially in Pakistan, but mostly in the region – is a lack of capacity in our higher education institutions. If you look at Pakistan, the figure that I probably reported at LINC I was that we had about 3.5% of the college-age population actually enrolled in universities and colleges. Unfortunately, in the year 2007, I cannot say that this figure has improved substantially for the simple reason, for example, that Pakistan is a country of 160 million people. Almost 50% of the population is below the age of thirty. If you look at the college-age cohort, we should have millions of students in colleges and universities, but actually we just have a very tiny fraction of that.

In terms of building new universities - yes, since LINC I in 2003, we have had several new universities come up. However, when you look at conventional institutions, we are talking about a very tiny capacity relative to the need. If you take a look at some of the new universities that have come up, the Lahore University of Management Sciences is an example of a very high quality institution. Yet the total student body is about 5,000 right now, not even a drop in the bucket relative to the needs. Compounding this problem of capacity is a shortage of faculty. None of our universities have a sufficient number of qualified people. The cost of faculty is high, while the quality is quite variable, and the issue once again is that because you do not have qualified faculty, you really do not know what is happening behind the doors of a conventional classroom. Finally, an issue of

concern from our perspective is the fact that the universities in Pakistan are concentrated in the larger cities and towns, which means that access to higher education is also very, very limited.

What can distance education bring to the table? For one thing, it has a huge potential capacity. With distance learning, the capacity of the classroom is not really limited, and technology can be used as a force-multiplier, particularly in terms of eliminating the faculty shortage. In terms of the sustainability question raised by my colleague at AVU, distance education always looks for economies of scale. We look at a large number of students and lower operating costs, and therefore distance education should be much more sustainable. And a very critical aspect is the fact that you can provide a uniform quality of education across the board regardless of geographic location.

So where does technology come in? That is where the title, "Education in Your Bag," comes in. Using technology, and using modern information technology, you can literally provide education anywhere. Last night talking to some of our colleagues at the reception, I mentioned the fact that with our model, you can literally place a person in Pakistan in the middle of a desert and you can have a two-way interaction going on – simply because the technology is now available.

Now to identify some of the challenges to distance education, I will turn briefly to the PANdora Project. It is a three-year project funded by the IDRC of Canada, which is a Crown corporation - so these are Canadian public funds. It involves a unique network of distance education researchers from several countries in the Asian region. These countries extend from Pakistan all the way to Vietnam. We have Indonesia, Thailand, Philippines, Bhutan, Cambodia, Laos, Vietnam, Mongolia and China – everyone is involved in this. And the idea was to look at the distance learning technologies to see what works and what does not work, what is appropriate, etc. The one thing we found out very early in the proceedings – and I think everyone agrees – is that one size does not fit all. You cannot take the Western experience and transplant it into the middle of the Asian landscape and expect it to work. I am sure that AVU has also learned the same lesson, and for this reason, they are now moving on into localization of content and development of their own content.

The model of research in the PANdora Project is very interesting. The Virtual University of Pakistan is the coordinating institution, and in that capacity, we receive the funds from Canada. For the moment, we are not one of the researching entities, but are much more a coordinating and administrative entity. There are nine sub-projects, and each one of those projects must have two or more partners. For example, we have Indonesia working with Pakistan, and Sri Lanka working with Thailand, etc. These nine research projects are looking at various aspects of the distance learning experience. For more information, you can go to the project website and look (http://www.pandora-asia.org). We have several publications in the works and already out. In fact, LINC 2007 is coinciding with the conference of the Asian Open Universities, which is happening in Malaysia right now.

In terms of what this project is looking for, four of the research projects are listed below:

 Accessibility, Acceptance, and Effects of Distance Learning Technologies in South Asia - Sri Lanka, Bhutan, Pakistan

- The Viability of Mobile SMS Technologies for Non-formal Distance Learning in Asia Philippines, Mongolia
- Evaluation and adaptation of Open Source Software (OSS) for Distance Learning in Asia – Mongolia, Sri Lanka, Vietnam
- Best Practices in Distance Learning Technology for Capacity Building in Cambodia, Lao PDR, and Vietnam - Cambodia, Lao PDR, Vietnam

The first one – accessibility, acceptance and effects – is of course critical, and I will be speaking more about that. The second - SMS Technologies for Non-Formal Learning -is extremely interesting. This is more like the pushcart vendor going around with a cell phone in his/her pocket who can receive a short sentence on the cell phone for learning English. This research gets into all the various potentials for non-formal learning with cell phones. The third project also has an implication because I do believe that the founder of Moodle will be at LINC 2007. This Open Source Software project will actually make contributions to the Moodle code base. It has developed two modules, one for SMS and the other for integrated video conferencing - so that you could do a live lecture from within Moodle. You would have your LMS open and you would have a little window, a "professor box" open, and you could talk to students. This has already been developed and will be delivered to the open code base soon. And finally, in an almost forgotten part of the world, we are trying to look at what would be the best practices for distance learning technologies for capacity building in Cambodia, Laos and Vietnam. These countries, as you very well know, have undergone decades of warfare, and there is very little left on the ground. Going there is another experience altogether.

Now let us get back to the Virtual University experience. The salient features of the VUP model are as follows:

- Video Lectures delivered by free-to-air broadcast television
- Internet used for dissemination of content, assignments, interaction
- Formal proctored examinations
- Public private partnerships for infrastructure provision

Our offices are in Lahore where we do all the content development and from where we broadcast the courses via satellite transmission. We do this through Pakistan's first communications satellite. This satellite has a huge footprint that extends all the way from Libya in the West to Bangladesh in the East. Here at the Dead Sea, we are sitting in a hot spot and could very easily receive the transmissions if we had a dish outside. These transmissions are received in what we call "virtual classrooms" located around Pakistan. Yet these virtual classrooms are very real, because they are physical classrooms. The one difference is the fact that there is no professor there. There is a television and a reception facility ad there are computers connected to the Internet for interaction. Interaction between the students and the tutors takes place completely over the Internet. Examinations are conducted formally and they are done at specific times under the supervision of trained proctors.

Now I will briefly go over the rationale, which includes the original concept and now with 20/20 hindsight, what we have learned and how we see that. When we started out in 2002, distance education was synonymous with print material – books delivered by pony express. You do your reading and then you take an exam at your own time and pace.
The authors of the materials are unknown and for the most part, there was very poor acceptability of these types of distance education programs. Here I am not talking about quality, but simply about acceptability. People just did not want to accept a distance education degree. The Virtual University of Pakistan decided to bring big-name professors and domain experts into the picture, even public figures. For example, we had an ex-Minister of Information & Broadcasting actually present a course on the Globalization of Media. In terms of our course lectures, they are developed meticulously. Now this is a one-time event, similar to the previous examples we have heard about from Mexico and Africa. For this reason, we can put all the effort we want into this development process. The result of putting these big-name people right on television - broadcasting them on television so that everybody can see and easily recognize them – meant immediate respectability. There was initially cautious, but eventually complete acceptability of our courses and programs.

Why did we use television? Let us be very practical. In the West we can think of broadcast video over the Internet, but not in our countries yet. Television on the other hand is ubiquitous; even in a tent you will probably see a little generator and an antenna, with a TV running. Thus, with television you can actually reach people because the satellite footprint is all over Pakistan. With television came the ultimate peer review for all our courses. We had nothing to hide since we developed our courses and put them up for everybody to see. This meant that other domain experts could actually hear the presentations of their peers and do a critique of them. We have always been very open to this peer review process. Interestingly, we have not had any negative comments yet.

As it turns out, our courses came to be contrasted favorably against in-class lectures at conventional universities. Here the issue is very simple. What happens behind the closed doors of a classroom remains within the classroom. You do not know whether the professor is feeling tired that day or has a headache. Unfortunately for the students, this professor on TV does not get tired. It is like a road roller experience – the knowledge and the material just keeps coming at you and you either assimilate it or get out of the way. This is something that one could consider a weak point of the model but at the present time there is nothing we can do about it.

In addition to television, the VU model uses Internet for the dissemination of content and for interactions. Again, the VUP and the Internet revolution in Pakistan occurred almost simultaneously. Starting with very, very expensive bandwidth in the year 2000, we now are down to an 80-times reduction of that early bandwidth cost, which has of course trickled down to the consumer. Everything has been opened up. The telecom sector in Pakistan has been deregulated, and an excellent framework has been set in place that is attracting international players. With a country of 160 million people, big telecommunications players are interested in coming in. Therefore, we have infrastructure being rolled out at a rate of cities per second - that is the rate of expansion we are talking about! So Internet is accessible all over the country, and although broadband is not entirely there yet, it is coming. Interestingly, the students that we are looking at for VUP are from a young student cohort that is already familiar with IT's.

Examinations have certainly been another critical issue. Right at the outset, we needed to differentiate VUP from Internet-based diploma mills. So we wanted to make it very clear that our examinations are conventional, that they are publicly held and regulated. As a matter of fact, the staff that conducts the examinations normally comes from other educational institutions in the local area. We have used this examination formality to

establish the worth of the courses and program, and in establishing credentials. Nobody refers to us as just another on line university because they know that the exam system is very conventional.

The rationale behind VUP's public/private partnership allowed us to expand very quickly and to establish a foothold all over the country. The private sector institutions that we partner with provide only the buildings, equipment and connectivity – no faculty. Right now we are in about 68 cities with over 112 so-called "virtual campuses", the virtual campus being an infrastructure-only provision of space – again, no facilitators, T.A.'s, professors or tutors – for the simple reason that at the moment at least, it would be playing with fire because we would not be able to guarantee the quality of the people at those remote locations. Early on, we made the decision that we would do whatever we could through technology but that we would not induct a person with less than perfect credentials into the system. While it is true that support and involvement varies from excellent to poor at these publicly owned virtual campus sites, the VUP student body is exceptionally enabled and they email us immediately if there is any problem with service provision.

Now let us go quickly to lessons learned. We have learned that we cannot do without video lectures, but we do know that students start learning innovatively. They do not wait for the broadcast on television because they also know that these lessons are available on CD's, which are interactive, and also on their computer systems. I have seen them automatically devolve into groups of five or six students sitting together, running a video lecture at 1.5 times the speed because it is perfectly understandable but they can compress it down in terms of time. They might also pause it after ten minutes and have a little discussion among themselves and then continue. In this way, we see that they have evolved their own learning methods. In fact, we are trying to keep up with them and perhaps change some of the materials in terms of making them more interactive, providing some additional technological tools in there.

Now I will turn to another important lesson learned. We have a learning management system, we have HTML content, we have an interactive course web site, etc., but the students still want something physical to read. The simple reason for this is the fact that they do not have access to a computer 24 hours a day. Also, even for those who do, they claim that their eyes get tired looking at a computer screen and therefore they would rather have printed materials.

Another lesson we have learned relates to our virtual campuses. The majority of our students are actually sitting at these campuses so therefore they interact amongst themselves. It is a youngish age cohort so we do not want them to stay in isolated pockets and we do not want a student to be sitting alone at home. We do allow that, but we prefer that they come to a campus and study.

I already mentioned this lesson that we have learned. It is that you cannot transport e-Learning into an environment where the necessary infrastructure is not there. As part of the PANdora Project, we have been aided by the consulting services of Professor John Bagley from Athabasca University, Canada's leading university in distance and online education. Professor Bagley has been living in the region for a year and has found that connectivity is extremely poor. International connectivity is not a usable tool in many of the countries of the region at this time. So one has to worry a little bit about whether we can just take e-Learning and e-Content and plant them down into those countries. It does not always work this way, so we must be very careful. In this regard, there is one final point that is also important. We cannot equate quality and technology. It is not true that simply because I use the Internet, my content is excellent. We all know that this is true, but sometimes we forget and instead get so excited about technology that we do not worry enough about the quality of content.

In terms of how VUP manages large student cohorts, we do not do any real time interaction. Real-time interaction does not scale. Instead, we have worked to empower students to ask questions at any time and offer a near real-time response. VUP has developed special software just for this purpose, with the result that students post questions around the clock – a huge advantage over having to wait to ask! A disappointing lesson we have learned is that students will cheat if they can. In order to limit this phenomenon, distance education systems require constant reviews and revisions, but, unfortunately, cat and mouse games will continue! In this regard, proctored examinations are critically necessary. Also, to deal with cheating, we keep the weights of the Internet assignments low while those of the examinations are kept high.

From our experience, motivation is the biggest challenge to a distance learning environment. How do you motivate a student who is a thousand miles away? It is almost impossible. So at the moment, we are not tackling this problem and are saying – bring your own motivation with you. We have laid out a lavish spread on the table – nice food to eat, nice things to drink - but bring your own hunger and thirst with you. We cannot really take a stick out and say come to class and study. However, when the students do bring their motivation to the table, we have observed real success stories coming out.

A final issue I would like to mention from the VUP experience is the fact that the male to female ratio is not as high as we would like it to be. Most probably this is because we have a split between big town and small cities, which is 50/50. The small towns do not have an enlightened population yet.

In conclusion, I would like to report on how we are progressing. The enrollment has increased steadily for the past three years. Our last class induction was about 6,700 students in September, 2007, and with that we now have approximately a 21,000 student body. Out of this number, about 17,000-18,000 are active, which means they are responding to questions, doing assignments, etc. I believe that our drop-out rate is 27-28%, which is fairly good for a virtual university. Above all, we are pleased with the level of acceptability VUP has achieved already and with the success of many of our students. Top technology companies have hired VUP graduates – and are very happy with their skill sets. Graduates have been accepted by top-tier schools for graduate studies and some are even enrolled in PhD programs overseas!

Thank you.

## The Syrian Virtual University: A Case of Challenges and Successes

Dr. Talal Sheikhalard Director of Research and Development The Syrian Virtual University Damascus, Syria

I will make this presentation on behalf of Dr. Riad Daoudi, President of the Syrian Virtual University. The Syrian Virtual University (SVU) was started in 2002, and our moderator this morning, Dr. Milad Sebaaly, is the person who worked extremely hard to establish this university. By now, we have about five years of experience – five years of both challenges and successes. In this presentation, I will talk about: 1) the rationale for using virtual education; 2) the Syrian Virtual University model; 3) the SVU programs; 4)a case study; and finally, 5) the challenges that we are facing.

So why virtual education? Due to rapid changes in science, technology and careers, there is a huge need for continuous human resources development (HRD) to expand the knowledge base of the workforce. Virtual education facilitates the injection of academic content to update a worker's knowledge and skills. The advantages of virtual education stem from the fact that it employs modern technology and modern educational methods. Furthermore, virtual education is available anywhere and anytime. It allows for a wide range of specializations and enables a student to work and study at the same time, thereby opening the door to lifelong learning.

The learning process at SVU is composed of five components: the student; the teacher; the content; the interaction among these three components; and finally, the assessment and evaluation. In a conventional classroom, there is a major interaction between the student and teacher, yet there is little interaction between the students and the content - since a traditional book is very limited when it comes to interactivity. The major difference between a virtual classroom and a conventional classroom is the fact that in a virtual classroom, there is a strong interactivity between the students and the content. In addition, the role of the teacher becomes that of a tutor and facilitator. The assessment in a virtual classroom is a proctored exam, similar to traditional education, and the assigned projects are similar to traditional education.

As a result of the factors cited above, the virtual university has an integrated environment including students, teachers and tutors. It has virtual classrooms and is similar to conventional universities in that all student activities and tasks can be performed. However, a virtual university has automated electronic administration of the virtual classrooms and a highly interactive content.

The Syrian Virtual University model includes facilities provided to students, such as fast Internet access, along with powerful PC's at our twenty educational telecenters located around Syria, with one in Dubai. In terms of language, we have an Enlgish language preparatory year for students who are looking to continue their studies with our university and we also have academic partners that I will discuss in a few moments. We have also developed our Arabic programs. In addition, when it comes to payment difficulties for students – because for other university partners, their fees are very steep – we have developed our Arabic programs and degrees at affordable prices.

The SVU learning model is composed of e-Content that is located at a Learning Management System Virtual Classroom and is composed of synchronous sessions. We use WebDemo as a tool. We also have asynchronous sessions, which are recorded sessions and asynchronous communication in the form of email. An Assessment Management System oversees all exams, and a Student Information Systems follows the student from registration through all coursework, throughout the period of study. When a student attends a virtual classroom, he or she can, for example, chat with a tutor and use a white board to work on a particular problem with the tutor. Also, students can easily ask questions. In addition, students can re-watch a class session, since the sessions have been recorded and can be downloaded to a student's home computer or to a computer at the learning telecenter.

SVU provides many services to its students such as virtual library, bookstore, telecenters, discussion forums, etc. We also have a virtual community of Arab professors who are available to our students. These Arab professors are not necessarily in the Middle East but are located everywhere around the world. In addition, the Syrian Virtual University has partnerships with different universities including Bellevue University, Ohio University, Baker College Online, Greenwich University, Portsmouth University and Edexcel. Very important is the fact that SVU is fully accredited by the Syrian Ministry of Higher Education.

SVU offers the following degrees:

- Bachelors: BA, BS, BBA, BIT, BGS, etc.
- Associate: AA, AS, APS, etc.
- Masters: MA, MS, MBA, MIT, etc.
- Certificate: undergraduate, graduate, professional courses

A sample of the many SVU programs includes a Higher National Diploma (HND) that, in association with Edexcel, provides in Arabic and English associate degrees in Business and Computing Applications, Internet Studies, Web Development and Programming, Management, Marketing, and General Business. There are Bachelor degrees in IT, Management, Marketing, General Business and English. Degrees are also provided in Information Systems Engineering (ISE), a 4-year, 160 credit-based engineering degree available in ten different specializations. Our newest program this year includes a Bachelors in Economics, emphasizing iBusiness Administration and iMarketing, as well as iBanking. Other new programs for spring 2008 will include a Bachelors in Law, a Masters in Web Technology, a Masters in Technology Management and a Masters in Quality Control.

The Case Study I will discuss now is that of our Higher National Diploma Program (HDP). As a matter of fact, in 2002 there was a huge need in the marketplace in Syria for business and computing applications. Local universities were not able to move fast enough according to the market requirements. Therefore, the Syrian Virtual University developed this HDP program and translated it into Arabic so that we were able to provide it both in Arabic and English to all of our students. Below is the content of the Higher National Diploma Program in Business and Computing Applications:

- 1. e-Business Development
- 2. e-Commerce Technology
- 3. Internet Studies
- 4. e-Commerce Project
- 5. Supply Chain Management
- 6. Website Design
- 7. Marketing for e-Commerce
- 8. E-marketing Processes
- 9. Integrated Marketing in e-Commerce
- 10 Marketing Planning and Intelligence for e-Commerce
- 11. Global Marketplace
- 12. Data Handling and Analysis
- 13. Introduction to Programming
- 14. Programming Principles
- 15. Data Analysis and Data Base Design
- 16. Personal Development

We do have some difficulties in that there is not a satisfactory English level for most of the Arabic Higher National Diploma (A-HND) students. We have found that learning English through a virtual classroom does not improve the communication skills of students, due to poor voice quality of the existing infrastructure. However, virtual education does significantly improve the written English. The advantages demonstrated by this Higher National Diploma case study is the fact that all participating students develop very strong computer and Internet skills, and the fact that all the classes are composed of only twenty students, leading to a rich interaction among students all around the Arab world. Due to the success of this program, there has been a steady increase in the number of registering students. The program has also been augmented by what we call our "Top-Up" Program, operated in conjunction with Greenwich University, which enables the A-HND students to earn a Bachelors degree in Computing, Business Technology or Business.

Now turning to the challenges that SVU is facing, we began in 2002 with only 200 students and now in 2007, we have enrolled 1,500 new students. That brings the current enrollment of students in SVU to approximately 5,000. So, given that we allow only 20 students in our virtual classes, you can imagine how many virtual sessions we have to manage. This is definitely a challenge! Other challenges include iLaw/Regulations and Virtuality (whether a course is accredited in other countries); IT and Security; and staff. A qualified staff in the area of information technology is of course crucial to the successful operation of a university like SVU. Another area of challenge is quality control, an area that we are currently looking at very closely for each program and for the tutoring. We also have begun an awareness campaign to introduce more parents and students to the concept of virtual education. Finally, we are working to develop a

sustainability model that will carry us successfully into the future.

Thank you.



# PANEL TWO

# INNOVATIONS IN TEACHING AND LEARNING

## The Power of the Internet for Learning: Moving from the Promise to the Practice

Zina Karam Partner and Projects Manager Alpha Creative Amman, Jordan

Your Majesty Queen Rania, Your Highnesses and Excellencies, distinguished guests, ladies and gentlemen, Good morning. I would like to take this moment to thank you and MIT for this opportunity and for hosting LINC 2007 in Jordan. This is a major stepping stone for Jordan and the Middle East concerning learning and its advances. I am sure this educational experience will be beneficial to all of us attending today.

My presentation, which probably won't exceed 10 minutes, will cover eLearning, eLessons and some questions to be considered when discussing these topics. I will also outline Alpha Creative's recent Pilot Project with one of the major K-12 schools in Jordan and the obstacles that we have faced.

Let us start with the eLearning definition. Effective, enhancing, empowering, and relatively easy, that is actually eLearning in a nutshell. Still, the term "eLearning" has many other interpretations, the one that is most aligned with our mission is based on the Open and Distance Learning Quality Council in the UK, defining elearning as "The effective learning process created by combining digitally delivered content with support and services'. As you can see, this definition highlights four main components: 1) effectiveness in insuring a successful learning experience; 2) benefiting from the elements of the Information Communication Technology and combining it with pedagogy delivering the blended learning; 3) digitally delivering the content via offline media, online, or streaming it over the internet; and 4) eLearning as a supportive tool for helping tutors, facilitators, and course coordinators deliver their curriculum.

To ensure a successful implementation of eLearning, one must look over five major stages. Number one is "Developing elearning vision"—so far, the Jordanian Government has developed eLearning vision on a national scale. Next comes the 'learning and teaching strategy for eLearning"—at this stage, the organization, curriculum, environment, and resources (to name a few) are identified. "Elearning ICT strategy" then follows—in which the hardware, software and the physical resources are identified and prepared for this strategy. The forth stage "Plans and Budgets"—are prepared in order to decide on the needed implementation, stages, schedule and the financial implication of it. Last but not least, the "Review"—in this stage, the implementation is reviewed on a periodic basis in order to check the results and progress of the project emphasizing on where we were, where we are currently standing and where we are heading. As you can see, we have highlighted the eLearning vision since it is the major starting point for adopting a successful elearning implementation... so allow me to elaborate more about the vision.

The eLearning vision consists of three major points. Whether from engagement to motivation, eLearning enhances the learning outcomes. In addition, it manages, organizes and distributes information more effectively as it is known to be a supportive

tool for all learning advances. Finally, extending learning beyond the classroom, eLearning moves from the traditional teaching into distance learning.

At Alpha Creative, we have concluded that the corner stone for eLearning is eLessons. To begin with, an eLesson (the electronic lesson) is defined as "transferring the classical text book into an electronic medium". These elessons are animated learning materials which are produced on a multimedia scale and play a pivotal role in delivering teachers' thoughts in a more visualized and effective way that accelerates the learners' learning experience.

Statistics say that 82% of students use personal computers, while 67% of them use the Internet very heavily. Seeing that we are living in the  $21^{st}$  century, and the revolution of the information technology is booming, these eLessons help students work and learn at the same time and at their own pace.

The objective of eLessons is based on the educational objectives while still facilitating the process of building connections. For that, eLessons online materials should be presented in a way in which they reduce cognitive load, while increasing retention and problem-solving transfer.

In order to grasp the essence behind the objectives of eLessons, one must understand its features. Elessons consists of 4 main features; 1) because such technology is geared to different types of learners, eLessons accommodate these different styles by a variety of delivery methods; 2) learning can happen at any time and any place, giving the students the ability to study at their own pace, without any restrictions; 3) it is cost effective for both entities; and 4) it fosters greater student teacher interaction and collaboration.

Seeing that the eLessons are a part of the revolution of the ICT, it would be useful to mention the benefits they may present to both the learner and the teacher. As a learner, especially in the case of children, experiencing a new and unusual way of learning provides a medium of amusement. E-lessons add that missing flavor into the daily learning routine and make it fun as well. Most importantly, they can restore the confidence some might have lost in the classroom. As for teachers, it also adds more flavor to their teaching ways by allowing them to benefit from an optimized lesson plan where they can address the learners' diverse abilities while still saving time and improving the students' learning experience.

Based on all the above, for any entity to obtain eLesson methodology, it needs to address four major questions. These questions highlight—enhancing learning using eLessons, the entity strategy, the curriculum subject, and last but not least, the change management and the ability to adopt such development.

After answering these questions, one must look at the components to ensure a successful eLesson. These components include: network issues—from a communication point of view, hardware issues, security issues—such as authentication and authorization, the intention to learn from both the teacher and student side, and finally, if there is something new to learn.

Currently, Alpha Creative is working on a Pilot Project with the new English School in Jordan delivering for their 8th Grade extended class a variety of eLessons covering Math, Science, and the English language. Most of the lessons, if not all, include a mixture of animation, simulation, assessment, and educational games and tools.

Going into this Pilot Project, we have faced some obstacles from both the Human and technological side. Looking at the human side, the major three obstacles were basically organizational indifference, cultural resistance, and most importantly, change management. On the other side of the spectrum, we also had some technological issues; for instance, the Internet penetration needs to be expanded, the technological support is restrictive and finally, cost retention.

Despite these obstacles that we have faced, allow me to show you some snapshots of our elessons—as you can see, they are bilingual, and the interface is user-friendly—according to the types of audience that is going to use it. For example, we have developed a simulating chemistry lab for all the tests that take time and are dangerous. With this lab, a teacher is able to save time, efforts, and ensure the safety of the students and other teachers, as well as the organization.

The proper education of our youth is a way for us to ensure the prosperity and advancement of the future for both our country and our region. By utilizing eLearning, we can help create a workforce that is analytical in thought and creative in implementation—and this is how we at ALPHA Creative can help you move from Promise to Practice.

With this I conclude my presentation. Allow me to thank you for giving me the opportunity to share with you Alpha Creative's experience in eLearning. For any additional clarifications and demos, please visit our booth in the exhibition area. Also, you are welcomed to our reception at 6:30pm as mentioned in the conference program.

Thank You

Dr. Robert B. Kozma

#### Independent Consultant

## U.S.A.

It is good to be back here in Jordan and here at the Dead Sea for the first time. What I would like to talk to you about today is ICT, Educational Reform and Economic Development. Now many of us all around the world are facing economic challenges and creating new ways of economic development and broad-based prosperity. That is the challenge that we are facing. What I have found is that in traveling to countries around the world and talking to ministries of education, often the economic development rhetoric is used as a rationale for introducing technology broadly in education in the classroom. This tendency is expressed in the policies of a nation. So, for example, in the United States, we have an ICT policy in education, which is aimed at increasing the economic competitiveness of our students. In Ireland, they also have a national policy, which is aimed at increasing the skills of students to increase their economic well being in the future. And of course here in Jordan, there is an ICT policy in education that is coordinated with the Education Reform for the Knowledge Economy and not unsurprisingly, the policy identifies the development of knowledge economy skills, using technology to build knowledge economy tools for students. Singapore also has a master plan for technology, and what they are trying to do with that plan is to help students become more competitive in the future and in a new, innovation-driven era.

However, there are many questions that these policies do not answer, and these are questions that I would like to address today in my presentation. For example, is there a connection between technology and development, not just in education, but generally in society and in the economy? In introducing technology, do we get development? That is an important question to answer if we expect technology to make a difference in education. For that matter, is there a connection between education and development? And finally, is there a way that we can connect technology and education to produce economic and social development? That is, what is the mechanism by which introducing technology into the classroom results in broad-based prosperity? Most of these national educational policies do not address these questions, yet they are the questions I think need to be addressed if what we are going to do is realize sustainable development as a result of using technology in the classroom.

So I would like to explore these questions with you today. One way of doing that is by looking at macroeconomic studies, what economists call "growth accounting." What are the sources of economic growth? One study out of the Organization of Economic Cooperation and Development (OECD) looked at the technology. Remember that in developed countries, in the OECD countries, there was a massive introduction of technology into the business and workplace during the 1990's. What OECD wanted to know was did this contribute to increased productivity. Did it contribute to increased economic growth? What they found, looking at country after country, is that in general, the introduction of technology resulted in a .3% - .8% increase in the gross domestic product. What about education? There was a Harvard study that showed that for each year added to education graduation within a country, there was a corresponding .4% increase in GDP in that country. More importantly, the quality of education made a difference. In other words, higher test scores resulted in 1.0% increase in economic development, in GDP. Knowledge creation and innovation was also very important. That is, what the OECD found in developed countries is that for each .1% increase in investment in research and development, there was a corresponding 1.2% increase in GDP. So there is a very important and powerful contribution of knowledge creation and innovation. Finally, there was also a study that innovative organizational practices resulted in a 1.4% increase in GDP. These include practices such as flattening the organization or increasing collaboration and communication among people within the organization, practices often supported by new technologies.

So what we have with these studies is some reason to believe that the use of technology, improved education, and knowledge and innovation result in economic development. But if we are going to look at the mechanism by which we can use technology in schools to improve education and to contribute to sustainable development, we have to dig more deeply into what it is that causes or supports economic growth. Now economists identify two sources of economic growth. One is *Capital Accumulation*, which is a way of growing your economy by hiring new people, purchasing new equipment, etc. Often this is associated with increased investment, often foreign direct investment, that is attracted by cheap labor. There is a different approach, however, to economic growth, which is *Increased Productivity* of the worker. Rather than hire more workers, you make the workers more productive so that each worker ends up producing more.

Now why is increased productivity a particularly important way of looking at economic growth compared to capital accumulation? Well there are a number of important reasons. First of all, capital accumulation is not sustainable. There are diminishing returns. You hire more and more people, but you do not get the same increase in growth by hiring yet another person or purchasing yet another piece of equipment. So this approach is not sustainable. On the other hand, increased productivity, that is basing growth on improving your human capital, is sustainable growth, and that is really what we want to look at growth that is sustained over a long period of time. This type of growth is the basis for widespread prosperity.

Now economists identify three sources of increased productivity. One is called *Capital Deepening*. One is *Higher Quality Labor*. The third is *Knowledge Creation and Innovation*. I am going to talk about each of these, one at a time. First of all, productivity-based growth that draws on *Capital Deepening* – what do we mean by that? This is productivity that is based on the uptake of new technology. That is, you have a workforce that now has technology skills, are now technology fluent, and are able to use new technologies to improve the efficiency on the manufacturing floor, in the retail or wholesale house, and in the offices. So that is where you get increased productivity – through the efficiency of using technology and the skill that your workforce has in applying that technology.

Productivity based on *Higher Quality Labor* is a bit different than that. With this productivity, you are getting increased growth as a result of each worker being more skilled, more knowledgeable and being able to apply that skill to create value for your product. So each worker is coming at his or her job and contributing additional value because of their knowledge, using it to solve problems that they encounter on the shop floor, in the office, etc.

*Knowledge Creation and Innovation* is a particularly important source of productivitybased growth. This is growth that results from the creation of new ideas, from new products, from whole new ways of doing things that we had not thought about before. So when you talk about the knowledge economy, this is really what you are talking about. An economy based on the generation of new knowledge, of new products and new ideas.

Now why is knowledge particularly important? Well there are several unique characteristics of knowledge that make it an important source of sustainable economic development. One of them is the fact that it is non-rivalrous. What do we mean by that? Well, with any given knowledge, you can use it, and I can use it. There is no sense of rivalry as there is with physical capital. If I have a computer, which is physical capital, I can use it but you cannot use it. So there is a rivalry between the use of that kind of capital. With knowledge as capital, I can use it, you can use it, everybody in this room can use that new knowledge and contribute to economic growth. You can also use it without destroying it. Unlike natural resources, knowledge can be used over and over again and it still retains its value. In addition to that, knowledge can be distributed at a marginal cost. It is very inexpensive nowadays, particularly using technology and the Internet, to distribute ideas broadly around the company or around the world. And finally, knowledge is used to make new knowledge. So knowledge begets knowledge. There is a continuous cycle – knowledge used to increase productivity, productivity resulting in economic growth, economic growth supports additional innovation and then you get new knowledge that creates a virtual cycle of sustainable development. So this is really what we talk about when we talk about not only the knowledge economy, but the fact that the knowledge economy is a new economy. It is an economy that can create sustained development, sustained economic growth.

Now we are at a point to talk about a major theme of this conference: how *does* education contribute to that sustained economic growth, or how *can* education contribute to that growth? What are the kinds of skills that students need in order to create this knowledge economy, in order to contribute to sustained economic growth? And what kinds of changes do we need to make in the school in order for that to happen? Remember, I said there were two forms of economic growth. On the one hand, there is *Capital Accumulation* – you hire new people, you buy new equipment. On the other hand, we have an economy based on *Increased Productivity* – growth that results from increased productivity. Each of these has very different implications for education. If what you are doing is growing your economy just by hiring new people - and by in large we are talking about low-cost workers - education plays a relatively small role in that. You have to have people who are educated enough to fill out an application, to read instructions, to follow standard procedures. But the expectations of an education system for that kind of economic growth are really rather modest.

On the other hand, with economic growth based on productivity, education must be a central feature. With this, what you are doing is developing your economy by developing your human capacity in your country. So, education is central to this kind of sustained economic growth. Now how does that work? Remember that I mentioned there are three kinds of productivity-based economic growth, and these each have different implications for education.

While they do have compatibilities, they have different implications for what you do in schools, in the classroom, with the curriculum, etc. *Capital Deepening* corresponds to an approach that I call *Knowledge Acquisition*. Now this is increasing the productivity of

the workforce by increasing the knowledge of the workers and their ability to apply that knowledge to solving problems. Now that corresponds to an approach I call *Knowledge Deepening*. And finally, *Knowledge and Innovation* - that is growth based on the creation of new ideas - corresponds to an approach to education that I call *Knowledge Creation*.

Now what I want to do is look at each of these complimentary approaches in terms of several factors - in terms of the policy implications, in terms of assessment and curriculum, in terms of teaching and learning, in terms of the use of technology and in terms of the social structures of schools. First of all, remember, Knowledge Acquisition means growing the economy by creating more technologically capable students who can contribute to economic growth by applying technology. But with this approach, the changes in education are really pretty modest. We are not talking about big changes here. We are basically talking about preparing students for the high tech workforce. So we want to increase the quality of education but we also want to increase the technology skills of the students. And this is really the important connection between what is going on in the schools and increased productivity in the workplace. On the other hand, in the case of Knowledge Deepening - that is, economic growth based on higher quality labor you want to prepare students who can add value to the products they produce and the workforce through the knowledge they get in school and their ability to apply this school knowledge to solving problems in the real world - complex, real world problems that they encounter on the job. Finally, the policy goal for the *Knowledge Creation Approach* - as the name implies - involves preparing students for the knowledge economy, where the students are going to be a creative, flexible workforce that can respond innovatively to problems and opportunities they encounter.

The implications that these approaches have are different for each factor in the curriculum and assessment. So the skills that we want students to learn in the *Knowledge Acquisition* approach are rather modest changes from the traditional approach. You have simple procedures and the memorization of facts, but in addition to that, you want students to learn how to apply technology. Assessment is usually done with standardized tests. With *Knowledge Deepening*, you want to focus on a deep understanding of key knowledge, key concepts in the subject areas, with the goal of strengthening their ability to apply these concepts outside of school, to real world kinds of problems. Here the assessment is done by complex, real world tasks. On the other hand, with *Knowledge Creation* you want to focus on innovativeness and lifelong learning. So these are the 21<sup>st</sup> Century skills that we are introducing. There is technology fluency, including real world problems, the ability to work collaboratively to solve problems and finally, innovativeness and lifelong learning skills.

Due to time constraints, let me give you an abbreviated version of this, particularly focusing on technology applications. What you will see in the differences of these three approaches is that technology in the case of *Knowledge Acquisition* is used primarily as a productivity tool. Technology in the case of *Knowledge Deepening* is used to help students deeply understand the knowledge in science, in math, in language, in social areas, and then apply that knowledge to real world problems. So here we are talking about using simulations and multi-media to understand these concepts. Finally, in the *Knowledge Creation* approach, through the introduction of a variety of educational devices, including virtual environments and knowledge building tools, students learn to respond creatively and to create new knowledge and new products.

Finally, let me say that as you ascend this ladder from *Knowledge Acquisition* to *Knowledge Deepening* to *Knowledge Creation*, you have to think about major changes, systemic changes, in education. That is, this change is not going to come about just by introducing technology. You have to think about changes in curriculum, changes in assessment, changes in pedagogical practice and changes in teacher training. What role can technology play in bringing about these changes? It can be the lever for change. And that is what I would like you to think about for the rest of our time together. How to approach technology as a lever for change, as a way to transform education.

Thank you.

## Moving Beyond the Conventional: Educating New Leaders for Transformation and Development

## Dr. Phillip Clay Chancellor and Professor of City Planning MIT

Thank you, and it is good to be back. I again want to thank you for the honor of being a part of this conference. I feel passionately about education as I indicated before, and I am sure that the rest of you feel the same as well. Education is a critical issue for the future because frankly, in my view, it is the only means by which we can reliably break the tether of illiteracy that continues to keep large numbers of young people in economic isolation. Education has the power to transform communities, nations, and individuals.

As much as we acknowledge the potential of education to bring about these transformations, we also have to acknowledge that as metrics go, we are climbing a very steep slope to get to the point where our vision matches the reality on the ground. I do not need to cite statistics—you know your own statistics better than I do—but my concern is that a growing fraction of young people in our various countries are not getting the benefit of education, even at a time when the value of education is growing. Education is the surest lever to prosperity, equality, and the good life, as we go through the 21<sup>st</sup> century. Yet, for a too large fraction, there is no prosperity, equality, and goodness in daily life.

Therefore, I want to spend a few minutes sharing some thoughts about how we might move from where we are to a place where the blessings of education are more broadly distributed. And as I indicated this morning, I believe firmly that technologies in communications and the like will play and can play an important role—not an ancillary role. Indeed, let me say at the outset that I favor a systems approach to thinking about technology and education. There is no single approach to progress; we have to make progress along all dimensions—from elementary and secondary education through tertiary and postgraduate education. Moreover, in each part of this system, we have to use education in an appropriate manner, pulling various institutions and constituencies along so that each part reinforces the other.

As we think about technology, we also have to think about the aspects of society to which education is linked. For example, when we think about industrial development and workforce development, we have to think about the power of technology to contribute educational services to those activities.

I want to suggest that talent is really the central issue of the 21<sup>st</sup> century. And by talent, I also mean the acquisition of knowledge, the enhancement of knowledge, and the application of knowledge to solve problems. Where talent is developed as a resource, people and places will thrive, inequality will be reduced, civility will triumph over conflict, and collaborations will soar. By the same token, when talent is not developed, then the places where the talent is not developed will fall behind. Talent will not exactly diminish the value of oil as a natural resource, and I think all of you understand how oil is

one of the most important resources today. Yet there have been times in the past when other resources have been critical. Salt, tea, sugar, and whale oil have all been very tangible assets that shaped the fortunes of nations or regions. All of those are no longer a big deal. Salt is plentiful, tea is everywhere, and when is the last time anyone used whale oil! We do not have to worry that talent will become an ephemeral asset. As one of the speakers indicated this morning, talent is an especially powerful asset. And as my grandmother used to say, "what is in your head cannot be taken out." She was a wise grandmother!

But Thomas Friedman has recently talked about how the world is flat, how technology has made the whole world venues where talent can be used. A good idea, a bit of analysis, a sharing of best practices—all of these things can move around the globe very quickly and make isolated but smart people wealthy. It can also bring opportunity. Talented people anywhere will become a resource for the users of talent everywhere. While the world is flat, there will be a few places where there are spikes: places and venues where talent is brokered more efficiently than in other places, and where supportive investments are well conceived and sustainably integrated and developed. Those spikes will make good use of social networking and technology to advance an area. There are a number of countries in the world that have invested powerfully over the past thirty years in their educational infrastructure. You may know of some of these places. Singapore and South Korea, for example, have powerfully leveraged their economics by pushing hard to advance education. As powerful as the message about talent ought to be, I am afraid that a passionate, consistent focus on talent is not always present in those places where it would be of most help. And I would include, I am afraid, the U.S. in that point because in my country there are places and there are sub-groups in our population in which we under invest in the development of talent. We waste minds. Consequently, I want to talk in the next few minutes about what it might take to put talent in the center of national development strategies, and I want to urge you to become advocates for these kinds of actions because it is important that educators be among those who step forward first. But as I will indicate toward the end that educators will not and should not be alone.

In moving into this discussion, I want to make three points. First is the point that education is not just about learning and teaching. It is about economic and human development. We have proof that the strategy, which I want to discuss will work. I gave you an example this morning when I talked about my own experience in education. Now it ought not be controversial that people, nations, communities, constituencies will embrace education. After all, all of us want a better life for our children, and we want to see our communities grow. The second point I want to make is that we do not always organize ourselves in a way to make sure this occurs. The final point I want to make is that technology is just a tool. We have powerful technologies in communications, but we must not forget that content is important as is pedagogy.

So what is required of us? The first thing I want to suggest may sound a little strange. I want to suggest that the first thing we have to do is develop voice. Some people will say—as one of our speakers this morning said—"It is about vision". But I want to be specific. Voice is the communication of purpose, of intention, of aspiration. Voice—when carefully done—galvanizes disparate passions and energies and pulls

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people toward a common purpose. Voice empowers and ennobles. Voice becomes vision. For e-learning, it is important to make the case for what it can achieve—not simply by speaking to its technology, but by speaking to the power of an educated people and linking it to great national goals.

Let me give you another example from my history, and it is an American story. Maybe some of you will remember the U.S. in the late 1950's. In addition to the Russians having put a vehicle in space before the U.S., we also had a stagnant economy and politicians wondered what we should do after the quiet post WWII decade. As well, we had a president whose campaign platform had been that we needed "...to get America going again". And when John Kennedy became President, he voiced a grand vision to the American people. He said, "I dedicate this nation to send a man to the moon and to bring him home safely again." Now you might ask what that has to do with e-learning or education. The fact is that that was a clear message for the institutions in our country to conform their institutions, resources, talents, and energies towards a national goal-a stretch goal we sometimes call it-where education is central. Institutions all across the country dedicated themselves to preparing the individuals who would be needed to achieve the national goal. Now the truth is, many of the people who were responsible for getting a man to the moon in 1969 already had their educations when President Kennedy made that statement in 1962. But the vision was so powerful that it set off a host of activities so that getting a man to the moon was only a minor product from the 1960's. The major product was a whole new way of organizing parts of our educational system, directing our energies, conducting research, and linking education to industry and to national purpose.

The second point that I want to mention that I believe represents an important task for us is to think about a plan. It is important to have voice, but it is also important to have a plan. But a plan, as I indicated before, has to take a systems approach so that it is clear how the various pieces fit together. A plan is important to frame a larger scheme because it is the largest scheme that will win you collaborators. And collaborators are needed to make what is sometimes a marginal or minor activity into something powerful and pervasive. There are other important aspects of the plan than this general suggestion that planning itself is important. And that is collaboration. It will be important to find friends because, unless your countries are different than mine, a focus on education is sometimes an after-thought. There is no one who thinks education is a bad idea, but there are many people who neither think that it is the most important thing to work on nor view it as a compelling priority above many other important priorities.

Educators need to step out of the shadows because in too many countries, educators are not necessarily the leaders. They stand behind the political leaders—those who are economic or industrial leaders or those who are military leaders. Educators need to have their own leaders. This leadership will be critical, not only because we need to be there with our voices and with our plans. We need to be there to assert and to protect the prerogatives that will come with developing an educational system, including the necessity that there be a consistent effort—not ebbs and flows in attention to education—that it needs to be a systems approach so that all pieces work together and that the promise of education to lift all to more equal level is not lost.

I want to close with talking about one other thing and that is entrepreneurship. Up to this point, we have talked about vision and planning and leadership, but entrepreneurship is very important as well, and indeed I want to make that my last and biggest point. Up until now, I have talked about education in rather traditional paradigms. We have talked about having a clearer voice and the like. But I think education needs some real invention and some real activity that is outside of the traditional paradigm. Educators need to take new initiative. We need educational entrepreneurship. Entrepreneurship comes from the French word, "to undertake." Even though entrepreneurship is associated mainly with business and enterprise development, I want to suggest that entrepreneurship is as needed in education as it is needed in every other area. We need some initiatives that go outside of the normal paradigm and we need some adventurous and risk-taking undertakings. We need to unleash the creative powers that are present in our people, including people in this room and including people who do not think they have much to offer education. Business and corporations do not own the word "entrepreneurship", and we do not own education alone. We owe our extended hand of partnership with all who will have a good idea and I will remind you of the presentation by our colleague from Mexico this morning. What you saw there were large numbers of instances of entrepreneurship at work, because what he has essentially described is how they created mechanisms to address obstacles that stood in the way of expanding education.

Accordingly, I would encourage you to take the educational entrepreneurship notion seriously and I want to close with a commitment from MIT. We have worked very hard in a variety of ways to take the spirit of our institution around the world. And it has often been very difficult to share the opportunities we have with young people from parts of the various countries that are less wealthy and less well connected.

In closing, I thank you for the opportunity to be here in Jordan. I welcome the leadership of her Majesty in being a Patron for this conference. And I thank all of you for coming to continue this journey in linking education and technology.

Thank you very much.

#### **MIT iLabs: Laboratories Without Frontiers**

Dr. Jesus del Alamo Professor of Electrical Engineering MIT

Well good afternoon and thank you for the introduction. I was not expecting such an introduction! Do not expect me to go out and walk on water sometime today – it is a little bit too hot out there!

Today I want to tell you about a new educational resource that is going to become available online very quickly everywhere, that we have been investigating at MIT and which we call iLabs. These are laboratories without frontiers. As you know, there is enormous educational value in the hands-on laboratory experiences in science and engineering education. Unfortunately, as some of you surely know, conventional labs as we know them are rather expensive and difficult to manage. They have complex logistics and also they cannot be easily shared. Every university must have its own set of labs. As a result, many of us in science and engineering education believe that we do not have enough labs. We would like to have our students have more lab experiences. So iLab is a concept that can really change this situation. And these are REAL laboratories that can be accessed through the Internet from anywhere at anytime, thus providing laboratory experiences for students much more easily.

Here is a list of iLabs that we have been working on at MIT: Microelectronics Device Characterization for Electrical Engineering and Computer Science, developed in 1998; Heat Exchanger for Chemical Engineering, introduced in 2001; Polymer Crystallization for Chemical Engineering, 2003; Dynamic Signal Analyzer for Electrical Engineering and Computer Science, 2004; Shake Table for Civil Engineering, 2004; and ELVIS for Electrical Engineering and Computer Science, 2006. These are all examples of hardware. We engineers love hardware – at least hardware engineers like me. I want to emphasize that all of the iLabs listed here represent REAL labs. These are laboratories set up somewhere, and in this case at MIT, for students to access via the Internet in order to carry out real experiments in real time. We have been working on this project now for several years and as you have seen, we have developed several labs – in Electrical Engineering, in Chemical Engineering and also in Civil Engineering. And we are working with collaborators around the world who are also developing labs in other disciplines. So these are real labs that can be used in engineering and science education.

So how do these iLabs appear from the student's perspective? I will take the example of the Microelectronics Device Characterization lab, which was the first iLab that we created and also the ilab with which we have the greatest experience. I am a professor of Microelectronics at MIT, and this lab was created precisely because in my courses I could not offer my students a laboratory experience. Yet this allowed me to introduce it. So the student sees a computer interface that looks very much like the real world. We use the language of circuits as a way to prepare our experiments, and the data is presented using the conventional way. Through various menus on the interface, you can prepare experiments, you can store them, and you can actually see the data. To enhance an awareness of the reality of the experience, we also show web cams enabling students to actually see the experiments while they take place in real time.

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Now let me describe to you a typical assignment. As I said, this particular lab is about Microelectronics. It is about teaching students how transistors work. In a typical assignment, I will ask students to take measurements on a transistor that has been made available to them. I want them to extract transistor parameters in order to characterize the behavior of that transistor. Then, using those parameters, I want them to construct a model using the equations that have been presented in class and try to study the correspondence of the model to the actual measurements. In this way, they can discuss the nonidealities of the device and perhaps, the inadequacies of the model. And furthermore, at the end of the assignment, I would ask the students to do any other measurements that they might want to do of other characteristics that we might have discussed in class or not formally asked in this assignment. We do this to encourage the students to freely explore this particular physical system at their own pace according to their desires.

From the very beginning, we took quite a bit of interest in understanding two things: 1)how the students use these new educational resource? 2) what is the available capacity in this system? Once it is developed, can we share such a lab with other people? So we have done a number of experiments. For example, in one class we had 100 students enrolled and a particular assignment went out on Friday afternoon and was due the next Friday, at the same time one week later. So these 100 students were off to do the assignment, and we watched to see when they actually did their assignments. So how do you think this distribution looked? We have looked at this distribution in groups of students from several other countries, and they all look pretty much the same. This is something very common about all students, as it seems. The majority of our students wait until the very last night to do the assignment. The peak time of assignment activity was between 1 and 2 AM on the morning of the day the assignment was due. So barely 12 hours before the assignment was due is when the students try to do all their work.

This is very interesting and this has very important implications because you must design your system to operate under these very high peak conditions that you must expect only a few hours before the assignment is due. What this also means is that the system has to work perfectly because if it fails, it is going to affect many students and you will hear many complaints. The second implication is that once you have designed your system to be able to accommodate this peak, then you have all this spare capacity in which your system is not being used. Because of that, we realized from the very beginning that online labs are really meant to be shared and to be shared on a worldwide scale because the Internet allows us to share them all over the world.

So we have been involved now for several years in sharing our labs, in doing a variety of experiments, in which our labs are shared with students and other teachers around the world. We have worked with universities in Asia, in Africa, in Europe and others of course in the U.S. Over the last nine years, since our first iLab was put online, our usage has grown to a point where we have typically served over a thousand students per year using these labs in a variety of courses. Now let me emphasize that this is usage of the labs for assignments in courses for which the students are going to receive a grade. iLab-based assignments will contribute to that final grade. The 5400 students that have used iLabs since 1998 are not casual students dropping in to see what is going on. These are serious students who have been assigned to do the labs and are going to be graded. Thus, this gives you a sense of the responsibility on our side to make these a worthwhile and meaningful experience.

Through these experiences, we have learned that there are really wonderful opportunities associated with iLabs, which I want to summarize for you today. First of all, we believe that through iLabs our students will be able to carry out an order of magnitude larger number of laboratory experiments as part of their education. We also believe that through iLabs we can really create unique labs that are just not possible otherwise. For example, there will be labs that are in unusual locations - for example, the bottom of the ocean or maybe the North Pole. There might be Labs that involve expensive equipment – for example, a nuclear reactor. Or there may be labs that use very rare or dangerous materials - such as, for example, radioactive materials. These labs are not possible in the present, but they would be possible if you could access them online. Also, iLabs will have very rich pedagogical value. For example, through iLabs, the lab is available all the time, and therefore the students have more time to do their experiments. They do not have to be kicked out when their time is up because the next student is coming in - as occurs with a physical lab. They can use the lab online from wherever they want. And also, the graphical interface through which students access the lab will also incorporate a variety of other tools that will have tremendous educational value - such as graphing tools, simulation tools, collaboration tools, tutoring tools - and in this way, make a far more meaningful experience. Finally, we believe that iLabs – because they are meant to be shared – will generate around them communities of scholars that not only will share the hardware itself, but will also share the content. This sharing of the content around these labs is something that we do not quite do today.

Now of course, ilabs also come with certain challenges that we have realized in the course of our work. The first one is that developing these labs takes quite a bit of work. One of the reasons that it takes a lot of work is that the domain specialist – say a person like me in the domain of Microelectronics – has to take a leading role in developing these labs. It is a person like me that in the domain of Microelectronics that really knows the experience we want to offer to the students. Therefore, a person like me who is not a software engineer or a computer engineer must be deeply engaged in developing these labs. As you can see, there is a mismatch of capabilities there. A second challenge is the fact that attention has to be given to user scalability. As I said, the students will all come to use these labs on the very last night before their assignment is due. Therefore, you really do have to give a lot of thought to how these labs will perform when you have a large number of students access them over a very short period of time.

We have also found that managing these labs – once you have made them available to a very large community – is also a lot of work. Sharing a lab with countries around the world, we found ourselves really doing a lot of work on behalf of colleagues in other universities to whom we were lending our labs. We have to manage all the accounts and authentication of all the students, their data, etc. It actually ended up being quite a lot of work, and we felt that this was a disincentive to the sharing of labs that really needed to be addressed. So the key challenge for iLabs really is this scalability: scalability in the dimension of easing the development of a lab and also easing the management of a lab.

Towards this end, we have been working at MIT on an architecture for iLabs that will really make it easy to develop the labs in the first place, but also to manage them in a very efficient way. What we have been developing is a three-tier architecture, containing three parts. The first part is the Lab Server, which basically provides access to the lab through the Internet. The second part is the Client - the interface through which students access the lab. And between these two, we have the third part that we call the Service Broker, which plays a number of key roles. The Service Broker serves the client to the users when they want to use the lab. In addition, it mediates all the transactions of carrying out the experiments and then returning the data from the lab server to the client. And it also performs a number of generic functions, such as user registration, authentication, storage of the data, etc.

This architecture eases the development challenge because when you want to develop a new lab, you only have to develop the Lab Server and the Client, and in doing that you can recycle a number of modules that have already been developed by a number of other people. Once you are done, you register the lab with the Service Broker, and then the Service Broker automatically provides a lot of the user-dependent or user specific generic functionality such as authentication, data storage, etc. Thus, when you develop a lab, you do not have to develop all these generic functionality, which will be available the moment you plug in and register your lab with the Service Broker. Now this architecture also eases the management of the labs. On the Lab Server side, the management of the lab itself has to be done and this management rightfully belongs to the owner of the lab to set up the required lab policy. But the management of the users should actually be done on the Service Broker at the institution where the users belong. For example, if the University of Jordan wants to do some experiments with MIT, a Service Broker can be installed here, and then the management of the students from the University of Jordan can be done on this Service Broker - without having to ask us at MIT to do that detailed management. This certainly seems right.

Also, in the last few years we have taken an interest in exploring the unique issues associated with the use of iLabs in developing countries. It seemed to us from the very beginning that as we attempt to share our labs with the rest of the world, there was really a unique opportunity for us in the developed world to support the educational needs of the developing world at a very small marginal cost by letting students in the developing world use our labs via the Internet when we are not using them. Of course, the opportunities are great because there are very few labs available in the curriculum in science and engineering education in the developing world and because there is a great need for engineers there. The challenges are also great. In addition to those that I mentioned earlier, in the developing world there is typically limited access to network computers and to educational software tools. There is also a limited appreciation of the versatility of the computer as a general purpose science and engineering tool. Finally, there is also limited bandwidth.

Let me now make a few comments about bandwidth. We have been working for several years with several institutions in sub-Saharan Africa. A typical case is one of our African partners, Makerere University in Uganda. They have a state-of-the-art optic fiber network throughout the campus connecting all the academic buildings and many of the student residences, with a maximum bandwidth of 2 Gb per second. The problem is that this network is connected to the rest of the world through a metropolitan network and eventually through an ISP to a satellite. This connection is so expensive that the university can only afford to buy 21 Mb's per second (as of November, 2006). For a comparison, at the same time, MIT had a bandwidth to the rest of the world of around 8 Gb per second. The reason for this disparity is very simple. If you look at a map of the world that includes the submarine optic fiber systems, there are lots of connections between North America and Europe and between North American and East Asia. There are a few connections with Southeast Asia, but there are very few connections around

Africa and South Asia. In fact, one could see that there is no optical fiber system that runs up Eastern Africa, which is one of the problems for Uganda. In addition to this, in the developing world there are limited national networks so even if a landing exists in Lagos, Nigeria, where we also have partners, that landing does not connect to the nation's universities because the optical fiber system in the country is not sufficiently developed. And these same problems exist in various other regions around the world.

Now there are several important consequences of this for iLab, and also for other rich educational resources that are becoming available on the Internet. First, as was mentioned already this morning, it is really essential to deploy educational resources locally because it is only locally that you can access them with enough bandwidth to really make the experience worthwhile. Second, it suggests that solutions that have been engineered in the developed world – for example, at MIT by our students – might not actually work that well in the developing world. So what this really suggests is that we need to engage the developing world in actually developing these tools in the first place for them to be effective. Third, also the pedagogy is likely to be very different in bandwidth-starved situations, and I have observed this while working with our collaborators in Africa. The technology is far less responsive and the ability to engage the student is really very limited. So that means that we really need to operate in the developing these tools to develop them correctly.

Now let me give you an example of just what it means to really develop these tools locally. For example, we have been installing Service Brokers - the piece of middleware that allows students to access our labs at MIT - inside the campus at our partner universities in Africa. For example, with a Service Broker installed at Obafemi Awolowo University (OAU) in Nigeria, the average download time for our applet, which is the graphical interface to the lab, was reduced from 79 seconds to 22 seconds. Now you might say, "Big deal, 79 seconds does not seem to be too long." However, you must remember that electrical power is very unstable, and the networks are also rather unstable. If you can cut down by a factor of four the amount of time that it takes to download the applet, you will greatly enhance the chances that this applet is downloaded without being corrupted. Such corruption would give rise to a very strange and not very meaningful educational experience. In fact, once you install a Service Broker then that becomes a nucleus for the development of labs, as we are trying to do with our partners in Africa. As a matter of fact, the first iLab developed in Africa was done at OAU by Kayode Ayodele for the study of Electrical Engineering.

Now I want to quickly speed up to finish my talk. The future of iLabs is clearly the creation of a consortium to work in a coordinated way with people around the world to develop this resource in a way that enables all of us to share a common design of iLabs. I will close with our motto: "*If you can't come to the lab…the lab will come to you.*" Thank you.

## Experience Implementing a Blended Model of Education at Amman Al-Ahliyya University (AAU)

Mr. Carlos Garcia Higher Education Division Manager Universal Knowledge Solutions Dubai, UKS

Good afternoon. Today we have seen many wonderful examples of technology-enabled education. So the question naturally arises as to what it takes to actually implement these technologies in our local environment here. What I am going to do in the next few minutes is to show you a case study of the implementation of educational technologies at a local university, Amman Al-Ahliyya University (AAU) and share with you some of the experiences that we have had in the process of doing these implementations.

Some of the things we have done as background for this implementation project were to look at best practices in other places and take those lessons into account in this project. For example, one thing we have learned from the wonderful experiences at Monterrey Tech is that the use of strategy as a driver for a transformation in a university is a key element. Essentially, you see many projects that fail, and the root of that is in the fact that people rush to do something without properly planning and looking at the long term consequences of it. Something that has been used very, very well at Monterrey Tech and that we are using as a roadmap is the establishment of a strategy that guides a transformation.

So what has been done at AAU is a series of simple steps to support an educational transformation in the whole institution. The first step that was taken was the development of an academic strategy to map the transformation of education at the university. The second thing was to enlist the support of all the segments, all the stakeholders in the university, and this includes the administration, the deans, the faculty and also the students as well as the technical staff.

- Deans are motivated to improve the quality of education
- Faculty are receptive to methods that will make their tasks more efficient
- Students are curious about the new approaches. Many are "ahead of the university" in terms of technology use

This work does not take a lot of effort, but it is something that is very important - to take each one of these groups and describe to them what it is you are going to do, what are the reasons behind the transformation. You want to enlist their support. And finally, once you have formulated a strategy and reached a consensus on how to achieve this academic transformation, then you prepare a detailed implementation plan to support the execution.

Now in the case of AAU, these are the elements of the academic strategy that was put together. It is simple and straightforward, yet still it can be very helpful in guiding the transformation. The key element of the AAU strategy was the decision to adopt a blended model of education. A blended model uses part online education together with face-to-face education and attempts to combine the best of both those elements to hopefully achieve improvement in the quality of education. Of course, this implies a teaching transformation, and what that means is that the model of teaching has to change;

you have to take the teaching from the teaching-centric model where you have the lecturer delivering knowledge, instead to the learner-centric type of model where the students are taking a very active part in the academic process. These are all basic concepts but it is very important to formulate them, to explain them to the stakeholders and to gain a consensus on what is to be done.

A key element of this model is the role of the instructor because he or she must step aside and become a facilitator of the educational experience rather than a provider of all the knowledge. Essentially the tasks we see for the instructor includes; organizing the course resources; guiding the collaborative efforts of the learners; and assisting the students in self-study. Therefore, part of the implementation plan had to do with a series of tasks that would enable this type of model to be implemented. That means training faculty, holding workshops, doing a series of activities that become enablers to insure that there will be success at the end of the process.

The blended elements that were established at AAU consisted of the online components, controlled by the use of a Learning Management System (LMS). We decided that for a blended model to be successful, an LMS is almost an indispensable tool because it is a system that allows you to post documents online, to handle assignments, to have discussion forums that take place online, to post case studies for students to review, and also to handle some type of assessment. So this is the online component.

Now in terms of the face-to-face activities that are used in the AAU implementation, the local culture has to be taken into account to make sure that things are done in a way that does not conflict with local practices. You cannot jump too far. You need to go step by step. We could not take the step of asking students to have laptop computers and to go online on their own. What the university has done as a transitional phase is to set up a number of PC labs that are available to the students so that they can have access to the eLearning content online at the facilities of the university. They can also have access from home, but this is not mandatory because in many cases they may not have that access. So you want to make sure that this type of computer access facility will be provided. The expectation is that at some point in the future, it will be possible to introduce a laptop based kind of environment that would allow this model to be more flexible. Additional elements of the face-to-face component include supplemental lectures to the online content, discussion of cases studies and other activities of this type.

So these are the two parts of the blended model that is being implemented at AAU. Now for this type of model to be implemented in a successful way, it is necessary to have an infrastructure on the campus that allows this type of teaching to take place. In addition to elements of this infrastructure already discussed such as the availability of eLearning systems and of an LMS, another important element is a portal through which students can gain access to all the online resources. You also need an electronic library as well as the very important presence of a technology support infrastructure. The latter is a critical step because you are asking faculty to make a significant change in starting to use technologies that are not familiar to them. I like to stress this point because this is a hard task for faculty. As it is, they are normally overloaded with teaching tasks. Having to learn these technologies and how to bring them to the classroom. etc. is no easy task.

Of course, since we are talking about technology-supported education and since practically every day there are new things coming online, then one element that must be part of a model like this is the support for emerging technologies. Here I am referring to new things that are coming into the environment that hold great potential to support the education. One of these new elements of the AAU infrastructure involves the use of wikis in the class. For those of you not familiar with wikis, a wiki is a web page that users can modify. They are very useful, for example, to handle student projects. Let us say that your class is divided into six groups of four students each, and each group is assigned a project. You could set up a wiki for the class where each project has a page in the wiki so that at all times you can see the status of the projects. This is something that is very simple to deploy. In addition to wikis, there is podcasting, which is the system of creating either audio or video recordings of events – perhaps lectures or perhaps just short talks. Such recordings can be put online, and then students can download them to their portable players, such as an iPod, for example. That is something that is getting a lot of use in universities and something of which we want to investigate the potential.

In addition to these new technologies, you also need an electronic library as well as the very important presence of a technology support infrastructure. On this score, it is critical that the institution have some kind of organized support so that if there is a problem in the classroom, the faculty will know where to go for guidance, for a workshop around how to deal with these technologies.

Of course, a very important piece in this strategy is the fact that someone has to create the content if you are going to be doing eLearning. Thus, there must be a content management unit that is in charge of these tasks – creating the content, management of the content, deployment of the content, etc. And finally, now that you are introducing all of these technologies on the teaching side, you want to make sure that the administrative aspects of the use of those technologies can be recognized by the administrative systems. Therefore, you need administrative systems that can be connected to the academic systems so that you have a functioning system overall.

None of the elements I mentioned above is rocket science. This is not terribly complicated, but to put it all together and to go through the transformation of an entire institution is no easy task. That is why great attention has to be given to each of the elements, and the planning is fundamental. And again, let me emphasize that planning is the key to the success of such a transformation.

Another very important step that comes with these elements is the redesign of courses. Now that you are implementing this new model, you have to make sure that you redesign the courses for the new model. This redesign has to be total, from scratch. These are not incremental changes that you are introducing to the courses; you really have to re-do the courses. This is a significant effort, and for this reason, you need to do training for the faculty to make sure they know how to re-design the courses, starting with the syllabus, determining what kinds of collaborative activities you will have in your course, and then determining what will be the content of the eLearning modules. All of these separate ingredients make a new course.

One very creative thing that has been done at AAU is the creation of an eLearning Center of Excellence. As you know, we are talking about a transition for the entire institution. So what AAU has decided to do is to set up an eLearning Center of Excellence in which you have the concentration of all these technologies. The idea is that from this Center of Excellence, the new knowledge will radiate to the entire institution. The Center includes:

• A showcase for Academic Technologies

- Pervasive Wireless Access
- Videoconferencing Rooms
- Faculty Support Center
- Video and Audio Production Facilities
- Auditorium for Workshops / Conferences

So what are some of the issues that a project like this has encountered? We are instituting change, and change management is an important issue. An example of what has been the case in a project like this is that a professor says "yes, we are behind this, we want to go with it." However, when you get down to doing it, it is very hard to change the traditional role of the teacher. Take the use of case studies. It is simple to do case studies, but to create new cases is a time demanding task. The creation of eLearning modules is very labor intensive, and the incorporation of new technologies is not as simple as it looks on the surface. One thing that is very important on the project management side is the fact that you need to manage this transition by creating clear projects timelines and deadlines to handle the various elements - thus insuring that things get completed on time.

So this has been the experience at AAU. I think in general it has been a very positive experience. It is a multi-year project that is about halfway through, and it is an example of how to do this kind of transformation in our environment.

Thank you very much.

### **ONLINE EDUCATION: Worldwide and Moving Quickly**

Dr. Frank Mayadas Program Director Alfred P. Sloan Foundation

Thank you all and thank you for staying. I have to tell you that I am aware that I am the last obstacle between you and the coffee break! And I am also the last obstacle between me and the coffee break, which is even more important. So I will try to keep all that in mind as I go.

I am going to take just a few minutes of your time to tell you a little bit about eLearning, mainly from the perspective of the U.S. I will try to give you a snapshot of what is going on and I will try to link it to worldwide issues wherever I can. And I am also going to share with you the perspective of the Sloan Foundation as I talk about this.

One of the things I would like to do is give you a snapshot of online learning today and also where things might be heading. In order for me to do that, I need to take a step back and tell you a little bit about the way American education works and why we have ended up where we have ended up. I think many of you know this but I am just going to remind you. The United States education is extremely decentralized – at all levels of education. Pre-college education is primarily under local control. The Federal government has hardly anything to do with pre-college education and instead, it is all in the hands of local districts. For colleges and universities, the system is also extremely decentralized. That means that there are about 6,000 degree granting institutions in the U.S., and these institutions enroll about 17.5 million students.

So now you have to ask yourself, "How do you get this very decentralized, large mix to march forward?" We have already heard today and we will hear more about national efforts, about national virtual universities, etc. We have nothing of the sort in the U.S. There is no U.S. national virtual university. Given this, I am going to try to give you the American perspective, but even I do not speak for the country since there will always be different people with different perspectives on this topic.

When I started the work at the Sloan Foundation in 1992, we concluded that there were two things we had to do in order for us to drive the country forward in eLearning. One was to energize the different institutions to begin to offer courses and programs. Secondly, we knew that this could not be done if the faculty did not believe in doing it. Therefore, we decided that what always gets the faculty interested in doing something is if it is a high quality form of instruction. Now over the years, high quality instruction has come to mean three things. That is, you give a student the materials from which to learn - it might be software, it might be books, it might be a television program. However, you do more than that. You also provide an instructor, a professor. Yet you do more than these two things on a campus – you also provide other students. And these three elements have traditionally been thought of as what we associate with quality education. We knew we had to do the same things online, and that will tell you why we ended up with the type of model that 99% of all American schools are using today – which as Dick Larson mentioned, is the Asynchronous Learning Model (ALM). With this model, there is an instructor, there are materials and there are other students. Maybe 1% of the institutions will actually give you a degree for some self-learning type of online program,

but other than this 1%, most U.S. online programs use this model. The opportunity we saw in the early 1990's was to offer online the same three elements: materials; instructor; other students – plus, to do it in a way that it would be accessible at anytime and any place.

Now you might ask me,

"If there are so many universities in the U.S., why does anybody care about online? After all, quite often there is probably a university nearby. And what about the asynchronous – where does that come in? Why is that important?"

The answer is that in the U.S. and in the world in general, there is less and less time now in which to learn - while learning is ever more important. The reason there is less time is not because time has shrunk. In the 1950's, the American family typically had two adult members who worked at two jobs – one worked in the home in the unpaid job, and the other worked outside the home in the paid job. That has changed. In the U.S. and in many other places now, you have two adults working at three jobs. They do two paid jobs outside the home, and someone still has to do the job in the home and in the community. This leaves less time in which to study and go to school. So for us, the anyplace and anytime becomes a real imperative, extremely important. It is not just an option, but becomes a must. In addition, modern economies are demanding people – we have heard this many times today - that are better trained no matter what the field, more highly educated and more in tune with high productivity kinds of work. Whether it is manufacturing, services, healthcare – these are much more skilled people who have to stay highly trained in order to keep the jobs they have.

So it was very clear that we had a big opportunity and we had to do something to take advantage of that opportunity. In the early 1990's, we saw the possibilities. When I got the Sloan program started, we had PC's; they were not particularly low cost but they were good enough. At that time, computer networks had appeared, but not the Internet. However, we got started and we thought we could offer the courses over Prodigy or America Online. In those days, the interaction was very, very clunky, and course management software was extremely primitive. Yet it was enough to show that our vision had a reality to it, which is to say that the ALM model of online education - including students, instructor and materials - was going to work and it was going to work asynchronously, anytime and anywhere. This was a very important discovery because we knew that the U.S. economy would reward knowledge and that technology would progress our way - that things would get better. And this is exactly what has happened.

What we have today in the U.S. is a situation in which during one semester in 2006, 3.5 million students enrolled in at least one class online. That is 20% of all university students in the U.S. This shows us that the model is working and that online learning is coming along year to year at 20% growth annually for a five-year growth rate. If you ask any chief academic officer at the universities - and we poll all the chief academic officers in the country as part of the Sloan survey, with about a 50% response rate – they will tell you with increasing certainty every year that online is at least as good and maybe better than a classroom learning experience. In addition, they are now telling us that online is becoming part of the strategic plan of their institutions. So it turns out that things are very much going in the direction we hoped for. This is not about replacing traditional classrooms; rather it is about offering students choices. They can take some courses in the traditional way and others in the online approach. I would just like to report that the

complete Sloan Survey Report is free and available for downloading online at the Sloan Consortium website.

Now that is not all. We find that every kind of institution is involved in online learning, including the private institutions, the public institution, the small colleges, the big colleges and the community colleges. I will tell you that in the U.S., virtually 100% of the big public institutions are involved in online learning – Michigan State. Penn State, Ohio State, and other similar institutions. That does not mean that they are all involved in online education to the same degree; some are doing it less while others are doing it more. For example, the state university system of New York enrolls about 130,000 online students. In the private institutions, the number is much smaller and in the highly endowed institutions such as Harvard and Princeton, the number is very, very small. So the use of online learning has to do with the motivation of the institution as well as their goals and mission. They are doing what is in their own self-interest and while they are doing that, they are providing greater choices for the learners in the country - which I think is a very good thing.

Nearly all disciplines are represented in the online learning programs. You can get a degree in history, philosophy, engineering, health sciences, nursing – all kinds of things. Now obviously, some of these have to be rather elaborate blended solutions because nursing, for instance, cannot be 100% online. Although no one really knows for certain, my guess is that from 3000 to 4000 degree programs are now available entirely online.

At this point, I would like to take time to look ahead and see what happens next. We are going to see continued growth in online learning, and there is no doubt in my mind that we will continue to see this for years to come. It will not stay at the 20% per year level. The reason is that for a long time, new institutions were coming into the picture and offering classes online. Because so many institutions have already joined the online bandwagon, the number of new institutions coming into the arena will slow down. Yet the ones that are in this arena will continue to grow, and we expect that growth rate to be more like about 10% per year.

Blended Learning, however, is going to become extremely important and will become very, very big. Today if you ask, - and in our survey we asked, "Are you blending courses?" - you would get a very small number responding that they are. The reason for this is that most universities do not even know. They do not count the blended courses in their own schools and do not know how many there are, and thus it is a very confused picture. However, eventually blended courses will become extremely important, and I will tell you later why I believe this to be true. However, right now one of the problems with Blended Learning is that it means so many different things to different people.

In this regard, the Asynchronous Learning Model (ASM) is very constant – it includes the three critical elements: instructor, materials, and students. We have adopted a definition for Blending:

"Some portion of each course, between 30%-79%, is online and integrated in a pedagogical manner."

In a case that it is higher than 79%, we would consider it to be fully online. Another important parameter of this ALM definition is that the online portion must offset the classroom time. So if you were having a course that met three days a week, you might now offer some of it online and subsequently, you meet only once a week. If you do not

offset the time, we do not regard it as a blended course. In that case, we would view that you simply piled web material onto what people were already doing and that you have not really reduced anything, but actually made more work for everybody. So these are the two parameters we have for distinguishing blended learning – the blend percentages and the time offset. The reason that I think it is important to consider this definition is that if we do not agree on what a definition of Blended Learning is, then we will not be able to compare results.

Another thing about Blended Learning is that some small universities have felt threatened when big universities offer online courses in their regions. They wonder what effect it will have on them. Will that be a bad thing for them? Our answer is, "Not necessarily." We tell them that they can offer a Blended Learning program. They are better known in their own regions and they will reduce the travel time for students. Let us say that they offer a 50-50 blend; students only need to come to class half the time. These schools can also improve their online services by offering some financial aid and advising online. This also might serve as a draw to bring more students on campus. In addition, more programs can be made available through Blended Learning than through entirely online because the lab portions could be done on campus. Jesus has the best looking online labs I have ever seen, but right now the traditional lab is still a possibility. Certainly in the nursing and medical fields, it makes sense to just blend. There also is the advantage of local advertising. These smaller institutions do not have to advertise their courses on Google and pay all those big bucks. In their own regions, they can use personal contacts, and local media to advertise all the contributions they are making to the community.

Finally, one reason that blending will become so important and so big is that it applies to 100% of the students. I firmly believe that even the students that are traditional students on campus will end up taking blended classes. And they will demand this. We have found that in many, many cases, the students that are taking these classes online are very young students. They are not necessarily working students; they are 22 - 25 years old. These students are quite happy to take courses in a blended fashion so that they have more time to do other things.

I would like to close by giving you a reinforcement that one reason we have gotten this far is that sharing has been tremendously important in driving progress, and I think we are just at the beginning of our ability to share practices. I think this conference is a very good idea about just what can be done in the area of sharing experiences and lessons learned. Yet we could do a lot more. We are trying – we have publications, workshops, etc. and we need to take advantage of all these opportunities to get together to talk about what we know and what we do not know.

If you are going to talk about what you know and what you do not know, it is best to think about these issues within the context of some common assessment or framework. Here I will mention the five pillars that we use at the Sloan Consortium. If you are assessing the quality of a program - in order to ask yourself, "How am I doing? Do I have a high quality program?" - there are five elements that can be measured.

- Access Am I reaching new people?
- Learning effectiveness How do I know students have learned and how do I know they have learned as least as well, if not better, than in a classroom?

- **Cost effectiveness** How do I improve this? How are other programs doing in relation to my program?
- **Faculty satisfaction** If faculty is not involved and satisfied, you will get a low rating and the program will not go anywhere.
- **Student satisfaction** If students are not involved and satisfied, you have no program.

If any of these pillars is missing, then you have lost the program. It will not grow and it will not go anywhere. On the other hand, these give you a rather precise way of having a discussion with any other institution that is involved in online learning. So I think this is an important thing to keep in mind – that we need a framework and we at Sloan have this one. However, we can always change it depending on discussions.

I would like to leave you with a few thoughts on some things that we at Sloan offer in the way of collaboration. We have the Sloan Consortium with its theme of quality with scale and breadth. The membership is free, and we offer publications, online workshops, and conferences. The conference in Orlando next month is an annual conference that will attract about 1200 people and is the largest gathering of people coming together to discuss what they are doing and learning in Online and Blended Education.

Finally, I would like to close by saying that while there has been tremendous progress in online learning since the early 1990's, it is only partial success. Can people really learn anything at any time, anywhere? The answer is no, not quite. We are not there. I believe that the way to move ahead is through initiatives at the institutions and more collaboration and sharing.

Thank you.

## Moodle: Creating Sustainable Educational Communities with Open Source Software

Martin Dougiamas Founder of Moodle Perth, Australia

Good evening. There is a lot I want to cover in a short period of time before dinner, so let us get started. How many people here have heard of Moodle before? And how many people have never, ever heard of Moodle before?

I grew up in the deserts of central Australia and now live in Perth on the west coast. When I lived in central Australia, my school was about 1000 kilometers from my home. As a result, I was doing school on a short-wave radio. Every two weeks, an airplane would come and drop off some papers, worksheets and things, and I would complete them and later send them back. So I did that until I was about 12 or 13 and then I came down to Perth to do high school.

I have a computer science background, and I got into the position of being the webmaster and administrator of online education at my university, Curtin University in Perth, which has about 20,000 students. I became very frustrated in that position because I was working with commercial software and here I was with a computer science degree – able to fix the commercial software, able to connect it with our other software packages and able to fix it to serve the needs of the academics I was working with. I was ABLE to do all these things because I was a computer scientist, and that is why I was in that position. However, I was not ALLOWED to make those adaptations because it was proprietary software. Therefore, I was stuck on the phone to Web CT support – which certainly was a different mode of doing things and very frustrating. I was working with academics and trying to actually get this product to do what they wanted it to do. As a result, I decided to go and build something on my own, and it would be Open Source.

I did a Masters and subsequently a PhD researching Online Learning from an education point of view. After a while, Moodle 1.0 arrived in August 2002 – just about five years ago. It is an acronym, in case you are wondering where the name came from: Modular Object-Oriented Dynamic Learning Environment. It is a course management system, a piece of software that provides a dynamic web site for participants to use. They are all participants in an institution or in any kind of community. First you need to have some sort of Authentication. Most institutions will not let everybody off the Internet into their space. Moodle is very good at connecting to other systems to do this. If you already have a list of people in a data base, Moodle can connect to it, and those people can get into the Moodle space with the same username and password that they use for the school network or email, etc. So once you have people in there and you know who they are, you can give them Roles. You can make them teachers, or students, or supervisors, or managers, or course designers, or parents, etc. Furthermore, you could be a teacher in one course and a student in another. It is all very flexible. With Moodle, you also have Activities and Structure. This is the "meat' of this nut, if you like. Activities and Structure are what enable learning to be facilitated. Usually teachers are creating the Activities and Structure, but that is not always the case. We will be talking more about this. Then you have **Content**. For me, content is one part of learning and although it is an important part, for me it is not a major part. And then at the end, you have some sort of **Assessment**. You will have some grades coming out – whether formal or informal.

The mission of Moodle is to make what is already so powerful – the Internet – accessible to teachers. As we all know, the Internet is an amazing thing. However, it is not much good if the software does not make it easy to use, easy to push those bits and bytes around on the network. So we are trying to make something that teachers can use easily and that helps them to facilitate real learning, transformative learning, deep learning, rather than simple rote learning – memorizing facts and regurgitating them on a quiz. We want this to be learning that will actually help the students change their lives and make the experience fun at the same time – or at least enjoyable, if not fun. Why shouldn't learning be enjoyable? Why shouldn't your work be something you actually want to do?

With Moodle, we have a very strong pedagogical focus. This focus is based on the research that I was doing for my PhD., and I have boiled my readings all down to a few key points:

1) All of us are potential teachers as well as potential learners. As soon as you start thinking this way, you open yourself up to collaborative environments where people can be learning from each other. You immediately start to get away from the view that I am the teacher, I have all the knowledge and am transmitting it to all the students, filling their heads up like buckets full of water.

2) You learn particularly well when you are making stuff, when you are creative, and this is true especially if you are making something for other people to see. If you are just alone creating something in your own room, it is not as effective as when you know others are going to see it. This is the reason for the popularity of blogs, for example. They are very powerful vehicles for reflection in the public space. You get a lot of feedback and thus you really think about what you are doing. That is a powerful learning experience. So creating things when others are seeing it is a very good thing. This is learning by doing, and it is not a new idea.

**3) We learn a lot just by observing the activities of our peers.** If you are in a group of people, and they are all doing things a certain way, we tend to do it that way too. It is the nature of human beings that we group into clubs, associations and countries – all kinds of things because that is culture and that is what we do. If you have a certain culture in your club, people will start learning things almost by osmosis.

4) If we understand the context of people, if we know about their backgrounds, where they come from and what they already think, it makes the conversation you can have with them a lot more relevant. Knowing this context, then your teaching is going to be a lot more appropriate, and you will be teaching what they need to learn, rather than what you need to teach. This is constructivism, the idea that people are constructing knowledge in their heads.

5) Any kind of learning environment needs to be flexible and adaptable. The environment in this room is flexible and adaptable – we have loose chairs. If we were going to get serious here, we could arrange the chairs in different ways. We could create all different sorts of environments here, thanks to the looseness of the chairs. At the moment, we are very much set up in a lecture format, and that is what we are doing.

So these are the ideas that I try to keep in mind whenever I have to make a decision about Moodle. I also try to promote these ideas to all the developers working on Moodle. Just a
little aside: What is the single, most powerful technique for Online Education? Say we boil down those ideas a little further, down to a couple of words. Of course, this is in my view. "Asking good questions." This is nothing new. You know, I was going back through the Western research, all the way back to Socrates – ancient Greece, Socratic questioning. This is what it is all about. He discovered that teaching technique and wrote about it at length. The idea that you ask questions that promote thought is a very old one and a very powerful teaching technique. However, it is asking good questions, not just any questions, because asking good questions makes the questioner think about what is a good question – thus he or she is learning at the same time. So take that away with you and think about it in your own educational environments. What good questions can I ask? And really watch that process happening and you will find great things happening.

There are many things we have learned in watching people use Moodle as it continues to be a research project that is just getting bigger and bigger and bigger. One thing we have found is that the first way people use Online Learning is that they start off by putting up resources. They start off with just plain content. They have some handouts or some textbooks that they are already using and they put that material on the Web. And that is a good first step for getting into Online Learning. From that point, there is a kind of progression that I find people tend to follow, and the more they follow this progression, the more they start to accomplish the types of things I was talking about earlier. So maybe the next step is adding a **Forum**. Perhaps it is just a passive forum, just sitting there. Here is a forum, guys, you can use it of you need to ask me anything - just use the forum. That is better than saying just use email because if a student asks a question on a forum, another student may answer it - and then the teacher will not need to be involved. So if I have a class of 200-300 people, they may already be starting to teach each other straight away through the forum. However, a lot of those forums will fail because students are very scared to post sometimes, and you need some facilitation, which we will talk about.

The next things that are added in this progression are a **Quizzes and Assignments**. Everyone knows quizzes. You have a bunch of questions and you can get some results. Sometimes people get really heavily into quizzes and questioning, and you can have very complicated, adaptive quizzes and all kinds of fancy grading techniques, etc. So these are just one tool in our tool set. Then there are assignments – when the teacher asks the students to give him/her something and then they are graded on it. There are lots of different variations of assignments. It is much better to have all of your assignments in an online place where you can just click with a mouse rather than having a big stack of papers next to you. Perhaps you have several classes, and at marking time the desk is just covered with too much stuff.

We also have other tools in Moodle. We have a **Wiki** module, which is for collaboratively building pages. We have a **Glossary** tool where students can collaboratively build definitions of the things in their course. The words they build become hyperlinks everywhere else in the course. For example, if someone has defined "social constructivism" in the glossary in week #1, everywhere "social constructivism" is mentioned – in the forums and in the wikis – there is a link back to that definition. In this way, the students start building up the course and the content themselves. In addition, we have a **Data Base** that does something similar, but is more structured.

So again in this progression, people might start using the forum more seriously, they may actively start engaging with the students, questioning and thinking about bringing people

together and things like that. Next a teacher might combine the course activities into **Sequences**. That is, taking the results of the first activity and put it into the next activity. This way, you make the whole course a learning design, a journey for the students. With such sequences, the things that the students are creating are directly affecting the next things they create. This is when it gets really fun because the students are part of the game - they are part of the whole journey - because you are adapting to them as you move through the course. Now this probably sounds like a lot of work to some of you. However, once you get used to it, it actually isn't and you are removing a lot of work and giving the students a really good, complex experience to bite into and learn.

Moodle has a **Survey** module for surveying the students on various things. We have some proven survey instruments, which help you get a deep understanding of how people think about one another. They can anonymously answer questions about how they are engaging with one another and with the teacher, and there are graphs you can drill down to, etc. The **Workshop** module is for peer-assessed assignments. Then, some of the people who really get into Moodling start sharing some of their ideas. These people are in a process of active research, improving their own teaching practice because they are reflecting on what they are doing with all these tools. Also, they are listening to their students and seeing how they could do it better next time. The result is a change in learning designs. As they move through this process for a particular subject, the sequence of things they are doing starts to settle down, and they have a **Learning Design** for that course – which is like a lesson plan but more detailed.

With all of these tools and this progression, we have a basic concept. If you take people and provide the right software tools, you can create a strong community – ideally, with some facilitators in there. It is a community of teaching individuals; the individuals are learning from the whole community, not just from one person. And the whole community is helping to improve the tools that you are using. So this is how the course improves over time. Now this process of improvement works not only for the course, but for the Moodle project itself because we have a lot of input, and Moodle is responding to what the community wants from it.

Open Source means that literally the source code of software is open, that you can view it and modify it. So there are licenses, and I have the over all copyright for Moodle. But because I have given an Open Source License, this means that everyone has the right to copy it. Without this type of license, normally copyright means that you cannot copy it and you are not allowed to change other people's code. Open Source means that the Moodle software is not only free, but "Free" with a capital F. This means that you are allowed to change it, do a whole lot of things to it, re-name it, give it to other people, etc. You do not need to pay for it, you can change it, you can help design and fix it. We have a lot of people doing just this. We have a lot of people looking at the source code and this brings security and performance. For example, say a university is using Moodle and they have a big bug causing their online educational system to run slowly. They have IT people - just like I was at my university - who have computer science degrees and who can look into it and say, "Oh, it is this bit of the code." Then they let us know, and we fix it. Everybody benefits. This is happening over and over again, all the time. It is happening precisely because it is Open Source. First, people can see the source code and second, people really want to contribute because it is Open Source. People are just not inclined to contribute to commercial software, thinking, "Why should I help them?"

However, if it is Open Source, people will get into it. This results in there being various different types of support available at different levels.

Moodle runs on a completely open platform. All you need is some hardware and you can build the entire server for free. It can be run on pretty much any environment – Apache, Mac 06, Linux, Oracle, etc. This open platform approach results in the fact that Moodle is being used in many, many places around the world. There is a button in Moodle that when you press it, we at Moodle receive a certain bit of data about your web site. That is the only way we know where Moodle is deployed because there is no licensing, and we do not have customers. People just download it, and it gets around. It is part of Linux distributions. There is a Linux distribution called Edubuntu from South Africa which has very much of Moodle as its core. So during the installation, we say, "Do you want this to be a Moodle server?" and then click - it gets distributed by other means.

Of the registered sites we know of, there are about 35,000 in 176 countries. In those sites, there are 14 million users, 1.4 million courses, 1.7 million teachers, 75 sites have more than 20,000 users, 75 languages (including Arabic, from right to left), and 3,000 downloads everyday that we know of. There are about 320,000 people registered on Moodle.org, which is the main community site. There are about 1,000 new accounts everyday. There are about 13,000 active stations at any given moment, which gives me heart attacks frequently. Now about a third of these active stations are teachers. These are mostly people who have never installed Moodle, who would not know anything about Open Source software. They are just users trying to talk to other teachers about how to use this. And this is the point that I have been moving toward in this whole presentation, is that this is the group we really want to focus on.

So how does all this function? How can we have such an organization, all this software happening, if it is free? This is the question people often ask, so let me quickly explain Moodle economics. There are two main outcomes for the Moodle project. There is the Moodle software and there is the Moodle web site. The community is an outcome of these two elements. My thesis was really all about online educational communities. There is a Moodle Trust, which handles the funds and pays people primarily to look after those two things – the software and the web site. So that is the Trust my company manages and that is how I can pay some developers and administrative staff.

We have a huge community of users and about 320,000 registered on the web site. There are even more than that who do not go to the web site, but still are doing things around the world. They are helping each other, writing documentation for each other, all kinds of things. Now some of them put donations straight into the Moodle Trust. There is, as with most Open Source projects, a donations button. These donations end up being not very much; it is enough to pay for half a programmer at Australian wages. Then there are contributing developers. There are about 250 people who have some sort of right access to Moodle, have some direct access to change bits of Moodle. Now we usually just give developers access to parts at a time until we really trust them, and then they have access to everything. Otherwise, it is possible to do a lot of damage if you do not know what you are doing. There are about a million lines of source code on Moodle, and there is about half a million lines of contributed code, extra third party modules and things like that.

Then there are clients, and these are institutions and companies and teachers who need services – they need support, they need consulting, they need training, they need hosting

and sometimes they need direct changes in Moodle itself. They might say – like the Open University of the U.K. said – now we have all this money, we are using Moodle and we really need this feature to be better. Can you fix it? So they will contract with us directly to work on stuff. I only take on jobs that were in my roadmap anyway since it helps push the roadmap faster. The other services I spoke about are handled by Moodle partners, and there are roughly 40 companies around the world who provide those services. They are only chosen to be Moodle partners through a quite rigorous selection process to make sure that they know Moodle very well, can run a business very well and are able to deal with people in their local countries.

We all work very closely together on Moodle services. Very often, on big projects, we might bring in several companies to work together. The Moodle partners put a percentage of their total income, about 10%, straight into the Moodle Trust. A couple of the other Moodle partners do not do that and instead contribute to the project by maintaining something for Moodle. So this is the whole picture. My job is to sit in the middle and make sure everything is pumping along well. I need to be able to hire as many people as possible for the areas of Moodle where they are needed to do all the required work. In a community, you have a lot of good spirit, a lot of good will and people are trying to contribute. However, you do need something in the middle to put all that together in a sane way – otherwise it is just a bunch of hippies! You definitely do need some sort of structure to give an Open Source project longevity going forward.

We have a certification process as well, which I was not so sure about when someone suggested it. Yet a lot of people wanted it, and you can actually pay and spend six weeks to work with a mentor to be certified as a Moodle teacher, which means you know how to use everything and can teach well. Now a lot of people are including this in their portfolios. Also, a lot of jobs are being advertised now as looking for a Moodle teacher. For certification, you have to build a course, you have to write a narrative, a quiz, etc.

How do we manage all this complexity and all these people? We have what we call the Moodle Tracker, tracker.moodle.org. It is a terrific piece of software and it is currently managing about 15,000 issues. These are bugs reported by members of the Moodle community. The go to the tracker and are given a number and anybody can watch the progression. Everything in our whole project, in all the development, is completely open. Every line of code that gets changed you can see – when it was changed, who changed it, why they changed it, what other people thought of that change. It is all tracked. Therefore, if you are having an issue with your site, you can search it, find that issue, subscribe to it and get regular email updates about that issue. This encourages you to take part. So it is all about informing users and quality in code.

Moodle 1.9 is just being released and it has a lot of great features. It is the most stable Moodle yet and it is faster than 1.8 and 1.7. It has a complete re-write of the grade book and it now supports outcome and competencies. So you can assign outcomes at the site level and then choose a subset for your course. Then for every activity, you can choose a subset of those. You can also grade against your outcomes with rubric grading. Then all of this information gets filtered into reports so you can see exactly which outcomes students are weak on, which outcomes they are strong on.

Moodle 2 is the next release we are starting to work on, which will be out next year. Before closing, there are a few new features of Moodle 2 that I would like to discuss because they are the thrust of our direction. I want to talk about supporting external repositories, support for A-portfolios and the Community Hub idea. So turning to files in Moodle, currently you upload files into Moodle, and it is not very sophisticated. The way it will work is that you will be able to connect with external repositories. So you might have a content repository – perhaps it is MIT's OpenCourseWare, or Merlot, or some big repository system that your institution is going to install. Everywhere in Moodle where you need a file, there is just going to be an interface that says, "Pick the file from the repository," and then the file will get copied and stored into Moodle. And if that file changes, you can easily set it so it will be copied over, so that every time it changes it gets copied into Moodle.

When it comes to files going out, this is also pushing files out to a repository, but more specifically, these are going to be portfolios repositories. So imagine you are a student and you have to finish a course that has certain outcomes. And you have just written a great post in the forum that you think matches one of the outcomes. So you can save your post and then push it out to your repository. Then you can tag it further there. These portfolio systems are being built up now. There are two already that work with Moodle; there is one called Mahara from New Zealand, which is being custom-built by a host of tertiary institutions in New Zealand and the Open University has built one called MyStuff. They are both very good, but just have different ways of approaching it. The fundamental idea is that you have a repository of stuff, your own stuff. This is particularly important for students. The students have a place where the interface lets them pick and choose and construct representations of their things for certain purposes - for example, for assessing one's performance in a course or applying for a job.

The final idea here is about Community Hubs. Moodle 2 takes all this and also some features we added in Moodle 1.8 which allow Moodle sites to connect together via a new tool called Moodle Networks. You might not be aware but in Moodle now you can connect with other Moodle sites, in such a way that students can take a course in another Moodle site without having to log in. Then the grades are reported back to the home Moodle site. Now turning back to the Community Hubs, let us imagine that institution A has a teacher using some courses. He is working with his students building up a Moodle course, but he is having some trouble because he is pretty new. Institution B has another teacher. She is really good and she has been doing the same course for a long time. She has really got the hang of it and she is using all the tools and worked through the progression, ending up with a very rich course. In the middle somewhere is a Community Hub. It is just another Moodle site with some switches turned on and it has a repository. She can log into the Community Hub and he can log in as well. They can interact with each other there, for example, in a course called Accounting 101. The teachers are now participant students in learning about Accounting 101. They can share their learning designs, their content, their ideas cross institutionally. And they do not have to share whole course – I know that is difficult to do sometimes – it could be just talking about techniques. If you want to try and give them an incentive to publish, you can say, "You'll get a little bit of money for every download." There are all sorts of economic models that can be worked out there. Yet the thing is that with Moodle 2, there are going to be lots and lots of these local hubs. Some of them are just going to be set up for local institutions, to get departments talking to each other. Others will be between universities in a peer-to-peer network. These hubs will be closed. Yet some will be wide open, containing masses and masses of content and having all kinds of things going on.

So this is the vision we have for Moodle and this is where we are going toward dinner! All the pieces are in place for us and for me it is very exciting to actually put these puzzle pieces together and make this vision a reality. I want to see a button on the bottom of everybody's Moodle that will get you to your community and help you to be a better teacher and to improve education overall.

Thank you very much.

### Quality Assurance in E-Learning: The Pharmaceutical Medicine Graduate Program – A Case Study

Dr. Honorio Silva VP, Science and Medical Practice Development Pfizer, Inc. New York, U.S.A.

> Dr. Sean Rowland, CEO Hibernia College Dublin, Ireland

Good afternoon. We hope you have enjoyed your lunch and are now enjoying dessert! My name is Honorio Silva and today – along with my colleague, Sean Rowland, - I want to talk with you about the Pfizer and Hibernia College Pharmaceutical Medicine graduate program, which we believe is a big success story for e-Learning in graduate education.

As background to this talk, I would first like to say a few words about biomedical research and development and the journey of new drugs from discovery to approval. At the start of this journey, millions of compounds are screened, resulting in a few leads. These few leads could result in the pre-clinical testing of 250 possible drugs, and out of this testing, ten drugs might reach the clinical testing stage. In Phase I of clinical testing, 20-80 healthy volunteers are used to determine safety and dosage. In Phase II, 100-300 patient volunteers are tested to determine efficacy and side effects. And in Phase III, 1,000-5,000 or more patient volunteers are monitored for long-term use. Out of this process, from the 250 drugs brought into pre-clinical trials, perhaps one drug will eventually – after 12-15 years – receive FDA approval. To make its way from the laboratory to the patient, this new drug carries the financial burden of the 99 percent of research on other candidate drugs – research that, for one reason or another, failed along the way.

Now I would like to turn to a discussion of Pharmaceutical Medicine, first describing what it is. According to the International Federation of Associations of Pharmaceutical Physicians (IFAPP), "PM is the medical scientific discipline concerned with the discovery, development, evaluation, registration, monitoring and medical aspects of marketing of medicines for the benefits of patients and public health." Biomedical professionals working in this discipline, while not dealing with individual patients, influence the health and well-being of populations, cohorts and groups of patients, and place their safety and interest as a priority in their activities and decisions. PM is a broad medical specialty that requires pharmaceutical physicians to have a wide range of expertise: basic research, drug development and evaluation, clinical trials, regulatory, pharmacoeconomics, medical aspects of marketing, business administration, safety and risk management.

Yet most biomedical professionals are not fully aware of the mission and vision of pharmaceuticals and the complexities and regulations associated with drug discovery, development and commercialization. For one thing, education in pharmaceutical medicine is not included in the undergraduate medical curriculum. Twelve universities in Europe offer onsite graduate courses, each with few students. Furthermore, there is a steady influx of biomedical professionals into pharmaceuticals and those working within the industry may not be aware of the discipline.

Following are several of the reasons why we at Pfizer were interested in fostering the creation of web-based training for pharmaceutical physicians:

- Emerging needs in graduate medical education;
- Unique partnership with medical schools and professional associations;
- Opportunity to leverage skills for Pfizer medical personnel;
- Leadership in Pharmaceuticals;
- Increased use of Internet for medical education purposes;
- Needs for further graduate training detected through internal surveys;
- Opportunities for further professional development;
- Lack of training opportunities for working professionals from the emerging world.

Pfizer identified a need for a web-based training program in Pharmaceutical Medicine and found an excellent partner for this endeavor in Hibernia College in Dublin. I will now let Sean Rowland of Hibernia explain what Hibernia does.

Good afternoon. Hibernia College offers accessible high quality, third-level education to students who would otherwise find it difficult or impossible to study for a qualification. It is Ireland's first and only online third level institution, founded in 2000 and nationally accredited by HETAC, the Irish government agency for Higher Education. The college offers a niche suite of programmes, mostly postgraduate. It has international linkages with Harvard, MIT and IBM. Hibernia's Academic Chairman is Professor Thomas Mitchell, former Provost of Trinity College in Dublin. There are over 1200 students enrolled in graduate programs, and over 4000 students enrolled in Continuing Professional Development activities.

Planning for the Pfizer-Hibernia Pharmaceutical Medicine graduate program took place between 2004 and 2005. The steps involved in this planning phase included: 1) An internal confirmatory needs assessment; 2) Benchmarking with other graduate training programs; 3) Planning and set up of academic network, including advisory board, curriculum, faculty; 4) Submission and accreditation by HETAC (Ireland and E.U.) and by IFAPP; 5) Internal processes for identification of candidates and 6) administrative approvals. Of all these steps, I think moving successfully through the accreditation process was the most difficult, yet most critical to the program's success. Another critical step was establishment of an excellent Advisory Board to insure program quality. The board we put together is a s follows:

- Dr. Dermot Cox (Royal College of Surgeons)
- Dr. Tom Mitchell (Hibernia College)
- Dr. William Shannon (Royal College of Surgeons)
- Dr. Joseph McCarthy- JFK School of Government Harvard University
- Dr. Richard Larson, MIT

- Dr. Robert Rubin, Harvard/MIT
- Dr. Rory O'Connor, Pfizer
- Dr. Pablo Pulido (Pan American Federation of Medical Schools-PAFAMS)

It certainly cannot be underestimated how important is the issue of Quality Assurance in the creation of an e-Learning program like this one. In our development of the Pharmaceutical Medicine graduate program, we built a collaborative network to ensure high quality. This collaborative network included representatives from Pfizer, HETAC, IFAPP, and other medical professional bodies, as well as faculty from MIT, Harvard and the Royal College of Surgeons.

Another important step in this case study was development of an academic structure for the PM course, which would lead to an MSc degree for successful graduates. The course includes ten modules given over a twenty-four month period and based upon a core curriculum required by IFAPP. Each online module requires eight hours of work each week, including three online lessons, one hour of online tutoring and four hours for student research and assignment completion. In addition, each year there is an on campus requirement for all students - one time at Harvard University and the other at the Royal Academy of Surgeons.

The curriculum for the modules of the MSc program in Pharmaceutical Medicine is as follow:

- 1) Drug Discovery and Pharmaceutical Development
- 2) Leadership (on site at Harvard University)
- 3) Clinical Pharmacology and Drug Development
- 4) Clinical Trials and Data Management
- 5) Regulatory Affairs and Knowledge Management
- 6) Safety and Risk Management
- 7) Health Economics and Business Administration
- 8) Business Ethics (on site at Royal College of Surgeons)
- 9) Information Technology and E-medicine
- 10) Research Project and Dissertation

Selection of the first class for this program was conducted as part of the Pfizer Internal Talent Development Program and was coordinated with Pfizer's Departments of Human Resources and Online Education. Identification of candidates came through top management levels, and 65 candidates were recommended by functional heads and by country medical directors. Twenty-three countries are represented in the 2005-2007 graduating class. The graduation for this class took place in Dublin on August 1, 2007, and the majority of students graduated with First Class Honors. Surveys conducted over the 2-year period indicate a high-level of student participation, satisfaction and retention. Students in the first cohort reported that the technology worked well, but that the workload was extremely heavy. Of course, the course review process takes into account all student feedback. This course has been recommended by the Pharmaceutical

Research and Manufacturers of America (PhRMA) as a "best practice" to be followed by other pharmaceutical companies. The Pharmaceutical Medicine graduate program added two additional classes - in 2006 and 2007 - employing a similar selection process as for the first class. Thirty-six students enrolled in 2006 (Pfizer only) and thirty-eight enrolled in 2007 (including nine non-Pfizer students). Some scholarships were offered to students in the 2007 entering class.

In closing, I would like to speak a bit about our plans for developing this program in the future. We are hoping to support further expansion of the MSc in Pharmaceutical Medicine beyond just the pharmaceutical industry, into the regulatory agencies and research groups. We are also working to refine our capacity to generate and support other graduate programs and to foster innovative partnerships that provide value to the healthcare community. The development of this e-Learning graduate program was a unique and innovative partnership among the pharmaceutical industry and the medical and academic community to meet the emerging needs in bio-medical education.

Thank you very much.



# **PANEL THREE**

# E-LEARNING IN THE EMERGING WORLD

### Enciclomedia: The World's Largest Interactive Classroom Project

Dr. Raul Medina-Mora Chairman and CEO Vision Mexico Mexico City, Mexico

First of all, I would like to thank very much MIT and the LINC program within MIT – Professor Richard Larson and Elizabeth Murray – for their invitation to come here for LINC 2007 and for giving me the opportunity to speak about Enciclomedia. I would also like to thank the Smart Technology of Canada that provided us with the Interactive White Board so that you can actually live the experience – or as close as that could be – to being in a classroom. I would also like to thank the local distributors of the Smart Interactive White Boards. Smart helped us set everything up for this demonstration.

The theme of this conference, "Technology Enabled Education: A Catalyst for Positive Change," – even though it was done independently of what I am going to do today – is exactly what we have been aiming to do in Mexico. The focus is on education, but how can you best use technology to enable education. I am going to talk about the Enciclomedia Project later in this presentation, but what I would like to actually do is to ask you to imagine yourselves in a classroom. The classroom would have this interactive board in the front of the room, and that is where the teacher and the students interact with their school materials.

The Enciclomedia Project is a project that is installed in all public schools in the country – cities, town, rural areas and urban areas. This is up and running today in 168,000 classrooms of  $5^{\text{th}}$  and  $6^{\text{th}}$  grades of public primary schools. So today, the public schools are better than the private schools in terms of the technologies and the capabilities, as well as the learning possibilities that Mexican children have.

So if you can imagine yourselves back in the classroom, all the textbooks for all the subjects for 5<sup>th</sup> and 6<sup>th</sup> grades of primary school are incorporated into Enciclomedia. There is only one subject that is not taught in Enciclomedia, and that is Physical Education. Even though we could simulate the games in the White Board, we prefer that the students go outside for physical activity! Now I am going to start out this demonstration with a little bit of history, and we all learn in our history about Rome. What you see there is a picture that the children have in their textbooks. Mexican children receive every year a series of textbooks for free, and the textbooks have this image. So if the children open the book to the proper page, they will actually have this image. What we have done is to take the actual book and give life to it. As you can see, within the text there are a series of links to the different materials. In particular, looking at Rome's Imperial City, we know that in Rome we have the Coliseum. With Enciclomedia, the children can actually come in and, with their hands, look at the Coliseum.

When President Fox came to a classroom and saw this image of the Coliseum and actually moved around it with his own hand, he cried. After that, he said, "I want this for every child, in every school throughout the country." Unfortunately, we could not do every grade – only  $5^{\text{th}}$  and  $6^{\text{th}}$ . Tremendous emotion was produced by being able to go to the Coliseum and then look at it and see that it is a historical monument – now one of the

new Seven Wonders of the World. On this interactive board, you can also see that the monument is actually within a modern city. Nothing that you can tell the children will ever do the same in terms of the emotion, in terms of the senses, in terms of learning – which of course is what matters.

The text of the book talks about the history of Rome, and every time you touch on one of these elements, a series of learning objects appear in context. For example, this is the word for gladiators, and you have a film library with a clip from the movie, "Gladiator." A number of the children, particularly those that live in cities, had seen the movie. However they did not understood that this was about the history of Rome. So now the history of Rome shows up in a very different way to them. You do not have to show the entire movie, yet it can be in the dynamics of the class that you actually get to see this. One way of bringing life to history and to books is that there is a timeline – a timeline that is telling you what actually happened at different moments. Of course, you can always select another link and the context will show up. For example, you can tell the children about the rebellion of Spartacus with another film clip.

Now I am going to move to America, and this course is the Pre-Columbian History of Mexico and Latin America, and in particular, the history of the Mayans. In the history of the Mayans, you actually have the ruins. And now that we all went and voted for the new Seven Wonders of the World – and of course, you all were voting heavily for Petra, which made it. We in Mexico voted heavily for Chichenitza. Now Chichenitza is one of the new Seven Wonders of the World and it is a truly fantastic place. Mexican children that live elsewhere in the country will probably never go to Chichenitza. And again, maybe no one here has ever been to Chichenitza. Now that it is famous, it will be interesting to visit. It is in the Yucatan Peninsula of Mexico. There is a short audio description to the children about where they are, and then one can do a virtual visit of Chichenitza. Here we see the pyramid that is called the Castle. The Mayans were very sophisticated astronomers, and coming down from these steps – exactly at the moment of the spring Equinox – the shadow formed by the border of these steps appears like a serpent coming down. And it may not be the 21<sup>st</sup> of March, but this phenomenon occurs at the exact moment of the Equinox. Our virtual tour also lets us travel to the top of Chichenitza where we can see the surrounding jungle and the other monuments. The children themselves can actually come in and do this virtual visit and get a sense of what Chichenitza was.

People always ask me how Enciclomedia teaches math with this interactive system because it looks like history would be a proper thing to be able to do with it. So now I am going to show a bit of math. For example, here we are going to teach the children about cubic metrics. We start out in this animation with the square centimeter and then make the cubic centimeter, using sugar cubes as an example. Next we build on top of a cubic centimeter to get to a cubic decimeter. I myself remember when I was in primary school the difficulty of summing zeros and having to move the decimal point. I did not know how many times I would have to move it to get decimeters to centimeters to square meters to cubic meters. It was kind of complicated, and I had no reference of just how it was constructed. So in this animation, we are putting together one thousand of those little sugar cubes. Out of that, when we finally reach one thousand sugar cubes, we have a cubic decimeter, which also is the size of a block of cheese! The sounds in this animation are very important because one of the big messages of Enciclomedia is that

learning is fun and should be enjoyed. With these animations, all of a sudden geometry can be understandable and fun.

In their textbooks, Mexican children also have exercises – so their textbooks are also workbooks. And of course one of the most difficult things to learn in  $6^{th}$  grades is fractions. So to teach this, Enciclomedia has a game. The teacher normally divides the class into groups, and each group names a member to come to the front and do a balance, using a scale animation that is used in learning to add and subtract fractions. This is a game that takes fractions out of the obscure world of things that a young person cannot understand or follow. Again, all of a sudden we have a very different structure.

Arts and music are part of the 5th and  $6^{th}$  grade curriculum, but there are no real textbooks for these subjects. So what Enciclomedia has done is to bring the teaching of music and the teaching of the arts into the classroom. This animation demonstrates the pulse of music, as measured by a metronome, and then demonstrates the pulse of different types of music – classical, rock and roll, Latin, etc. Another concept in music is that of harmony, which of course, I did not know about! The way it is explained to the children is that you have a certain melody and you can harmonize it in a happy way or in a more serious way – using the same melody but a different harmony. Classical music for children aged 10 to 12 is viewed as something for the old people, something they do not particularly care about. However, this animation lets the students experience a harp, an English horn and other instruments of the orchestra. It also tells them about the orchestra conductor, explaining how the conductor starts a concert – what is the movement that actually directs the musicians to start. The students learn that different conductors have different styles, and of course, the most emotional part is how a conductor finishes a piece. All of a sudden, classical music is fun!

Now I want to return to one other thing here. In fifth grade when the students do Natural Science and the nervous system, they get to learn about the brain. In doing so with Enciclomedia, they get to look at the brain and manipulate it. This animation shows what the cerebellum is and provides an explanation of it. The student can manipulate the cerebellum to observe it in different ways. Teaching Natural Science and Biology about the human body can be very interesting and fun.

English has never been taught in Mexican public schools, and this has been a disaster for the country because all our children grow up and reach 13 years old, when they go to secondary school, without speaking English. Of course, in this world, and particularly because of the geography of Mexico, this has become a historical vicious circle. So, it is a long story, but what we did was to bring English teaching experts to help us design the English program. This is a semester of English that will teach two hours per week. The first two months of the program are dedicated to convincing the children and the teachers that English can be learned, because by the time they are 10 or 12, they have already concluded that they will never learn English. The way you get them over this mindset is by bringing music and games into the learning process. However, the problem that the teachers have is that they do not speak English. Yet as one teacher said in her evaluation of the program, this is the kind of learning – with music and animation – that is not forgotten.

There is a booth outside where we have Enciclomedia, so at the end of this session, and throughout the day, I will be happy to show you more of it. Now let me talk about the project itself. Enciclomedia is the world's largest interactive classroom project, and my

friends from the UK who are the initiators of a movement there to bring interactivity to the classroom – I tell them that we are the largest because there are more of us Mexicans than there are Brits! In the UK, there are about 80,000 classrooms, in primary and secondary schools, while Mexico has 168,000 classrooms. Enciclomedia is funded by the Mexican government and it is really leveraging educational technology. It is a new model of pedagogy because it brings the group social learning, with the teacher and the students together. It is also a development platform, which I will speak about later. The objective of Enciclomedia was to significantly improve the educational quality. Of course, because it is the product of a past president, President Fox, it has received quite a bit of criticism. For this reason, one challenge we have for the project is the issue of sustainability. It is a Mexican invention by a colleague of mine, and it was a presidential declaration and commitment that made it happen. One advantage that Mexico has is that the curriculum for all primary schools is one curriculum for the entire country, and the textbooks that are delivered every year to the students are all the same. Enciclomedia serves 4.5 million children every year and then 2.2 million additional as they come into fifth grade.

In terms of Mexican education statistics, we have 200,000 schools, if we include preschool, primary and secondary. There are a little more than 100,000 schools in primary education. There are 25 million students, 15 of which are in the first six grades of primary education. There is a big discussion about the evaluation. With this system, we are changing the paradigm and we are changing the way children are learning yet we are still applying the old- time exams. For this reason, we expected to have bad results at the beginning because for example in history, we are not focusing on the memorization of dates, but upon the significance of the historical events that took place. As a candidate, President Fox promised that Mexico would invest 7% of GNP in education, and this is how that was accomplished. So during the years of his administration, Mexico reached the 7% figure. As a consequence, the ICT industry grew 19% in 2006.

The English learning program was a big, bold move that we took, and fortunately for us we had the right design that was piloted in 180 classrooms that were chosen at random from the schools that had Enciclomedia. No teacher spoke any English among those selected, and the advantage that these teachers have is that they know about Enciclomedia and how it operates – so they are at least a half step ahead of the children! This language program is being incorporated into Enciclomedia right now so starting this school year, 4.5 million Mexican children will begin learning English. This is going to be a dramatic change for these children as they reach adulthood and have to compete in the world.

The most important success factor for Enciclomeida is that it is working in the classrooms. The focus is on learning, not on the technology. I do not know how many of you have noticed where the computer is here? The whole learning, the whole discussion, all happens here at the interactive board in the front of the room. Children come up, pictures come up and many children fight to come up!

The technological platform that is behind this is a major success factor. The model that we implemented, in terms of economics and financial, is a services contract for six years. The infrastructure belongs to the providers of the technology, to the company that provided the technology, and they are responsible for having the classroom operating. If the classroom is not operating, then the monthly fee is not paid. This arrangement puts the incentives in the right place. With it, you do not have to have new people in the local school administrations and in the schools to actually do the support of the technical work

on the computer. The basic way to understand this is: if the classroom is operating, then the classroom is paid for.

Enciclomedia required a lot of political will. President Fox will be recognized in history for having done this. Today he is the past president so the project has been attacked. Another factor for implementation that is very important is community involvement. Because Mexican schools are free, the community and the parents have no role in the school. However, the kids are going home and talking about having visited Chichenitza and having seen the astronomy there. They also talk about having seen the Pyramids and the Coliseum. And they have learned about the English horn and have listened to it. So the parents are coming to the schools, and they want to find out what is going on. Actually, the local administrators are having problems because they do not know how to deal with the parents. Eventually that will change because the schools will be used for other things as well. Today they are only used for eight hours each day, with one school in the morning and one in the afternoon, but closed the rest of the day.

Exam metrics are based on previous pedagogical models. That is a problem because we are still testing the way that we used to test and have not done new testing. This is a worldwide problem, by the way, and there is a committee in the OECD on which we participate that is asking the question, "How should the new examinations be? How should we assess learning differently than we have?" We believe that games will be the way to make assessments, but that is another discussion. However, there are new metrics. One of these relates to the discipline in the classroom as reported by teachers. They used to spend the whole day just telling the kids to behave, but now that problem has diminished dramatically. Something else that has improved both for teachers and students is attendance in class. For children, going to school was a very boring experience, since they could have more fun at home or with friends. Now that has changed.

Thank you very much.

#### **E-Learning Experiences in the Middle East**

Dr. Milad Sebaaly Chief Executive Officer – Levant Region Technology World Company Kuwait-Amman-Damascus-Beirut

Good morning. I think many of us who come from Arab countries would ask ourselves why do our colleagues in Mexico have this kind of advanced system and we do not have it. Do they have more money than we do? Do they have more talent than we do? And there are a lot of other questions that I am not allowed to ask. Today I will go over a number of issues that I personally, and our group of companies, have faced working in eLearning for the past almost 10 years in the Middle East region. I will also try to come up with some ideas for serious discussion and careful thought. First, I will go through a very generic, perhaps dull, introduction that everyone will go through. Next, I will give some background about our experiences. Finally, I will share some of the conclusions that we have come to as well as some of the challenges we have faced and continue to face.

Everyone is talking these days in the region about transforming our economies to knowledge economies or going into the Information era or talking about socio-economic development. Yesterday, Dr. Kozma had a very nice yet short presentation about how improving the education and introducing technology into a country's education system can affect that country's socio-economic development. I will not cover the "how" part of this discussion. I will, however, attempt to cover the "when" part. When we talk about improving our education systems and our human resource development systems, there are three levels of impact we have to examine. We have to examine a short-term, immediate impact by looking at people in the workplace who have been there for some time and need immediate updating of professional skills. We also have examine a medium term impact – our higher education systems that will graduate students in the coming ten or fifteen years. Finally, of course, there is the long-term impact to examine – our basic education system.

Now there are a number of general challenges that human resource development faces in the Middle East region, which are probably very similar to other regions in the world. At the lifelong learning level, we lack an adequate number of lifelong learning programs. In many of our universities, we have old curriculums and we have a traditional culture that says - I get a degree, I hang it in my office and that is it – the degree is for a lifetime. In my opinion, nowadays degrees should have an expiration date because if I am a bachelor degree graduate in Business Administration and I do not upgrade my information or my knowledge for let us say ten years, I will be completely out of sync with current business administration.

In higher education, some countries have limited capacity, especially when it comes to public universities. Many of them have limited specializations, curricula that are not linked to market needs, minimal research and development activities, often weak infrastructure, and traditional teaching methodologies. In addition, we are suffering brain drain where our young generations travel abroad to study and all too often do not come back. These limitations in our higher education systems are especially unfortunate given

that our societies are young: 50% of the populations fall below the ages of 22-25, depending on the different countries.

Turning now to technology-enabled education in the region, there are many varied perceptions of eLearning, Online Learning, Blended Learning, Open Education, Virtual Universities, and Distance Learning. Furthermore, there is a lot of room for awareness in order to convince the many different stakeholders - parents, students, faculty members, administrators, etc. In this area of technology-enabled education, my personal background - and the companies I have established started or helped start in the Region dates back to my earliest experience at American University in Dubai (AUD). At AUD, I was Chair of the Department of IT for four years, where we implemented different types of eLearning solutions. Later, I established the Syrian Virtual University, which was the full-fledged virtual university that was under-represented here yesterday in one way or another. After that, I started UKS, a specialized company in eLearning and Educational Technology, which I will talk about later. Then I became involved with Technology World, which is another investment company specializing in Educational Technology projects, especially mega-projects. More recently, I have been associated with Global Investments, a specialized investment company and with Archers, a Research and Brand Consultancy Company.

At the American University of Dubai (AUD), we had the room to experiment with different types of new content, different technologies and the latest infrastructure. However, we were not allowed to touch the teaching model which means – as Dr. Mayadas mentioned yesterday – whatever technology you use, you should not touch the three-credits model - you should teach three credits in class and everything else is extracurricular. The experience at AUD was a good start; technology was used as a kind of facilitator and also as a kind of image face-lifter for the university itself.

Next, I was involved in establishing the Syrian Virtual University, which started as a fullfledged virtual university accredited by the Minister of Higher Education, supported by the President of Syria. However, when we started that back in 2002, many students were not allowed to have email in Syria, so we had a long road to travel. Nowadays, SVU has a much better infrastructure. Yet in those days, awareness was the major issue - people really did not have any idea about what this whole idea of eLearning was about. They all thought that this was similar to the degree mills that send emails advertising Masters degrees and PhD.'s. We also had a lack of expertise in the country in general so we had to import a team of people from outside. There was a large need in the country for graduates or even for young people who knew IT and English, mixed in with perhaps some management skills. So a funny thing that happened is that we started what we called a "Preparatory Year" to teach students English, some kind of management and IT. When these students finished the Preparatory Year program, they found jobs with salaries three times the size of university graduates! As a result, however, they did not want to continue their education! Later on, we established an Associate degree, and the same thing happened with the graduates of that program. However, now things are moving ahead

Lack of funds is a major point that I would like to highlight now because we will be talking about it at a later stage. Our experience at both AUD and SVU showed us the need to have a specialized consulting and solution provider firm in the Region that: works at international levels; provides solutions according to international standards; and compares in terms of solutions and products to whatever exists in the world. Every time

we have attended MIT LINC or any other international conference related to these areas, we saw how great was the need to deepen our knowledge in technology, in pedagogy and in educational methodologies. We needed to know how to utilize technology effectively and efficiently to transform the way students learn and transform the way teachers teach in order to modernize our educational system. We realized also that in some of the Arab countries – especially the wealthy ones – it became a fashion to beef up the schools with all kinds of PC's, servers and interactive boards, etc. Yet all this was done with no real result. This follows what Bob Kozma was saying yesterday - that technology and quality is not an automatic formula; it is not directly proportional that when you put in technology you will have a better quality.

As a result of this realization, we gathered a group of experts from academic backgrounds, technology backgrounds, business development backgrounds and we established the company, Universal knowledge Solutions (UKS). UKS has had its fingerprints on most of the major higher education online learning programs or blended learning programs in the region. We have implemented a number of large projects across the region – UAE, Saudi Arabia, Kuwait, Amman, Beirut, Damascus, etc. At the time of UKS's founding – I am talking 2003, 2004 – there was a need to educate the teachers, the professors, and the faculty. They needed to learn about everything: new technologies; learning management systems; assessment management systems; and virtual classrooms. They also needed to learn how to integrate all these together in order to develop modern content that is interactive - and not just power point presentations thrown on Web CT or on Blackboard. At that time, it was also necessary to start strategizing – talking about short and long-term strategies, about change management, about project management and about the need for some additional expertise.

In those early years of UKS, we also realized that the market was not mature yet. There was a big lack of awareness and a lack of funds. Lack of funds does not mean that ministries, universities or schools do not have money. On the contrary, they did have money. However, they did not have a location in their budgets for this new thing that they do not understand. For this reason, it was very hard for us to go and present our technology-enabled education plans and then wait for them for a year or two to include the cost within their budgets. So we concluded that even if you have the vision, the strategy and the technology and expertise to implement it, you still need something else. You still need some entrepreneurship as Professor Clay said yesterday. We realized that there was a need to build some new financial models, some new modes of private-public partnerships. We encouraged the public sector to increase its investment in education in an efficient way. Earlier we heard 7% for Mexico. Many of our countries have a much smaller percentage for educational spending. And most importantly, if the public sector does not have money or does not have plans to increase educational expenditures, how can we involve the private sector. Especially given the fact that our region is an oil region - particularly in the Gulf - and for the past few years we have had a lot of excess cash. Our governments have calculated their budgets on an oil barrel price of \$30 and now that price is \$90. Now we have a lot of cash to spend.

The question is how can we attract such investments either from the public sector or from the private sector to modernize our educational systems? When we go to places like MIT LINC or other similar events where we are exposed to what the world is doing, we start looking back and asking the initial questions that I posed at the start of this talk. How can we impact the overall movement of modernizing the education systems in the region without becoming ministers of education ourselves? We asked ourselves these tough questions at UKS and then we went into partnership with an investment group in Kuwait

and eventually had a kind of merger with a company called Technology World which is a technology investment company. We attracted a lot of attention from investors to educational technology. We had a green light to go and invest millions of dollars in feasible technology-enabled educational projects.

Once we had the money, we had to convince the other stakeholders - the owners of private universities, the leaders of public universities, the ministries of education or the schools themselves that we were not coming to eat you or to buy you out. What we were doing was creating educational funds or investment opportunities, but those were not for free, those were not for non-profit organizations. We were creating low cost, long tem investments for investors that understand the educational sector and understand that educational projects cannot be something done in a "hit and run" fashion. This is a longterm partnership between parties that understand each other, so we are not bringing commercial loans from banks or from other investment companies. In this regard, we had to utilize a lot of innovation, a lot of sensitive negotiations with the stakeholders in order to reach new models of public-private partnerships where you bring in millions of dollars of investment to a university - but then you take out a very small portion per student for a very long time in order to cover your investment. This is a win-win situation for both sides. The university is getting the technology, the expertise, the training, the content, all without having to alter their annual budgets and capital investments. At the same time, the students are getting a much better education, the professors having been trained to use the best available technologies and methodologies. Finally, the investors are getting their money back within a reasonable amount of time and with profit.

Again, this process also requires the development a lot of awareness. On the one hand, the private sector, especially the eLearning companies – of which we have few here, including UKS - should not think that they are working with an educational institution to deliver a "hit and run" project for six month and then take their profit and get out. On the other hand, the universities should not look at the private sector as if they are a bunch of crooks coming to take the university's money. As you have seen in my colleague's presentation, Dr. Carlos Garcia, the project at Amman Al-Ahliyya University could not have been done without a very, very close coordination and cooperation between different parties.

Again, because awareness is a big issue and because we in our society look at education as something very high, while commercial ads are something very low, we cannot go and advertise education as if we were advertising Pepsi Cola, etc. Whoever is going to talk about education needs to have a communications strategy rather than a marketing or advertising strategy. They must understand that education is something sacred, where parents are ready to sell their land to pay for their children's education. Therefore, we cannot commercialize it. We cannot have something like they have in the U.S. where you see a large billboard on the highway advertising a Masters degree in six months! If one were to do that here, you would be dead!

On the one hand, our universities and our professors – the talent that exists in our educational systems - have a lot of ideas and have participated in a lot of trials, pilot projects, bits and pieces, utilizing Moodle, utilizing Web CT, getting free courseware from MIT or from another university, and, in the end, transforming that educational

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technology into a small thing. All of these various efforts are still bits and pieces, very scattered efforts that are not having the real impact that we are looking for. On the other hand, in order to have real Blended Programs, or full-fledged Blended universities, or the modernization of existing universities or K-12 projects like Enciclomedia, you need to have the different components that I talked about earlier. These are the components that I and my colleagues have seen work successfully in our experiences going all the back to AUD and up through the current years at Archers and Global Investment.

Indeed, these experiences have some implications. The dimensions of educational transformation are various dimensions. We cannot just talk about academic change or change within the academic circles – how the professor teaches and how the student learns. While this change is very important and crucial, it is not sufficient to create a regional or national major impact. We have to look at the structure. We have to understand that the university in its current shape has been like this for the past 300-400 years. Every other organization has been touched or changed or revamped by eGovernment and eBusiness, etc – except our universities. They are extremely resistant to change. For this reason, here we have to be a little more flexible when we think about change; if not revamping the whole structure of the university, we must at least start creating flexible units within the university that can deal with this kind of modern technology and new way of education.

We rarely see real development taking place in the region. We rarely see the introduction or development of new or specialized technologies here. Few professors are involved in developing technologies, in participating in the international movement of Open Source development or even commercial development. Probably, this is related to many other things, including the lack of research and development in universities and other places.

We also have to find innovative investment models in order to support this transformation and we have to have the right positioning. When we talk about a new program, it is extremely important to position it the right way in society - for parents, for students, for professors, for teachers, for university administrations. We need to have ways of encouraging academics themselves to adopt these kinds of new educational trends. I say this due to our experience in different projects – citing our experience at Syrian Virtual University as a big example. Yesterday someone asked Dr. Talal what was the reaction of the existing universities when SVU was established. Dr. Talal was not there at that time, but I was. We had to fight very, very severe battles with most of the academics in the conventional universities, and I personally had to go for 21 satellite TV interviews and several debates with conventional professors on TV or in the newspaper just to show that what they were fighting was a myth about virtual education as opposed to real virtual education. People would listen to a friend or a neighbor or read something in a magazine or a newspaper and then build a concept and without going deep into what the real dynamics and facts of such education are - what are the pros and cons, etc. Instead, they would just establish a certain opinion and start marketing it. Most damaging would be a situation in which a parent asks a neighbor who is a university professor, "What do you think about the Virtual University or the Blended Program? Shall I allow my child to participate in that?" And then the professor responds, "It is rubbish!"

So strategy and vision are very important, and innovative models within universities are very important. In many conventional universities, when we started implementing, for example, an online academy or an online program, we again faced a lot of internal politics and fights. We realized that we were able to have successful implementation only when we had the following elements:

- Commitment and support of senior management;
- Awareness of the benefits of eLearning;
- Deep discussions on the implications of the change;
- Listening to the concerns of all the stakeholders especially the professors.

In addition, it has also been important for us to be able to effect the internal structure of the new technology-enabled education entity. It has to be kind of autonomous, flexible and it does not go through the normal routine or bureaucracies of the existing universities.

In closing, I want to discuss some of the challenges that we have faced. Some of these involve a paradigm shift involving the role of the professor, the role of the student, the role of quality assessments, fear of technology, fear of additional work, lack of incentives on the professors' side, etc. A lot of people will ask whether a particular innovation is a substitute for, an enhancement of, or the same as what is already being done in the classroom. And many educators are not ready even to re-think their teaching. Most think, "I am the best professor in the world." I used to be like this myself!

Now I would like to highlight one point before I close. In the region, we have a patriarchal system. In our society, the father, the teacher, the boss – these are all people who are not easily questioned. You cannot easily challenge their thoughts or opinions. This tends to give the professor a certain image in society that he is not ready to change easily. In addition, when it comes to leadership style, one of the main success factors of such transformation is to have the right leaders in place. In our region, again because we come from a patriarchal society, most of our leadership styles are paternalistic. This means that we care for people, but sometimes we care less about the outcomes of our programs. We also have a lot of leaders who do not care at all about people or outcomes. So we have to strive to have the right leadership in place, and this again is another transformation and change management process.

Thank you.



# PANEL FOUR

# **E-LEARNING IN THE REGION**

#### ICT for Education in Developing Countries: Both Feasible and Crucial

Dr. Mohammed-Nabil Sabry French University of Egypt Cairo, Egypt

Good morning. The title of my presentation is "ICT for Education in Developing Countries: Both Feasible and Crucial." However, as I was writing this presentation, I wondered if I should say "ICT for Education or Education for ICT," because both of them are in fact helping each other. Now we are speaking at this conference about developing countries, and "developing" means increasing wealth. The major question one should ask is: What makes the wealth of a nation? Is it petrol, agriculture, factories? Is this the wealth of a nation? In fact, the real wealth of a nation is its human resources people capable of changing the course of history of a nation. This is the real wealth of a nation. I am not only speaking about leaders and the elites. I am speaking about every man and woman in each country, creating every day, added value to their nation. This is the wealth of a nation. And these are not just hopeful words - not just me speaking this way. Yesterday, and even today, we have heard very much evidence of this fact.

I would like to add a couple of numbers to the numbers you have already seen - perhaps with a different perspective. First of all, let us look at data that correlates the global enrollment ratio, which is defined as follows: "the total number of people actually learning, divided by the total number of people at the age of learning." Then we can see how this correlates with the GDP of a nation. There is a very strong correlation. You have seen these types of figures presented both yesterday and today. Yet I have included some additional information. Now let us look at Arab-African countries – referring to those who are just Arab, just African or both Arab and African like Egypt - and compare them to the rest of the world. Arab-African countries have the lowest enrollment ratios and the lowest GDP's. This tells us that something must be done.

The ICT revolution has brought a new set of requirements for people in the workplace. During the industrial revolution, in order to produce increased value, it would have been enough to have more workers working faster and more hours every day to produce that added value. However, this is no longer the case today. Today with the ICT revolution, you have a greater number of jobs requiring a higher level of many things - a higher education, a higher sense of initiative, a higher ability to do self-learning. This is a completely new paradigm shift in terms of the skills we are asking people to have today as compared with the skills that were required in the industrial revolution. Of course, this means that we should have new educational approaches. The difference is both in terms of volume and type. We require a much larger number of highly qualified graduates, as well as different types of graduates – as was mentioned yesterday in a very brilliant presentation by Robert Kozma.

Now that is the story when it comes to education. How about the role of ICT in producing goods? There is a lot of data pointing out this fact. I will not reiterate them because that would be completely boring and you might in fact start sleeping! So to touch on it briefly, for example, the impact of ICT on labor productivity in European countries has been more than a 25% increase. The data show consistently that ICT has a

predominant impact in improving not only trade and labor productivity, but also overall GDP.

Now given all this, we know that we should upgrade education, but what is the bill for that? How much money should we spend exactly – or at least, orders of magnitude? Here I will present data coming from the Human Development Report of the United Nations Development Program (UNDP), from the year 2006. I used to think like many others that increasing GDP per capita is linked with the percentage of public spending out of the GDP. However, this report indicated that the results are not really correlated. Out of the four categories presented – OECD, Arab, African and others - we know that OECD countries have larger GDP's per capita. Yet they may spend the same percentage of their GDP on education as does a developing country. However, the result is not the same. Why? Because the GDP's of the OECD countries are very high, and the percentage represents a bigger amount of money. And to be sure, students do not need percentages; rather, they require labs that have a fixed price, they require books that have a fixed price, they require buildings, etc. In truth, these students do not require a percentage, but they require an amount. That is why in working with figures, I have come up with a way of estimating the bill. The bill is the spending of education per capita compared with the GDP per capita. And here we find that the correlation is very, very high. There is a certain amount of money that any government should spend per capita in order to get effective education.

Now if I take the bulk of countries in our region – that is Arab-African – we need to know what we should do in order to move toward the center of gravity of developed countries. It turns out that our countries need to spend something like three times what they are spending now on education in order to achieve a GDP three times greater than the one they have now. From this, we get at least an order of magnitude on what a country should spend if they are looking for high GDP and high development. Now the question is, should we spend this on primary education? If you look at the part of public spending on primary education per capita in Arab-African countries versus that in OECD countries, you find that the correlation is very high. Yes, we should spend on primary education. How about secondary education? How about tertiary education? The data is telling us that if the correlation was only on primary education and not on the others, then we could believe that it is enough to have a population that is literate. However, the data is telling us much more. The added value of educating people mainly comes from tertiary education. But of course, you cannot spend on tertiary education to have good university graduates without having good primary and secondary education. Therefore, this data is telling us that we should in fact spend on all three levels of education.

Now having money is one thing, but having the needed resources is quite another thing. You may have money, but money does not always buy everything. In fact, in order to have good quality, face-to-face education, you need buildings and labs and this costs a lot of money – but only money. You also need skilled professors and you need content. Obtaining this requires not only money but also a lot of time. So this is what is needed for face-to-face education, and we see from the point of view of money that we would have to spend three times as much as we are spending now. However, we would have to wait a long time.

So what about using the same reasoning for eLearning. In 2005, the Egyptian government asked the question: Is an eLearning university feasible? As a matter of fact,

a committee was formed, and I am proud to have been a member of that committee. We had very hot debates on the committee and came up a year later with the answer - "Yes."

The criteria drawn up by that committee are as follows:

- We want to have the same quality as the four top level Egyptian universities;
- We will have Blended Learning, with 25-30% face-to-face learning;
- There will be high standard buildings, labs and IT equipment and of course, high standard salaries to motivate professors;
- One professor to 50 students in Blended Learning (this is much better than the current ratio in Egyptian universities).

We have calculated the cost of building such a university, including depreciation including everything - and it came out to be 30-50% that of the four top face-to-face universities in Egypt. Now this number is very interesting. You remember the three-time increase in expenditure. Now with Blended Learning, it is feasible to actually achieve that increase, more or less. With Blended learning, we can save maybe up to one half or one third the cost of each of our four high quality universities in order to get a university of equal quality. By the way, the decision of the Egyptian government was not that of the committee. In fact, it was a bit different, but it was also interesting. They will not build a separate virtual university but they will ask existing face-to-face universities to have an eLearning component that grows over time. This is another approach, which is not a bad one.

Therefore, from the money point of view, I believe it is feasible to make the three- time increase in expenditure on education, if you use Blended Learning. However, as I said before, having money does not mean you have everything. There are resources that you need. Now if you do Blended Learning, what are the needed resources? First, you need some labs and buildings, but they are much smaller than before because you have at most one-fourth the number of students visiting them. Also, you of course need a network infrastructure and you need terminals and software. In addition, you need trained professors and this is a big and tough issue. And you need an interested audience. Yet above all this, you need content. This is the biggest stumbling block. Now I will address each of these issues one by one, and see how they can be dealt with.

First I will speak about infrastructure and I have good news for you. The Digital Divide is narrowing. I have based this statement on recent publications of the eReadiness index for different countries. The eReadiness evolution can be divided into three tiers: *High* for developed countries; *Middle*; and *Low* tier. Between 2005 and 2006, the progression was as follows. At least concerning the increase during this particular year, the Lower tier increased much faster than the Middle tier, which also increased faster than the Higher tier. This is certainly great news. However, in order to decrease the Divide, it is not only a percentage but also an absolute value that should increase. And I am happy to report that this is the case! In only one year, the lower tier has progressed as much as the Middle tier and much more than the Higher tier.

So the Digital Divide is narrowing. This is the case because both sides on the different sides of the Digital Divide have decided to do something about this. I do not believe that this is a philanthropic issue. Both sides have something to gain with this. In fact, ICT infrastructure boosts trade, and countries on both sides of the Digital Divide want to sell things to each other. According to the World Bank, ICT has had the following impact:

trade used to be 20% of the world GDP and now it is approximately 30% of that GDP. This is mainly due to the introduction of ICT. Another factor in this evolution is that good infrastructure enables outsourcing, and outsourcing is an activity that is win-win for both developed and developing countries. To be able to get involved in outsourcing, the basic requirement is to have good infrastructure. So in this regard, it seems that things are going well and at least in a positive direction. When it comes to infrastructure, the U.S. comes in second to Denmark. There are countries in the Middle East region that fall below #70 on this ranking list. They include: UAE at #30; Saudi Arabia at #46; Jordan at #54; Egypt at #55; and Algeria at #63. These countries in the region can serve as local motivators to foster infrastructure development for other countries in the region.

Now I would like to give two examples from Egypt that illustrate the fact that a partnership between government and the private sector may have a high impact on ICT infrastructure development. Egypt has launched a set of initiatives in this direction. The first one was Internet Dial-Up for free, for anyone. There is no need to buy a subscription or to fill out any forms. You connect your computer to the telephone line and immediately you can see the Internet – for free. Although it is dial-up and not fast, it has enabled many, many people to have access to the Internet. Of course, this was accompanied by an intense media campaign to encourage people to explore the Internet. The following figures indicate how things have changed from 1999 through 2006:

- Internet users:  $3 \Rightarrow 8$  Million (i.e. ~ 12% of population)
- Fixed Tel. lines:  $7\% \Rightarrow 16\%$  of pop.
- Mobile lines:  $1 \Rightarrow 24\%$  of pop.

A second example of public- private partnerships in Egypt relates to a deal that was negotiated nationwide to cover by 1010 certain computer needs. For example, a family's PC could be purchased for only \$7.5 per month. Every Egyptian family is eligible to take part in this program. In addition, a Pro PC could be purchased for 41% a month, while an Expert Laptop can be purchased for \$20 a month.

Now that my time is running out, I want to focus on the most important issues for us in the region and in the developing world. The number one issue is a need for trained professors. This is not a matter of financing and it is not a matter of having adequate time to learn. It is a matter of the need for both educational and social reforms. This is a major issue, one that could require an entire lecture. A second major issue for developing countries is content. Of course, we all know about MIT OpenCourseWare (OCW) and also about many other open content sources - and we can use that. When it comes to this content, known as Open Educational Resources (OER), the following model has developed to exchange it; you have the *Supplier*, for example MIT OCW, and the passive Users. I do not think that this model is sustainable in the future. The best model is to have collaborative development. With collaborative development, something fantastic like Wikipedia has been developed. And that collaborative development is also multilingual. This brings me to the main purpose of my presentation. It is a win-win proposition for professors around the world to have this kind of partnership to collaboratively produce courses. I have a dream. My dream is to cover all African and Arab countries with a network of universities collaboratively developing courseware. I have started a program called OpERaa – Open Educational Resources for African-Arab World. Like any opera, it has the following components:

- Stage Enabling technology and access, a prerequisite for any development project;
- Singer Professor training on eLearning and a professor exchange program;
- Song Collaboratively creating course content and fostering trilingual content.

If anyone here is interested in participating in this project, then I would hope that during this conference we can network to discuss it and we can prepare a concrete plan. The project's email address is <u>operaa07@gmail.com</u>. Our hope is to construct an Educational Solidarity Bank to which everyone can contribute.

In conclusion, ICT for education is of course crucial for development. The public spending needed to upgrade the education in developing countries is three times the current expenditure. Yet we could cut this by a third as I have shown. In terms of other difficult issues to be addressed, those of networks and terminals are solvable, while the interest of the public has never been a problem. However, when it comes to educational reform and educational content, these are the major issues that must be addressed.

Thank you very much.

#### **Overview of Jordan's Initiatives**

Dr. Khaled Toukan Minister of Education and Higher Education Hashemite Kingdom of Jordan

Presented by Dr. Tayseer Al-Nahar Secretary General of the Ministry of Education for Education and Technical Affairs

Good morning ladies and gentlemen. It is a great pleasure for me to represent His Excellency, Dr. Toukan, who is unfortunately unable to be with us due to a sudden commitment outside of the country. My presentation will basically touch upon some of the eLearning initiatives in Jordan – essentially, what the Ministry of Education and the Ministry of Higher Education, as well as the Jordan Education Initiative (JEI) are doing in terms of eLearning initiatives in this regard.

It is needless to say that education is central to real socioeconomic development, and when we talk about socioeconomic development, this means that any strategic approach to educational reform – including the policies of the reform itself and the strategic directions - have to be placed in a wider perspective. The approach must take into account the development objectives of access, equity, inclusion, and empowerment along with sustainability of change through the provision of relevant and high quality educational programs and services for all students.

Definitely, a successful reform program in education has to be based on policy review, analysis, options and choices that we have about curriculum design/development, learning resources development/acquisition, teacher training/professional development, ICT development, and early childhood development. There are three approaches for the type and pace of reform in education. Either we adopt an incremental approach or a change by explosion, which is revolutionary; these two would be at opposite ends. A third way is a systemic approach in terms of being a transformational one. If we adopt an incremental approach, we are talking about a piece meal approach with high risk factors because it is slow and often lacking direction. At the extreme level, we talk about change by explosion or a revolutionary approach, which is a top-down approach.

This is done with a rapid, directive framework and sustainability is an issue here. Whereas when we talk about systemic change or transformational change, we are talking about some risk factors because we have to work at different levels at the same time, and this approach is labor and time intensive. Yet this is the approach that we are in fact adopting at the Ministry of Education. This transformational approach is outcomedriven, it is learning and process- oriented, but it has long-term objectives, and we have to be patient about the outcomes. This approach is also geared to change the root causes of educational dysfunction and /or inefficiency and will result in institutional changes in the culture of learning here in Jordan. This systemic approach is also sustainable.

Now let me discuss the educational reform initiatives we have in Jordan. We have the *Education Reform for Knowledge Economy (ERKE I) 2003-2007*. This is a very ambitious and complex five-year multi-funder and multi-donor program of reform in governance and administration, institutional development, transformation of programs and practices, school construction and renovation, and early childhood education. Central

to the reform is the desire to provide learning opportunities for students that promote the development of essential skills and competencies that are required for successful further study and work in the information society and knowledge economy.

The structure of this reform program includes four components:

## **Component 1**

- National Strategy and Public Relations Campaign
- Organizational Change
- Education Decision Support System
- Monitoring and Evaluation
- Institutional Arrangements

## **Component 2**

- Curriculum Renewal
- Teacher Training
- Student Assessment
- Resources for Learning

## **Component 3**

- Renovation of Existing Schools
- Building of New Schools
- Computer Labs and Science Labs
- Kindergarten Classrooms

## **Component 4**

- KG Curriculum
- Licensing and ECE Teacher Training
- Kindergartens for the Poor
- Public Awareness and Understanding

Now I would like to briefly discuss the investment in the development of ICT training programs by the Ministry of Education. The figure is 60,000 in the International Computer Driving License training program (ICDL), 40,500 students in the Intel Program, 11,000 in the Thinking Tools Program, and 2,570 teachers trained in the Word Links Program. This data reflects the heavy investment in training programs made by the Ministry when it comes to ICT and Education.

The other initiative I would like to discuss is the *Jordan Education Initiative* (JEI). The JEI is built upon a public-private partnership model for educational change and was established at the World Economic Forum in 2003. It has developed and piloted eContent curriculum in over 100 schools in Amman (the Discovery Schools), and has explored ICT-based initiatives in Life-long Learning and ICT entrepreneurship and industry development. The success of the JEI has been translated into similar projects in Palestine, Egypt, Rajasthan (India) and the Global Education Initiative.

Where do we stand in terms of the Jordan Education Initiative? The JEI Discovery Schools have three tracks. The first one is about is eContent Development and Deployment, while the second one is about Teacher Training and the third one is about Technology in Classrooms. The accomplishments to date for each of these three tracks are as follows. About six subjects have been completely digitized. This means that eLearning material is available for Arabic, English as a Foreign Language, ICT Science, Math, Civic Education, etc. These programs are at various levels of implementation – some are at pre-pilot or pilot for certain grades, while others are in the roll-out phase. During this entire reform process – pre-pilot, pilot, roll-out – the Ministry is investing heavily in teacher training for teachers in the six subjects mentioned above. In the 100 Discovery Schools, our plan is to train 1,814 teachers this year.

# **What have been the accomplishments to date by the Jordan Education Initiative**? They are as follows:

- Eduwave as a learning portal has been established by a local software company and students, teachers and supervisors can access their learning materials through Eduwave;
- All MoE schools have been supplied with at least 90 % of their required ICT equipment and other essential infrastructure (electricity, network, air-conditions...etc.);
- School Internet and intranet networks have been established by local companies

(Jordan Telecom, now Orange). Connected schools: ADSL schools : 2145, L.L schools: 157;

- MoE has built its own data center (Hashem II) and JT has committed to manage the data center and ensure its operations, security, support...etc.;
- MoE is working in coordination with MOICT to connect schools and other MoE sites with the National Broadband Network (NBN) through fiber optic media (100mbps). Currently over 240 MoE sites are currently connected by NBN in Module 1 in Amman;
- Various technology models were implemented at some of MoE schools: Computers on Wheels, Thin Client, Multipurpose Room, etc.;
- MoE has signed a maintenance contract with local firms to support all schools with maintenance, support, spare parts...etc.;
- JEI implemented a Discovery School model in 100 MoE schools; laptops and projectors have been distributed to Math and Science teachers, and JEI supported the computerization of the eContent materials with the Curriculum and Textbooks Directorate and the local companies, and delivered many training sessions and workshops for teachers with the Directorate of Training in order to increase their capabilities in the use of ICT to support student learning.

What is the strategic approach to educational reform in the Jordan Ministry of Education when it comes to ICT and education? Definitely, we have to identify and clearly spell out the goals, the parameters and the challenges in implementing ITC in education. Some of the key questions we are all asking and keep asking all the time when it comes to ICT and education include:

- How can ICT contribute to the creation of teacher's networks, associations, and communities of practice?
- How can ICT be used as alternative education service delivery systems in rural and remote areas? Some of our schools are not yet connected because they are in remote areas.
- What are the critical constraints- financial and otherwise- for the use of ICT in schools?

When it comes to initiatives with ICT in education, what are the key goals for the progressive infusion of ICT as a tool for learning? Qualified teachers and supervisors are very important if we want to succeed in this regard. We also aim to have proper understanding of the role of ICT in quality teaching and learning – that technology is a means, not an end in itself. ICT alone cannot fix a bad educational system. Yet on the other hand, ICT can improve a bad system faster so we have to understand that ICT is a tool to promote learning and teaching. Another goal in Jordan is that all schools get their fair share of resources. We do not want to create a new Digital Divide within the country in terms of accessibility and utilization of the eLearning material. We also intend to have all eLearning materials digitized, installed and ready to access. Two other key goals are 1) to have a well-managed eLearning platform that acts as an eLearning portal, and 2) to have a healthy environment for ICT equipment by ensuring an up-to-date maintenance plan, technical support system and an operational helpdesk. There are five components that are always used as Digital Access Indicators by the International Telecommunications Industry (ITU) to measure the overall ability of individuals to access and use ICT. These five components are: Infrastructure; Affordability; Quality; Usage and Knowledge. Jordan stands relatively well compared to other countries listed in this index.

What are the strategic directions in implementing ICT as an enabler for learning in any educational system? Definitely, there has to be in a coherent national ICT framework that encompasses ICT strategy and policy. First of all, there must be an architectural framework that clearly identifies and maps connections and linkages. Second, we have to develop core learning content and supplemental enrichment resources, reference materials, teacher manuals and guides. Third, there must be a buildup of institutional capacity in the use and mastery of ICT for all functions. And finally, there must be a follow-up and impact assessment of the return on the investment in ICT for education.

Definitely, ICT is not a solution. ICT can help an education system to tackle many of its challenges in this regard. It helps in expanding educational opportunities. It helps in increasing efficiency and in expanding the quality in learning and teaching. However, if IT possesses all of this remarkable potential, why have we not yet experienced drastic positive effects? If technologies are the solutions they claim to be, then what or where is the problem? In fact, we have to realize that the potential of ICT to support learning is not realized automatically. The problem is not strictly technological. It is educational and contextual - constraints must be alleviated and conditions met for success.

Experience points to eight parameters necessary for the potential of ICT to be realized in enhancing quality education. *First*, there must be a clear educational policy regarding technology as an instrument for learning rather than as an end in itself. Second, there must be a champion for change in schools and in the system at large. *Third*, the piloting of new initiatives is very important, as opposed to an immediate rolling out or scaling up. Fourth, ICT has to be integrated into a wider educational context and can not fall within a narrow mandate or purpose. *Fifth*, financial resources are very important, especially for poor countries. As my colleague has well stated, the Digital Divide is narrowing, but unfortunately the Knowledge Divide is widening. This finding comes from analysis of the Knowledge Ladder, which starts with knowledge acquisition, moves to knowledge deepening or internalization and peaks with knowledge creation. Sixth, infrastructure is very important. The real question is what type of infrastructure should be in schools infrastructure that is appropriate, cost-effective and sustainable. *Seventh*, content ware is very important. The provision of ICT and the training of teachers, etc. would not automatically boost or improve learning or teaching. It would be like building roads without having cars. There must be the provision of excellent content ware and resources. *Eighth*, there must be committed and trained personnel. These are the eight parameters that have been proven by research to indicate the ingredients that must be present if ICT is to improve learning and teaching.

When we talk about piloting programs in ICT for education, there are certain measures that support success:

- ✤ Start small but think big;
- ✤ A holistic and complete approach;
- ✤ Approaches that are widely networked;
- ✤ Approaches that are well integrated in the system;
- Initiatives that have the potential to develop into a movement;
- Initiatives that enjoy leadership over a span of time with a high level of commitment and the ability to motivate and mobilize;
- Initiatives that manifest continuity of focus (by agencies & governments), enjoy sufficient funding over time and have strong community involvement, participation, empowerment and demand for quality;

What are some of the challenges facing the Ministry of Education? Here we are reflecting on our own experience, but these challenges are more or less the same for all educational systems in this regard. Following are many of the questions that we often ask ourselves:

- How can we afford enough multimedia-capable, internet-connected computers so that a classroom computer is always available for all students?
- How can we afford enough multimedia computers and telecommunications connectivity to sustain new models of teaching and learning?
- How can many educators who are disinterested or phobic about computers and communications be induced to adopt new technology-based models of teaching and learning?
- How do we prove to the public that new technology-based models of teaching and

learning are better than current instructional approaches?

- How can educational technology increase equity rather than widen current gaps between "haves" and "have-nots"?
- If we use technology well, what should we expect as "typical" student performance?

By the way, the international results on the impact of ICT on student achievement is mixed. Some say it is improving the learning as measured by student achievement while other results are not showing any relationship in this regard. There are two factors worth mentioning here. If the ICT has to boost learning and teaching as measured by student achievement, first, the measures of achievement have to be changed. Traditional measures of achievement would not capture the kinds of skills we are expecting from using ICT in education. And second, there is a threshold before which we should not be expecting any change in student performance. After we meet that kind of threshold, we might expect some impact on the learning and achievement of the students.

For the Ministry of Education in Jordan and for all Ministries of Education that are coping with the task of trying to introduce technology at all levels - whether in management or instruction – the following are strategic issues that need to be addressed:

- Scalability
- Affordability
- Sustainability
- Integration
- Institutionalization
- Commitment to Change
- Organizational Structure
- Operational Processes
- Focus and Direction

In terms of scalability, let us take the example of the JEI Discovery Schools. Can we scale this model or not? This model is heavy-invested – heavy investment in ICT, heavy investment in teacher training. Can we scale it and role it out to all our schools? Can we afford this model or not? Is it sustainable or not? Is it well integrated within the educational context or not? Is there an institutional dimension for all these innovations? Is there a commitment to change even at the school level? And is there an organizational structure that would provide encouragement and support for this model. What are the operational processes that have to be put into place if we want to receive a return on investment in this regard? Finally, is there a focus on the direction of these initiatives?

What are the challenges that remain in Jordan in terms of implementing ICT in education? For one thing, teachers and supervisors are challenged in the transition from traditional teaching ways to advanced technology ways. Furthermore, teachers and supervisors are overwhelmed with many training programs and workshops that add more pressure and responsibilities. Another challenge is the long and often delayed process of tendering procedures to purchase PC's. In addition there is the challenge of limited utilization of some initiatives due to a lack of scalability vision. Also, there is a need for

evaluation studies that assess the implemented technology models. And finally, there is the challenge of ICT equipment's life-long limitations that needs regular maintenance and upgrades.

There are several next steps planned by the Jordanian Ministry of Education regarding the implementation of ICT in education. We will have a well-defined plan for ICT deployment for all MoE schools to ensure equivalent competencies and will cover all schools needs from the available ICT resources. We also plan to provide new connectivity approaches that ensure an excellent school connection for greater access to eLearning by initiating new connectivity contracts as well as more NBN progress. We are also planning several evaluation and assessment studies - regarding the current technology models, regarding Eduwave as a learning platform, and regarding the number of required data centers around the country. In addition, we will establish a central and unified helpdesk that supports all schools with essential services and technical assistance. There will also be completion of the digitization of the E-learning materials. Finally, we are planning implementation of a new technology model that supports ICT labs and meets financial constraints, e.g. (Multi-purpose room project).

**Yet the first thing we need to discover is the pedagogical model we are creating using ICT.** How is it different from the traditional model? Does it suit the conditions of the schools or not? What types of changes are we expecting 1) in teaching and learning, 2) in the school environment and 3) even in working with parents. These are the elements and the bricks of the pedagogical model we are trying to build. We have not yet reached there – we are preparing and planning. We have some experience, but the biggest challenge in fact is the question: What is the ICT model we are trying to build and what is the ICT that would facilitate teaching and learning with that model?

In closing, I would like to cover some of the ICT initiatives for Higher Education here in Jordan. **The Higher Education Development Project** was started in 2000, covering eight universities and providing them with basic ICT infrastructure. In addition, PC labs have been created across campuses for student use, connecting them to the Internet. This also includes the placement of PC's in the offices of faculty members, providing them with email access and connecting them to the Internet. This development project has furthermore led to the establishment of ICT faculties or colleges, offering BS or MS programs in CIS, MIS, BIS, etc. Along with this has also come the establishment and development of websites.

Another arm of the Higher Education development Project has focussed on ICT literacy through courses and training. These efforts include, for example: computer literacy courses for all students; training for faculty around the use of Internet, Power Point, ICDL, etc.; and experimental eCourses. The project has also developed e-Libraries and sponsored ICT symposia and conferences. Currently, the project has two major goals for the future:

Goal 1: Revising study plans, programs and specializations in community

colleges and gearing them toward technical education

Goal 2: Expansion in technological education at the bachelor's level.

Thank you very much.

#### AMSI'S Advanced Classrooms: Emphasizing the Human Aspect

Adonis Nasr Chief Executive Officer AMSI – Academia Management Solutions International Dubai

Good morning. Over the last twenty-four hours, I have had the chance to rub shoulders with some of the sharpest and most dedicated minds. We have come from all corners of the globe, but ultimately we share the same concern – the welfare of our children and the betterment of their lives.

Over the last twenty-four hours, I have heard portions of my initial presentation, touched upon and discussed by experts of implementation and leaders in their fields of work. I heard them describe ICT classes and how they are built in hardware and software. They spoke about teacher empowerment and limitless resources that would become readily available. They spoke about technology advances and the advantages to the students – each from his world and experience, each with total passion and belief. I heard about entrepreneurship in Mexico that has brought wonders to rural areas. I heard Dr. Kozma relate the economy to education, perpetuating a model of sustainable development. I heard confirmation from Dr. Clay that talent shall be the next most valuable resource. He was very emphatic about the required merge of entrepreneurship and human character development. I heard Dr. Naveed Malik categorically state that we cannot equate technology with quality. All of this, with my personal experience re-lived, brought back memories of struggles with budgets and boards of directors, with ICT heads, and with parents – the labors of birth re-lived through the dynamics of change.

Allow me to tell you what is behind us and what has been literally behind us over the last Five years ago, we launched "N4B" which is the Notebooks for Books six years. experience. The concept was to have computers replace students' books, and that was never going to be enough. Imagine it with me, a multi-tier, ergonomically designed classroom that reminds one of the lecture halls of university days. Imagine also a modern podium from which a teacher peers at his students and then enhances this with a computer built into the podium from which the teacher can control the teaching session. Add the network module and appropriate group-controlled software for the students. Interconnect all this to an advanced, multi-media projector. Install a white board and into the white board imbed a multi-media, interactive board from which all data is captured and transmitted online, or to any network-ready PC. Arm the students, each one, with a state of the art notebook computer, modulated around the network and hooked to it. And load the notebooks with level-grade books and all the extra material a student might require for research. Provide wireless and wired supervised Internet access in all hallways, libraries and other recess areas in your schools. Give the teachers interactive writing pads to maintain connectivity within the domain of the classroom, and thus eliminate boundaries. Interconnect your campuses, if you have more than one, to allow distance learning and improve efficiency. Allow online data collection and retrieval. Now supervise the transformation of your curriculum from the standard format into presentations or content, formulated and finally enhanced by graphic designers. Then train and re-train your teachers and your staff to adapt to the modern technology.
At our schools, we installed these systems in 34 classrooms in the 10<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> grades. And then we bought 2,000 notebook computers and gave them to the students. We welcome you to our world. Dr. Craig Barrett, the President of Intel, heard about this a couple of year ago – this was back in 2004 – and he came and visited. AMSI students in the 10<sup>th</sup>, 11<sup>th</sup>, and 12<sup>th</sup> grades now carry notebook computers that have their standard text books in digital format for ease of access and manipulation. In our environment, their teachers use multimedia settings in the networked classroom set-up where the server allows them access and the access allows them to download their presentations from the school data banks. They edit what they require in real time into the platform that they have in the classroom and then, at the end of every session, they upload what they have just edited straight into the students' computers or onto our web page. Well the simplicity of my description may not go well with what you saw on the screen, so I leave the complexity of the systems we have made to your imaginations.

I wanted to begin my talk just like this to tell you that we stand far ahead in terms of technology transformations over the last six years. Our visions have long been realized. My initial presentation two days ago was set to continue along these same lines. I was going to tell you how we did it. I was going to describe to you each component of the technology and the problems and the challenges. And then obviously, I was going to tell you that we are fantastic at what we do and then basically introduce a lot of marketing about AMSI and perhaps push some of you to buy some of our products. Yet, five years after the most sophisticated environment has been made available to our teachers, I stand – especially after the first 24 hours of this conference – proud and disappointed. Proud because we have done it – we have come a long way and we have achieved it. Six years later, our students and teachers share a fantastic environment. But at the same time I am disappointed because I know now that it was never enough, it was never going to be enough.

Our classes are the ultimate tool of delivery, they stand as the next step of academic evolution. For any school that does not have the technology we possess - and the dream, I am sure, of a million school principles who do not have this - I must say that our classes alone do not bring forth the single, most fundamental of all human qualities, the essence of our vocation as teachers, which is the student's *passion*. All of this technology does not bring forth the passion. The questions we now ask six years later and since completion of our technology transition, have now become problem-driven. I look into the university graduates that I see applying for jobs and I hear from friends around me and I realize – and I want you to realize with me – how many are missing their mark because they never had a chance. A graphic designer who does not have artistic skills is doomed to work for someone who does, and therefore he or she shall never become anything more than an advance photo shop user. How many advertising and marketing graduates do not have the basic skills to be creative within their profession; they have the degree but lack the passion. They have jobs, but cannot build careers. I can go on like this. I can cite examples from finance, from accounts. Even from engineering and IT. We are all firm advocates of the necessary technology revolution, but over the last six years of our arduous implementation, we now know the tools of our trade and technology enhancements must be used in the development of *character* - not only in the betterment of delivery and data access.

Imagine with me - this is something that we have created and I would like to share it with you – what if we created an environment where passion is nurtured? What if we had a

pre-engineering lab – physical and virtual – with say, a tensile testing machine or a compression machine or a hydraulic displace system and a host of electro-mechanic tools for the students to experiment with? This would be something to tickle their minds away from the requirements of physics or math. What if we could run experiments and simulations of extreme engineering in a virtual lab for high school students? This would allow direct student exposure to processes without the math and physics required and the theoretical assimilation. The purpose of this is not to test them or show them the experiment. The purpose is to see if they are interested in becoming engineers. To see if they will be tickled or if we can create a certain curiosity so that they become engineers. Or we can divert them. The idea is what if we could tickle the interest of a young mind and, just as importantly, what if we could divert the interest of another who is not really interested, but is being pushed there.

What if we could test a student within a pre-business simulated or real environment to see if he or she is suited for financial studies and business administration? What if we could identify a possible medical researcher? What if we could recognize the artistic inclinations in a student to direct him into graphic design or divert him away from it if he does not have the talent? What if in a mass media lab we launch a future director who otherwise would have gone into international law or medicine, thereby completely missing his original vocation?

Now let me tell you about the International School of Arts and Science (ISAS) model. It is a school and it is not a transition between a regular school and a vocational school. All we have done is to provide labs. We have the standard physics and we have the standard math. Our students are in the core curriculum studying standard subjects. They will not deviate. These labs will be offered to them as additional learning experiences. We have a music lab that has a music studio, and all the students do is record and they are exposed to the rigors of what the guys in translation have inside the booth. They just have a recording studio in front of them and they are exposed to it and maybe they would like to do that as a career. And what we would do is to push them in that direction. The whole purpose of the ISAS model is to try to show them - as much as we could – what is really out there so that they can perhaps have a better selection process.

Technology forums and conferences like this one have long presented us with hardware and software and content. The tools presented were delivery enhancers, faster search engines, data base managers, routers, and overall playgrounds for technology exposure. There has been reporting on GDP, and yet we rarely address the real problem in technology forums. I address you as decision makers, strategists, and authorities in your fields. Your schools and your universities and their exercise and endeavor are building the men and women who are going to manage the future. It falls to your institutions to best align the qualifications of a person and direct them into the field that he or she excels in. If they are not directed into the right vocation, then they will miss their true vocation and neither first class technology nor advanced content would have helped. The tool in this case would have remained the tool.

Strategies of deployment, transition and implementation of educational technology must include academic empowerment and passion recognition. We must create a technologyenhanced means of identifying student potential and ways of exploiting that potential. Only then will we have fulfilled our own true vocations. This requires a fundamental involvement of academicians, policymakers, at both the high school and university levels. It requires institutional feedback from recruiters and employers. It mandates the involvement of authorities to encourage the transition from standard and technology enhanced classrooms and to secure that this transition rolls out hand-and-hand with curriculum adjustments to accommodate the field results and to maximize the exposure of the students. We all know the difficulties that come with the dynamics of change, but in this case it is not an option. It is just as necessary as the transition to technology use was for us six years ago and still continues to be for a large portion of the world. I share my concerns with you and hope to add to your focus a concern that has been living inside our school walls, our offices and our homes. Technology and passion must go hand and hand or else all transitions remain only tools, and tools eventually become obsolete.

I thank you.



# **PARALLEL SESSION #1**

# THE JORDAN EDUCATION INITIATIVE

#### The Quantum Leap in Education

Rana Madani Head of Educational Research and Innovation The Jordan Education Initiative (JEI)

Good afternoon. I always like to start any presentation with a quote that I think will fit the content of my talk. This is my quote for today's session.

Our Age of Anxiety is, in great part, the result of trying to do today's jobs with yesterday's tools.

Marshall McLuhan

This quote talks about how rapidly things are developing and that if we refuse to move while things are moving around us, then the end result is that we will be behind.

When I was told that I would be talking with you today, I thought of the changes that are happening in our schools and in the education system these days. As Haif has said, I was a teacher for 14 years. During those years, I was looking for any tool that might help me and aid me to be a better teacher. At that time, I felt that technology could be a very good tool. I was a person who was afraid of the computer, but then I realized that the computer could offer me much and really help me to deliver the information to my students in a better way. If we look at education right now, and we look at teachers and how their role is evolving during these days, we can see that the teacher is not a lecturer any more. Rather, the teacher has changed from a person who will stand up in front of his/her students into a person who will actually be a learner with the students in the classroom.

In order for any country or for any institution to start implementing a new education program, certain policies and strategies have to be changed. I cannot claim that I want to start working with technology and yet I keep my own old policies and strategies. You have to have a new system. You have to look at your system to evaluate it, to revisit what you have and to see if what you already have is going to fit with the program that you are going to adopt. If not, you need to be very flexible in order to do the needed changes that will make the new program fit smoothly and lend itself easily into your future strategies and policies.

My presentation will include comments from real life educators in the Jordan Discovery Schools. I will start with one of our distinguished Discovery School principals, Intisar Al Gheiwi, from the Princess Taghreed School.

The use of technology has impacted the school in different ways. The school focuses now on the quality of education, not on its quantity. The school also

has started using different methodologies, such as collaborative work between the students and teachers. The school encourages creativity among teachers and students. The teacher has become a facilitator in the classroom rather than a lecturer. Technology has also helped learners to solve a problem and supported self-learning. It has also stimulated competition, creativity and interactivity. Other important impacts have been the saving of time and effort, as well as the exchange of ideas within the local community. Our school has two computer labs, eighteen laptops with projectors, and lately we have had the interactive white board, which has created a different learning environment in our classrooms.

Now let us take a look at the paradigm shift that is taking place in education. As you all know, at one time our societies went through a period known as the industrial society. If you look at the education system maybe thirty years ago, it used to be a system in which the teacher was the center of the education process - the teacher lecturing the students. In those days, some schools did use technology, but not all of them. The curricula at that time were actually fixed curricula that were not open to the outer environment or to other societies. The curricula of a particular country was focused solely on that country and would not look outward to other countries and to other educational practices in different parts of the world. Also, if you all remember, we were required to memorize a lot and we were bombarded with too much information, resulting in the fact that we soon forgot what we had learned.

However, if we look at the technological society of today, we can see that we have a society that is centered around multi-media. In education, the learner is the focus now, and we have a flexible curriculum where we can employ an interdisciplinary approach. A teacher or student can connect different disciplines together, and there is global networking as well. Simply by a click, you can see what is happening in different parts of the world. You can be a self-learner, having access to any online course and getting a certificate without even the need for an instructor or a teacher. Today the learning process is a lifelong process for anybody who wants to learn, even if you are in your fifties or sixties or seventies. Through the Internet, an older person continues to have access to education, finding courses and information that is available everywhere.

Now let me give you the comments of another principal, Manal Qadourah of the AL Shifa' Bint Awf School, which is one of the distinguished Discovery Schools where we have excellent leadership and tremendous motivation among the teachers who are adopting all the changes in a very, very fast way.

AL Shifa' bint Awf is a Discovery School that has been supplied with a variety of technologies represented by computer labs, laptops and different e-contents, such as e-math, e-science, and e-English. Technology is used everywhere in my school, whether in the administrative work, in the classrooms, or when we celebrate our annual Technology Day. Our students also communicate with the world through the Internet to exchange ideas and experiences. Despite the fact that the school is in a poor area, it does have the technology that can serve the students and teachers. Although we are living at the time of globalization and information technology, this development does not cancel out the role of the teacher, the book and the pencil. The well-trained and effective teacher in the classroom can mix and blend technology with the traditional way of teaching, which has also changed and developed over time.

In the Discovery Schools, we have a wide variety of teaching methodologies. Students can learn in groups, through debates, and alone using the computer. In addition, recently we have initiated the smart interactive board in our classrooms. These boards are helping the teachers and are transforming the classroom into a very interactive environment.

For a school or for a system to have the technology, what are the things that we basically need? First of all, we need to have the hardware in the school. Next we need to have training for the teachers – training around how to use the new hardware and how to teach the new content. Finally, we need to have a content that will suit the new technology or the new ideas that we want to deliver to our students.

First of all, I would like to talk about the teaching aid or **the hardware**. What do we need in our schools in order to be able to deliver the new content? We need the equipment. We need the supplementary material. We need the computers that can help us deliver the content. We need a library that has different e-materials. We should continue to have books, but there should be many choices so that the teacher can choose whatever is suitable for his or her subject. At the same time, we should not restrict the teachers to one e-content, but should have a wide variety.

We also need an **Internet connection that is reliable**. We have noticed that poor interconnectivity will frustrate and discourage teachers. For example, if they go to a classroom well-prepared to have a lesson using the Internet, and there is no Internet. At this time, we have to understand that teachers are dealing with a new, threatening methodology and technology, so we have to facilitate everything to make it easier for the teacher to deliver the content. We have to have professionals in the school who can deal with the new technology and help the teachers. The teacher cannot be responsible for delivering the e-content while at the same time fixing the computer or fixing an Internet problem. So there needs to be technical support for teachers so they will be able to deliver their content.

Another critical ingredient of introducing technology into schools is **Teacher Training**. Everywhere I go, I always hear the same question about teacher training. What can we do to help teachers? How are we going to train our teachers? Actually, we have found that training is very, very important. You might have the best technology in the world, as well as the best content. However, if you do not have a well-trained teacher that can deal with the technology, then the technology cannot help the teacher and is thus useless. On this topic, the following quote is one I really like : "Technology cannot make a good teacher, but a good teacher is the one who is able to know when and how to use the technology." Below are comments from one of our Discovery School teachers who has benefited from the training we provide.

My name is Abeer Sadeq, a math teacher and assistant at AL Shifa' Bint Awf School. I have benefited from the technology in my school, such as computer labs,

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personal laptops, and projectors, as well as the availability of Internet. All of this has enriched my personal knowledge by providing me with different teaching methodologies that positively affect my students. I also benefited from the several training courses about the use of technology and different teaching styles, training that enabled me to apply what I learned in my classroom. I have noticed that thinking and problem-solving skills have improved among my students and that they have become better learners.

What have we done in the area of teacher training at JEI to help these teachers feel more comfortable with the technology? If there is any opportunity for a training course that is found in Jordan or any other place, we always encourage and support our teachers to be part of these training courses. Also, whenever we install an interactive white board, we do training for those teachers on how to use such boards. As you know, according to the policy in Jordan, every schoolteacher must have the International Computer Driving License (ICDL). Furthermore, JEI has offered subject specific training taught by the company that has developed a particular econtent. Beyond this, the Kingdom is responsible for training other teachers who might use the particular content. We also enrolled a few teachers in an online course from Harvard University's School of Education. In addition, we have provided leadership workshops for certain of our school principals and are planning to provide more of these. Finally, we have recognized that many of our teachers and school principals would like to improve their English language skills in order to better communicate with the world. Therefore, we at JEI are thinking of offering certain courses for teachers to improve their language because the suitable skill for this global communication is the English language.

As I already mentioned, JEI participated in a training course provided by the Harvard University School of Education, and this was a new experience for teachers. They were engaged in lively and stimulating discussions with other teachers from all around the world. They learned exciting methodologies and strategies to use in the classroom, and ways to employ the new technology more effectively. In my opinion, it is very important for teachers to employ technology in this way because it enables them to create lively and interactive atmospheres for their students.

So far, we have talked about the **hardware** and **training**. Yet what about the curriculum? Are we going to keep the same curriculum with the new technology? Or do we also have to do certain curricular changes that will fit the new paradigm shift that is happening in education? What kind of curriculum do we need? What is the importance of having an e-content? Can it be true that we need the technology, but at the same time we are going to teach our students using traditional textbooks? Should we discard the books and look for other materials or can we have both, using the e-content as a supplementary material? Today there are many debates about books versus e-content. However, in my humble opinion we should continue to have both until a time when we are confident that the new e-content is a very good replacement for the traditional learning content in our schools.

Students are looking for something different in e-content. You cannot offer an e-content that has pictures similar to the ones in the textbook. You must look for an e-content that is more stimulating, more interactive and will actually attract the attention of the students and create a different learning environment in the classroom. Also, you need a content that is going to make the students not only better thinkers but also better learners, teaching them to rely on themselves in obtaining the information that they want.

On this topic of e-content, I want to share with you the words of another teacher who is at the Saint Phillips School in England.

A program we use and that the children use is a program called Text Ease and it is a Word Processing program. It also has many other things that they can do - spreadsheets, data bases, etc. It is a program very much like Word and yet it is very child friendly so now they know it so well. So they are not asking me how to do the program, they just know it.

In relation to e-content, I choose to talk about science because I used to be a science teacher. When I was a teacher, there were certain concepts that were difficult to deliver to the students because it was required that the students imagine what was happening. For example, one of these concepts is the movement of particles. No matter what you do and how hard you try to present this concept to your students - through all types of strategies - often it is just very difficult to make them experience what is happening. Now with technology, these difficult things are becoming easier. For example, you can show students the human circulation system and you can show them how blood is flowing. Or you can show students how particles are moving, what is happening with pressure and volume. Now with a very simple click, you can make your students imagine what is happening. With technology, you can demonstrate things that you cannot actually do in real life in your classroom.

So this new educational technology all looks very nice, very easy - but is this the real situation? No. There are always barriers that will stop many teachers from moving to use the technology. I have been in the Discovery Schools now for two or three years and I have felt the pain of many teachers that are in our schools. Some of them are very motivated, while others lack the motivation. Some of them simply need someone to lead the way for them and tell them, "yes, you can do it." People are very different, one from another. Some will accept the change very fast while, others will be more reluctant, and still others will say, "no – stay away from me." It is our job to work with all these different people, to convince them about the changing paradigm of education. They need to be aware that the world is changing, and the generation is changing. Students know a lot about technology, and if a teacher wants to communicate with students, that teacher has to know about technology.

Another barrier can be a lack of support. When I say support, it could be money or it could be time. Time is one of the major problems. Sometimes we want our teachers to change, but at the same time, we as principals or as the government are not ready to help make the changes for those teachers. While they already have very full schedules and too many things to do, we still ask them to adopt the technology. We have noticed that the key person for change in the school is the principal. The principal can move the school with him or her or can suppress the whole school. So if we have a principal who is really a believer and wants to make the change, then one will see amazing things happen in that school. It will be transformed from a traditional school to an amazing place with the new technology.

Another barrier to this change can be teacher mindset. Many teachers fear the change, and it is normal. Many fear they will be replaced, yet the technology will never take the place of a teacher. So we have to start working with those teachers to help them better understand and accept the new technology and teaching methodology.

What have we learned throughout our experience at JEI. I will start with the words of Saint Phillips again and then I will go to our experience in Jordan.

Take your time. Don't try to do it all in a hurry. Expect that it is going to take several years to provide a full implementation of what you want. Plan your development plan accordingly. The head teacher of the school needs to have a real mission for ICT and a real desire to see it developed in the school. Without that, you are not going to end up with a budget, with resources, or with the direction for the subject. Keep staff with you. Support them, train them, encourage them, but don't force the pace beyond what they can cope with.

But recognize that they will get there and help them.

Whenever you want to start a program, you have to pre-plan for that program. You have to have a clear vision, both at the governmental level and also at the school level. Each school principal has to have that same clear vision. *What are they going to do? Where will they be in 5 years time?* This is really important. When you have your vision, you start planning and you start looking for the tools that will help you reach where you want to be.

Technology can never replace a teacher. The teacher is the key person who will use the technology that will benefit both the teacher and the students. The commitment of teachers is needed. We cannot have a program without the commitment of our teachers. And there must be technical support. Technology can be frustrating if you don't know how to deal with it and if it is not available all the time. As stressed above, training is a crucial component, and yet, you cannot force the training on someone who does not want to make the change. Finally, it is a change management component that has to be in the schools from the start. That has to be in place before the program can be implemented.

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# **Educational Initiative University-School/JEI Partnerships**

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It is my pleasure to talk with you today about the University-School/JEI Partnership. My presentation will follow this structure:

- Advantages of Partnerships
- Forms of Collaboration
- What Makes a Successful Partnership?
- Barriers to Collaboration
- Universities-JEI Partnership
- Good Examples of U.S. Partnerships

First of all, what motivated me to talk about this topic is the fact that, I started working with the JEI just recently. Upon coming to JEI, I looked at the long list of partners and could find not one single university. Yet we know that universities are important institutions in any community, and there are many objectives that can be achieved through universities. I will start with this quotation by Daniel Gilman who was the first president of Johns Hopkins University, one of the best universities in the U.S. He expressed the hope that one day American universities would:

"...make less misery among the poor, less ignorance in the schools, less bigotry in the temple, less suffering in the hospital, less fraud in business and less folly in politics."

I think that all of us here hope that universities will be up to this level of aspiration and take these roads.

The core of any partnership in general is working toward the goal of simultaneous renewal. When universities and schools work together, it is important for each to realize that what they will get from this partnership is a renewal. The partnership concept rests on the belief that organizational performance can be significantly improved through joint, mutually dependent action. Above all, every one of us realizes that universities play an essential role in any economic and social development. Actually, universities are the economic engines in any society.

The purpose of the partnership between universities and schools is to improve learning for all students. This can be done by improving the quality of teaching, by providing support services available to teachers, by demonstrating ways in which schools can facilitate and promote learning, by providing opportunities for students to develop positive attitudes for higher education preparation, and by the sharing and dissemination of best practices between public schools and universities. So as you can see, there are many outcomes that can be achieved by this type of partnership.

There are many advantages for universities in such a partnership. First of all, university professors will get field experience. In most instances, university professors are accused of being theoreticians who do not know anything about what is going on in the real world. A strong university-school partnership would give these professors a good field experience. In addition, faculty members can advance their research because being in the field will open up new ideas and avenues for research issues. Also, university professors are involved in the solving and teaching of real world problems. In many cases, when a professor is talking to a class about a particular issue, he or she might use examples from the U.S., Europe, etc. However, it is important to provide concrete examples in class from what is going on in real life here in Jordan, in order not to be a theoretician all of the time. With this kind of partnership, university students will also gain training and skills. Universities are often accused of graduating students that do not have skills. Yet by entering into collaboration with schools, university students can get stronger skills and be prepared to have more opportunities to get jobs. Finally, such a partnership will lead to the generation and application of new educational research and, subsequently, an increased knowledge of teaching and learning.

Now let us look at the advantages for schools. Schools will receive the "know-how," since university professors have that "know-how," at least in theory. The partnership will also assist schools in improving their quality of teaching and quality of programs. Through such a well-structured and formal collaboration, schools will get access to university faculty as well as to university facilities. Also, with this arrangement, schools can solve their problems at a lower cost, or at no cost at all – as we will see later. When schools and universities work together, the success of the partnership will reflect back on the community and on the government, and this will stimulate innovation- the heart of any economic growth.

There are several forms of collaboration that can take place between universities and schools. One of these is service learning. By "service learning" I mean engaging university students in community learning and service activities as part of their regular, credited coursework and as a requirement for their graduation. Another form of collaboration is faculty involvement that takes the form of individual initiatives where faculty become the driving force behind particular community activities. Still another form of collaboration is to have teachers in residence, similar to a partnership between universities and industry where universities might have people from industry working as part-time instructors. This model also can be applied to universities where two or three faculty members are instructed to teach instructional methods and classroom management, while also supervising interns and pre-service teachers. Student volunteerism can also form the basis of a type of collaboration characterized by individual and voluntary initiatives where students engage in community activities. This would not involve coursework or credit, but would be totally voluntary. A final model of collaboration is that of applied research involving the university, faculty and students in data collection, analysis and reporting on current community issues.

Now that I have introduced the models of collaboration, it is important to think about how to make these partnerships successful. As in any partnership, it is important to have trust between the partners. Very critical to establishing this trust is to have good communication, and we can develop this communication by having visits between the two institutions. We have to view both schools and universities as open systems that are not closed to each other. It is also important to establish an office to coordinate the partnership, having a partnership point person in the Ministry of Education or the Directorate of Education and in the partner universities. Of course, any successful partnership must be seen as a win-win relationship with mutual benefits for universities and schools. From my point of view, a major impediment to faculty collaboration on projects in the community is the fact that this community work does not count as part of the promotion process. When a professor applies for promotion, the university is supposed to look at three main things: teaching; research; and community service. However, at the end of the day, they only look at the number of research papers you have published. It does not matter how much work you may have done within the community, since that does not count.

For such a partnership to be successful, it is also important to understand and appreciate a community's culture, and both partners need to reflect on the other's traditional ways of thinking. We have to admit that in such a partnership there are two different cultures - since the university's culture is different from that of the school. Each partner must appreciate the other's culture and be prepared to make efforts towards more collaborative activities based on equality, professionalism and mutual respect. These partnerships can also be successful when they create quality programs that attract students. Through these kinds of collaborations, universities can improve their programs and thus improve the quality of their educational product.

Unfortunately, there are many barriers to partnership. On the university side, there is the issue of teaching load, which is very high. As an assistant professor, for example, I have to teach four courses each semester. In addition, I have to have at least five office hours per week, bringing my load to forty hours. Given this load, professors do not have time to do community service or to focus on their own research. Another barrier is the lack of publicity or organized workshops. Many times, professors hear from the newspapers that the Ministery of Education has organized a workshop or initiated new programs, or sometimes the opposite happens - the university organizes a workshop, and we do not have attendees from various So as you can see, there may be a lack of publicity from both sides. sites. Furthermore, as I mentioned above, a barrier develops because the university does not link faculty promotions with the school/university partnerships. This appears to be a difficult issue to change since universities are still highly centralized organizations and, to a large extent, they are highly bureaucratic. A final barrier can be mistrust. A university professor may think that to collaborate with the schools is something that would not be easy because they think that school principals and teachers are not upto-date with what university professors know. On the school side, there is a misconception or mistrust because schools/community perceive university professors as being theoreticians and outsiders of the local community. Another barrier on this side arises from the fact that schools are bureaucracies too. For this reason, sometimes these schools are perceived as and behave like closed systems.

However, there are many good examples of university/schools partnerships, but unfortunately, not in Jordan. Most of these examples come from the United States. One of these is the Boston Higher Education Partnership, which is a consortium of 31 universities and community colleges in the Boston area. This organization has partnerships with Boston public schools, and they provide grants for graduate students, sponsor teacher training programs and offer assistance by working one-on-one with the Boston public school teachers. There is also the example of Rutgers State University in New Jersey, which has the Computer Usage Training Program. Here university professors work with schoolteachers, training them in technology so that the teachers can train their students in technology. In addition, there are several programs at Brown University in Providence, Rhode Island. For example, Brown has a summer program in which 400 high school students go to Brown University for an academic enrichment program. Also, they have the Computer Science 92, Environmental 11 Course, which is guite comprehensive. During each spring semester, teachers work with Brown students on developing course material about environmental issues and then during the summer, they work with Brown students to develop a course implementation plan. Finally, during the fall session, teachers work with both Brown students and professors on how to implement this in their classroom curriculum.

The partnership relationships I have described above would apply in a potential JEI Discovery School/university relationship because the Discovery Schools, while not synonymous with JEI, are one of the main components of the program. Currently in Jordan, there are about 6542 faculty members and 120,00 undergraduate and graduate students in 22 universities. While in these universities there are centers for community service and consultation, these efforts are not reaching into the schools. The only partnership that exists now between universities and schools is through the university schools of education, during the pre-service teacher training.

Jordan's National Strategy for Education, 2006-2011 stressed the need for faculty members to reach out into the community in an effort to motivate students, both graduate and undergraduate, to do voluntary work in their communities. However, we are not currently seeing that mandate implemented on the ground. What we need above all is the active involvement of university undergraduate students because these students could do many things in the Discovery Schools. They could work as volunteers in many programs, existing programs as well as new, innovative programs. Also, most graduate students are required to complete a thesis, and many could pick an issue in the community or in the schools. With a university/school partnership in place, university professors could direct students to study problems in the Discovery Schools. The faculty members themselves could also play a vital role in this partnership as they have in the "Faculty For Factory" partnership, established in 2004 and supported by the Jordan-U.S. business partnership. In that case, each faculty member in engineering or in other fields works with a factory to solve a problem. We could translate that into "Faculty For School" or "Faculty For Faculty ( teacher)" partnerships, with university professors working one-to-one with school teachers.

There would be many advantages to the university in a partnership with JEI: using the Discovery Schools as labs for innovations in education, technology, etc.; developing software and training programs for the Discovery Schools in collaboration with the JEI; improving university offerings and programs; and producing employable graduates. Finally, such a partnership would allow university students and faculty to work with a highly experienced team in both education and technology – with the team that the JEI has assembled in e-curricula, training, change management, technology, etc. The university would benefit significantly by taking advantage of this experience.

For the JEI also there would be many advantages in a relationship with Jordanian universities. The JEI can work with faculties of education to improve the standards for teacher professional development. For example, Jordanian teachers are required to have ICDL. This could be done in universities where the government would save money with graduate students teaching the ICDL courses. Similarly, the JEI could also cut costs with some of its other teacher training programs that could be provided through the universities. And finally, one major goal of the JEI is lifelong learning, something we are working to reactivate. One idea is to provide this education in after school programs. Such programs would mainly depend on volunteers and of course, university students would make excellent volunteers for this effort.

In conclusion, partnerships can make a difference and they do make a difference. University-school partnerships are a must for both organizations. These partnerships are "win-win" relationships and they must be perceived as such. The minister of Education, the Minister of Higher Education and the JEI should find ways for collaboration. Schools and universities should understand each other's culture. So what is next? The first step is to decide who goes to the other. The JEI goes to the university or the University goes to the JEI? That I believe must be the next step.

#### **Effective Engagement of the Private Sector in Education**

Emile Cubeisy Vice President Accelerator Technology Holdings Amman, Jordan

What I really want to share with you here today is a look at private sector partnerships in education from both sides: from the perspective of my experience when I was part of the JEI, as well as my experience now when I am in the private sector. I want to discuss how we perceive the concept of partnerships and to share all the lessons I have learned on how to effectively engage the private sector in development lessons overall, but most specifically in education.

It is important to place this discussion within a context, and the context here is the concept of *need*. When Jordan started the Jordan Educational Initiative (JEI), it was within the context of the fact that this country has no resources except for the people who live within the country. Given this concept and reality, we had to achieve a fundamental change within our educational process just for the simple goal of survival. It was a tough sell to approach the private sector with a compelling case that would open up their doors to participate with us in catalyzing a lot of the educational changes we have talked about today. It was a tough sell because we are a country with a per capita GDP of 1600, a relatively small population of six million plus, and no substantial economic base, so to speak. For these reasons, we really had to convey and sell the concept that Jordan is capable of generating innovation and producing value-added dividends not only within Jordan's borders but also beyond those borders. So this is the context and history that I want to convey at the start of the discussion because, when you live it, you realize how true the lesson of JEI is. It is a lesson of how a small country – and it could be any small, emerging country – can really effect change. And this change is not just at the country level, but also at the institutional level and at the individual level.

Clearly we see today that the world is probably more fluid, complex and interdependent than it has ever been before. As a result, there is fundamentally a requirement to continue to change and innovate. Today knowledge is the "natural" resource and innovation is the process - a process without borders. Today also, the landscape for knowledge has become more advanced, sophisticated and cluttered than ever before. As a result, today when we look at this sophisticated knowledge, we can either approach it with a clear vision of what we are trying to achieve with it, or we can fear the changes necessary to attain that achievement.

So just who are the people who possess this knowledge, the "knowledgeable people?" Who are the people that are catalyzing the changes today, and how can we really become one of them? Fundamentally, from my perspective, a knowledgeable individual is one who sees change as the only constant and understands that the idea of change is always accelerating, always moving faster and faster. Also, the knowledgeable individual is one who is not limited only to seeing things within his or

her own box, but understands things within the context of the larger system, taking a holistic view overall of the phenomenon of change. Probably most important in describing the knowledgeable person is the fact that this individual accepts the truth that there are many alternatives - there is the possible, the probable and the preferable, with his or her focus always being on the preferable.

Within such a world context, within a system where things are constantly changing, where endless dynamism surrounds us, and where we in Jordan are competing like everybody else, ---- who is it that we seek as partners to create educational change? It is the global company. Yet the global company to me has never been about borders or about the concept of multinational corporations. The global company is a mindset, and this type of company understands that the only comparable advantage they have is within their process of innovation. How do they make the company better, how do they create better? I have found that these global companies combine market and technology know-how with the talents of knowledgeable individuals to solve the constant stream of challenges in our world today. It is not about the entity, but rather about the people within that entity that are creating the change, enabling something like the JEI to implement the type of change it is creating. For example, I can name individuals in certain companies who, despite opposition to JEI within the company, saw value in the initiative and helped create the change.

Another characteristic of the global company is that it brings markets together through local-global alliances. These partnerships are not about hand-medowns, but are about global-local co-creation -- co-creating within any environment, whether it is at the level of a school or at the level of a country. The last characteristic of the global company that I would like to mention here is its ability to empower principled pragmatists that are results oriented. In our efforts at co-creation, we cannot forget that results are the key. Therefore, in undertaking an initiative like JEI, one has to look for companies out there that see the value, are willing to deliver and can bring this whole effort together.

What does the private sector bring to an educational reform initiative like the JEI? Obviously, one thing is money. Yet even more important than money, there is a leadership component that the private sector brings at both the local and global levels. Their ability to engage and to bring things to life is a critical reason why the private sector role is so important within the overall process. In addition, research, technology and best practice are additional strengths that the private sector brings to a partnership. When we look at them, we may not understand or see the relevance of these strengths, but this relevance develops through dialogue. Another tremendous contribution the private sector brings is competency in management and project execution. We can say we want to do something, but how do we create it and where does that discipline come from? Speed of implementation is another important contribution. When we look at private sector participation and the value that the private sector brings, we recognize that the private sector accelerates the process of development because it is less bureaucratic. It is able to move quickly and develop key pilots efforts that others can see and emulate over the entire process. And their

last but not least contribution is that, through their linkages with other initiatives of a global perspective, they are able to help bring this all together.

So what are the requirements of a global company for engagement in a partnership like JEI? What do they look for? In my experience, leadership is the most important requirement the private sector seeks. When they engage in an initiative, they want to feel that the people at the other end of the partnership care enough. Here I am referring to the leadership at the other end. One of the blessings that Jordan had in this process was His Majesty King Abdullah. He was very vocal in driving support for the country and was extremely active in insuring that these private-public partnerships would succeed. In addition to the leadership of His Majesty, the Minister of Education was also very passionate about this initiative. With this strong leadership at the top, global private sector companies, as well as local companies, could see clearly that someone cared at the other end of the equation. In addition to leadership, these companies also look for passion and entrepreneurial spirit. At the end of the day, it really is about passion because ultimately when the private sector is participating, they want to feel that: 1) its involvement is making a difference; and 2) there are people on the other side that really care about the initiative.

Still another requirement for global companies is a long-term commitment to goals by all stakeholders. For them, a partnership project cannot be a "one-off." There must be a broader, intrinsic value to the effort being undertaken. There must also be evidence of a clear plan in place. In this regard, I will never forget when the CEO of Computer Associates stood up at the World Economic Forum and showed the work plan of the Jordan Education Initiative, citing that plan as why companies should invest JEI. i n The work plan conveyed a language those companies could understand. Project participants were being held to a real sense of clarity, accountable for timelines and deliverables. Final requirements for a company to participate include an alignment with company objectives and core competencies, as well as assurances that the initiative has proper management infrastructure, providing confidence that the effort will succeed.

On the other side, what are academia's requirements for such a partnership? From what we have seen, the most important requirement is that there be corporate champions. What makes all the difference is not the corporation itself but the people in the corporation. We had a gentleman from Microsoft that I will never forget. He was dead against the approach Microsoft was following with JEI and advised them otherwise. He was an educator, first and foremost, and fundamentally cared that the initiative would succeed.

For academia, one of the biggest challenges of private sector participation is the fact that it tends to follow a rollercoaster pattern. Of course, education is not a rollercoaster process, but is instead an eight to ten to fifteen year investment process. On the part of academia, there needs to be assurance that the private sector shares that medium to long-term perspective. A private sector partner must also possess a basic understanding of the initiative's context, its educational goals and its markets. I will never forget when one CEO made a recommendation that Jordan should aspire to an education system similar to that of Ethiopia. Now I do not want to take anything away from Ethiopia, especially since I know nothing about their education system However, Jordan has a right – as any country has the right – to choose the type of education and outcomes that it wants, rather than what others dictate. Therefore, a critical requirement by academia is that a partner has the ability to understand and embrace the goals a country or an initiative is trying to achieve.

Still another requirement by academia is that there be customized approaches rather than a "solutions-in-a-box" methodology. Every corporation, every private sector partner will take out a catalogue or a brochure and present five thousand different initiatives or ideas straight out of the their catalogue. A great thing about the Jordan Education Initiative was that we did not compromise and go for the easy solution, saying "give me this generic solution, or give me that generic solution." Instead, we sold these companies on the value of coming with us, investing with us and finding together the right solutions for Jordan. And these innovative solutions we create locally have a broader, global context and significance.

In an initiative like JEI, any private sector partner must have a mindset of coexistence with other global companies. These are not "one-ups;" it is not just a situation of you and me going out there and doing something. Rather, education must be viewed within a broad context, and there need to be partnerships with a wide variety of companies. Any JEI partner must learn to work with others. This is something that is very important for the private sector to understand. A final requirement by academia is to encourage local impact first and let maturity develop.



# **PARALLEL SESSION #2**

# **BLENDED LEARNING**

# Blending Using Online Activities: A Case of a Significant Learning Experience at a Jordanian University

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### Abstract

This qualitative case study discusses a personal experience of using several online activities with a group of adult students. The study illustrates how an online environment can supplement face-to-face teaching to produce greater significant learning experience for students. The online environment was based on using open source learning management systems. The study examines a group of post graduate adult students' perceptions on their first interaction using active pedagogy in an online environment. The study demonstrates that the environment is well accepted by students and had greatly contributed to their lifelong learning skills such as communication and critical thinking skills. In this environment students were engaged in attaining six learning goals that are in line with Fink's "Taxonomy of Significant Learning" [1]. This study is an encouragement for the adoption of blended learning at local institutions.

# 1. Introduction

Many higher educations especially in western universities are blending, online education with face-to-face learning using asynchronous tools such as discussion forums, wikis, blogs either in an open public online environment or privately enclosed through the use of learning management systems. Blended learning is an effective approach since it can combine the best learning techniques, technologies and deliveries to provide meaningful educational experiences for students [2,3]. The literature has widely accepted that the use of online tools can provide a flexible and a motivating platform for deep understanding of knowledge and development of skills such as critical thinking, retention and recall, communication, and use of technology [4].

The use of online activities allows students to engage in discussions that may result in construction of new knowledge. This concept of learning known as social constructivism has been laid down by Vygotsky [5], who suggested that knowledge is socially constructed during interaction with others and where language is the main tool that can promote various modes of critical thinking including problem solving. It is also argued that if students construct knowledge for others to read, it will result in a more effective way of learning and remembering knowledge. Students become teachers and learners at the same time [6]. Therefore, students need to engage with a community of learners to gain significant learning experiences [1].

### 2. Case Context

The teaching approach in Jordan is predominantly teacher-centered. This approach relies solely on pedagogies that emphasize rote memorization, and neglecting deep understanding, critical thinking and development of lifelong learning skills. Student in this paradigm are passive and can become easily overburdened with information to be memorized. Teachers and students in this environment are also susceptible to boredom and teachers may also lack motivation for innovation in teaching [1]. Education in Jordan now is going through a paradigm shift and this case is a step towards creating learning that is more meaningful.

This case examines the online learning experience of adult students at masters' degree level at one of the universities in Jordan. The students were all in agreement that the didactic approach of teaching was adding little value to their knowledge and experience. This had encouraged the teacher in this case to go beyond the norms and to experiment with social constructivism through the use of set of face-to-face and online activities. This paper examines the impact of online activities. Students for the first time were introduced to online activities through the use of open source learning management systems called Moodle [7,6]. The online activities were complementary to the face-to-face learning and were based on using blogs, wikis, discussion forms and glossaries building to

#### 3. Research Method

Being a first time experiment for the teacher and students, it was worthwhile to examine the impact of such environment on their learning. The study was set to answer the question "How online activities have impacted students learning?" Data was collected over five semesters from 150 students. The data collected was qualitative in nature and generated by asking online open ended questions. Over 300 statements were collected. Students were asked to discuss openly the things they liked and disliked about their online participation.

The "Taxonomy of Significant Learning" proposed by Dee Fink [1] is used to analyze students statements to understand the impact of online learning and in order to determine if it is worthwhile to continue blending. The taxonomy is a deviation from Bloom's taxonomy and it is targeted towards higher education. Individuals and organizations in higher education are expressing a need for additional type of learning that impact the lives of adult students for example learning how to learn, leadership and interpersonal skills, ethics and the ability to adapt to change. Fink [1] argues that for learning to occur it must have a lasting change on the learner; "no change, no learning". Significant learning relates to the different ways learning can occur and creating a lasting change that is important to the learner's life. Teachers want their students to learn something important or significant, rather than something relatively insignificant [1]. Fink's taxonomy is based on six interacting elements related to different kinds of learning that are needed to create a more significant or higher level of learning to students. These elements are foundational knowledge, application, integration, human dimension, caring, and learning to learn. The next section discusses these elements. The taxonomy is also considered as a tool for formulating learning goals in a course.

#### 4. Findings and Discussions

The online learning environment was described by students using words like "interesting", "enjoyable", "rich", "motivates", "interactive", "easy way to learn", "relevant to our lives", "great experience", "no stress", "creative", 'active' and "beneficial". These words are indicative of the positive impact of the online environment on the students learning, making the environment worthy of examination. The analysis indicates that students engaged in active learning using online activities had reshaped their learning in a significant way compared with what they were used to. From students' perceptions, the combination of activities allowed students at various degrees to experience Fink's six categories of learning (foundational knowledge, application, integration, human dimension, caring, learning to learn).

#### 4.1 Foundational Knowledge

This kind of learning is related to content acquisition, key understandings and remembering of various topics including terminologies, concepts, theories ideas or perspectives. This type of knowledge is needed to scaffold to other knowledge and to initiate reflective inquiry. It is foundational for the 'application' and the 'integration' learning element. Although students were attending face-to-face lectures and obtained fundamental knowledge, they also perceived that learning through the set of complementary online activities had provided them with richer environment for fostering understanding, gaining further rich knowledge with better retention and recalling. Some excerpts from students to support this claim.

...it was a great experience, as it added a lot to my **knowledge** of the subject taught...The best thing in this forum is that it allows others to comment on your post, the **more opinions** we get, the **better understanding** we gain. In addition, this helps other students on getting **more knowledge** when they **read** and **answer** each others' posts... the online activities give a real **depth** for the theoretical information gained in class ...it gives us a chance to **know** 

different points of views... It allowed me to understand some topics that were not comprehensible to me, through the many contributions for one topic, which gave me more understanding and gaining more knowledge for that topic...critical thinking forum enabled me to construct appropriate **new** knowledge by interacting with the other students...when you search for the meaning of the word it will stay in your mind and you will always remember the word, and that help's you to use the key word in your answer or in your discussion... When I write about this topic in my own words, I feel I don't have to spend that time on that topic when I study for the exam, because I already had studied it in a different way...encouraged me to discuss subjects that I feel is important, which encouraged to learn more about it and stored in my *mind*...*it is an excellent way for learning, when an issue is posted, it enables* everyone to join in to give their opinion in a discussion and through this, students gain variety of information on the topic being raised...It helped to develop deep understanding and more accurate on issues being discussed... When we search the internet on a specific topic, it builds deep ideas and gain experience and knowledge.

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The interactive and collaborative environment gave student the opportunity to understand topics in depth and gain diversified knowledge in a new different way and their own language. The term in "their language" means that it is written in simple language away form the jargon of text books or written in their own Arabic language. The online environment had encouraged students to be more active in searching, reading and writing, which seemed to have impacted the retention and memory recall of information.

#### 4.2 Application

This kind of learning is related to students gaining certain skills to allow for engagement in critical or creative thinking or practical development of ideas or artifacts, or managing projects. This kind of learning allows the other types of learning to become useful e.g. using foundational knowledge to think critically about a certain issue or by doing something practical with it. Examining students' comments we can see that they were involved critical thinking and skills development.

# a) Critical thinking

Sharing and storing content using online activities gave students the ability on regular basis to examine the content that was collaboratively and dynamically constructed, which gave them the opportunity to progressively learn by observation and to enrich and produce new knowledge and concepts. Some students' statements demonstrate the impact of the four online activities on their cognitive processes:

...can see other students assignments and **make comparison** and learn from others experience...can see **different opinion's and thinking** from other student...I liked having the chance to **have a look at other people answers and discussions** being conducted in regular bases through the web site...by looking at other students contributions you enrich your knowledge...when I read and view the importance of topics of each one of my colleagues I can see

#### Broadening the horizon of thinking:

the topic from many different points.

...discussions helped to enlighten my thinking in a more rational way....it helps me to think out of the box...extending the boundary of thinking, by trying to predict the possible outcomes or problems...answering other students questions opened my mind to different points of view and wide range of opinions.

### **Improving thinking ways:**

...it help me to think right and to discuss with others what I believe in and think...When you ask a critical question, it requires you to **think** about that topic, which will make you understand better ... it was an experience that enriched my ability to **think correctly** on how to comprehend the different raised topics for the subject...The critical question forum helped me to **think** more deeply about things, expand my knowledge and somehow changed the way I think... It influenced the way of my thinking, it made it more logical... encouraging thoughtful analysis ... it helped me to develop another *approach of thinking* by sharing ideas with colleagues... enable the student to think and think deeply in the issue and try to organize logical answer... developed the way of my thinking into a more logical and scientific way, and developed my abilities of producing questions...reading posts, you get to know the way that my colleagues are thinking and their opinion which can improve my thinking way... It is very useful and effective for me, I have gained great benefits because it helps to analyze the topics in a different way and makes the student think in a different way... It increases the analytical thinking skills for student...more time to read the question and reflect on it and answer it with care... It made me to **reflect** and search different sources to enrich my contribution ... the other benefit of the wiki project is team work, which allows for creativity and it is also a reflection of the students learning put in their own simplified language... a good way to organize your thinking.

The experience expressed by students may be described as being enlightening; they had ample time to be reflective, predictive, analytical and rational. The

environment was transformative for some students; it changed their way of thinking and expanded their boundary of thinking.

#### b) Skills

The application element also includes learning that can build certain skills. The described environment gave students opportunity to build skills in a number of areas, for example:

#### Confidence and freedom of expression:

...to discuss with others what I believe in and think.....I liked it because it enabled the students to go into open ended discussions, expressing their points of view, their thoughts and knowledge... you can give your opinion honestly and frankly without any limitations... ...I had more self confidence to introduce any topic that I find useful for students ...I like this part because it allowed me to freely choose and write about the subjects that seemed important to me, and in my own language without being restricted to certain points or paragraph from the book... it helps us to express our knowledge and enhance our communication skills by learning how to get to the point directly... it is different and very interesting, and gave me the opportunity to express myself freely and without any barriers.

#### Care and accuracy:

...online learning very beneficial because of the 24 hour connectivity, which gave me more time to read the question and reflect on it and **answer it with care**...because I feel that I am going to prepare a document not only for me but it is mainly for others, because every thing should be **accurate and revised thoroughly**...With this style of learning, I found that there are other people who will be looking at my final work, so I used to allocate more time and effort for this purpose, which resulted in me gaining good experience on how to Arabize glossary terms using search engines to find a meaning that is **more precise**... I have to write the glossary in a **clear and understandable** way not to myself but for anyone to read.

#### Searching, reading, writing, and using technology:

...it made me search for answers... It helped me in writing in English ...gain more benefits from reading the other students' blogs...it made me search for answers whether from other books or from the internet...Online learning activity helped me improving my skills through writing intensively... It forced me to read some extra topics and in doing some search on the internet.. It provides a student an opportunity to practice composing professional writing **communication**...due to the exchange of ideas, opinions and discussions through the internet had increased my **communication skills**... encourages students to **read more** and think deeply about the subject so the y can contribute... Gave me the ability to **search the internet** and in return this was a positive impact on my understanding...It added a lot to my knowledge of the subject taught in addition of the **experience of using the internet**...it increased my **computer knowledge**... Strength's your knowledge and increases your skills in **using the internet**...the blog helped me to **search the internet and author information** content, as a result increased my experience.

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Engaging students in online activities raises the opportunity for students to gain lifelong learning skills such critical thinking, communications, and technology use. These skills were highly valued by students and gave them a sense of significant learning experience.

#### 4.3 Integration

The Integration goals gives student the ability to relate fragments of knowledge to build a holistic understanding of the subject matter or the ability to connect to other people or to integrate knowledge between different contexts. The ability to integrate provides the learner with intellectual power. The following statements illustrates that students were engaged in knowledge integration:

One of the important activity that we did and influenced my knowledge, is making connection between the book theory with the practice side...it helped me to focus on the **practical application** of information systems, specially in my field...the website, glossary, blogs, discussion board, helps to **bring everything together**...it was like diary I had to write daily! But it helps a lot in **linking** what we took in the class and the problems you are dealing with!... the critical question forum is very good part too coz it made a **relation** between the students and their thoughts... It pushes me to think deeper, in a more scientific way in order to **link** between what I'm learning and our daily life practices... After this experience I was able to conclude how to **harness** much of this information and concepts in a practical way, which encouraged me to shoulder the responsibility for **designing and building** a website for the company that I work for...The wiki helped us as student on how to collaborate and **tie ideas together**.

The complementary activities assisted students to see knowledge holistically. Students were relating various fragment of knowledge and were also integrating knowledge into their working lives.

#### 4.4 Human Dimensions (self, others)

This learning element or goal creates an environment for students to enable them to know something of value about themselves or others, such as self image or what they want to become. Sometimes students acquire a better understanding of others: how and why others act the way they do, or how the learner can interact more effectively with others.

To follow some of the student's statement that indicates that students were realizing that learning is not about only gaining information and knowledge, but it also includes learning about "human dimension" of life such as character development and selfawareness and self-regulation, empathy and social skills (emotional intelligence), students have said:

...It increases the self-confidence that the student needs to support his personality and to socialize in a community...It gave the opportunity to know how the other think, which I have to respect and give value. It is a mean of learning to hear to each other and communicate ... increase my ability of evaluating my mind power... I learned how to discuss issues with the group... helped us to cooperate to solve problems in teams, which is a good way to implement a project, exchange ideas and come with final decision as team, which enforced the spirit of working as one team and to accept the opinions of others...this allows me to see how much I am late when I compare my assignments with others' or even if I am doing well... how to **deal with my** self and how to see my self while I am in such situation which give a great sense (a feeling of responsibility) because I feel that I am going to prepare a document not only for me but it is mainly for others, because that every thing and every small or single thing should be accurate and revised thoroughly... I wish we had this site before, it allows us to interact with the instructor and colleagues in a better way... Increased the self dependency, and give the person a great feeling when he get the information he want and add values to his knowledge.

The dynamics of the environment allowed students to interact more effectively and purposefully with themselves and with others, basically they were learning about the "Human dimension" of life.

### 4.5 Caring

This dimension of learning creates changes in the way students feel or care about the subject, themselves, or learning. This change motivates students and provides them with energy to learn about the subject in a lasting way; deeper and more meaningful. Without genuine caring for the course, little educational significance happens. This type of learning is related to the development of new feelings, behaviors, interests and values. Examining students' feedbacks indicates that students have developed a sense of caring for the subject:

... I like the feeling that the student is **attached** to the subject throughout the whole week and not just during the lecture hours... I like the way we take the lecture cause we have to participate and share opinions and thoughts which makes us somehow active... I think this methodology of learning made me more enthusiastic to read more and participate with my other colleagues using the online activities...Builds a stronger connection with the material and the group... Many years later I will remember all about this subject...It motivated me to research...it increased my liking to the course and to its ways of teaching and the teacher, I wish all subjects are taught in a similar manner ... After this course I will think seriously about completing an MBA on line...doing activities online, exam online, receiving information and notes online which gave the feeling of being in touch with the course anytime, and the quick response from the site administrator and his wide interest and respect to his student which encouraged everybody to speak and write without fear... previously I used to check my mail box on daily basis, nowadays am not only checking my inbox but also course website... the fruit of this course is that I bought a laptop in order to connect with course from any place and time...I now feel like a post graduate student, because of the different and rich teaching methods, which had **developed a love for seeking** *knowledge* and also equipped us with technical and technological experience.

Students have cared for the course and its active method of teaching which had positively motivated their learning and skills development.

#### 4.6 Learning how to learn

In this goal students gain some understandings about the process of learning such as becoming a better learner by engaging in self regulated learning or deep learning, how to conduct inquiry and constructing knowledge such as engaging in scientific methods and how to be a self-directing learner i.e. planning for learning agenda, or becoming intentional learner. This type of learning gives the leaner sustainability in continuing learning for life with greater effectiveness. Some of the comments indicate that students were becoming aware of learning processes.

...Critical thinking forum enabled me toconstruct appropriate new knowledge by interacting with the other students, encouraging thoughtful analysis and enhanced me spending a lot of time searching, reading and writing...taught me how to learn, and how can I effectively introduce a technology and MIS in my work to succeed and meet work environment challenges and opportunities...it helped me to develop another approach of thinking by sharing ideas with colleagues...learning from each others and exchanging information and ideas, this will enhance new concepts during this

forum...stirring students up to continue learning all through their life...I admit, I used to find difficulties in assessing the value of topics given in the textbooks, because of lack of experience or prior knowledge, most of the topics were totally new. This experience has benefited me by changing my way of studying, which used to rely on memorization and than comprehension followed by application some of the understandings in my work, after this experience, became capable to abstract and how to utilize many of the knowledge and understanding in my working live.

Students' statements are indicative that they have acquired skills to learn better, how to construct new knowledge and how to learn from each other by collaborating.

#### 5. Significance of the study

This study illustrates that using online activities can greatly enhance face-to-face learning. The online activities have added new learning dimension for students and the overall reaction was a positive experience. Students experienced for the first time what it means to be an active learner. A student's statement may summarize how online learning was perceived.

The method of learning the subject was effective, it allowed collaboration, thinking and actions to collect information related to the subject, so in general it is a good way to learn and at the same enjoyable, but requires extra time and effort for the student.

The online experience expressed as being active and enjoyable because they had autonomy, were responsible for their own contribution and were allowed to interact with each other, exchange opinions, understand and learn better and at their own pace and in their own language. Online activities provided students with better ways of learning by critical thinking, reading, writing, searching and collaborating. Collaborative learning is a necessary component for teaching, and learning [8]. Another value of doing online activities is that students' work is visible to others; this motivated them to ensure their work is up to a certain standard.

Students sometimes were under pressure to deal with the various activities. However, they managed to conduct most of the activities because they understood the value of what they had to do, but most importantly because the activities were taskoriented instead of memorization-based [9].

The teacher had observed that students were able to deal with the subject's concepts and terminology much easier and were able to retain much of the information because learning was cumulative derived from different collaborative activities and almost on daily bases. The activities helped students grasp the various topics and developed a deep holistic view of the subjects. Students in this case needed less effort to prepare for exams because they were more confident of their

knowledge retention. Several students have taken the mid, final and comprehensive exam with little or no prior preparation.

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In addition, the use of learning management systems gives administration transparency to monitor students and teachers progress, since online activities can be considered as portfolio for the whole course making students and teachers tasks more visible.

Students now have higher expectations on the quality of their learning and have demanded that blended learning should be an overall strategy for the institution.

#### 6. Conclusions

The use of Fink's Taxonomy of significant learning had provided a good framework for understanding students' statements and to answer the research question: "How online activities have impacted students learning?" The online activities had extended the learning environment beyond the class room walls creating significant learning experiences for students. The online environment gave students including timid students an opportunity to think and express their knowledge and experience. The environment promotes active, self directed learning opportunities in a flexible approach. The question now is no longer about whether to blend with online activities or not. The issue is how to blend to achieve better supportive environment to achieve a more significant learning experience. Use of online activities should be encouraged at local educational institutions as a way to strengthen the face-to-face learning environment and in order to equip students with lasting lifelong learning skills.

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### Blended Learning in Higher Education: Tapping on the Best of Both Worlds

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#### Abstract

The emerging technologies offer alternative ways to conceptualize and deliver education in pursuit of promoting learning. One of the many ways is blended or hybrid learning. Blended or hybrid learning is steadily adopted my many universities around the globe as a way of improving quality of learning and making education accessible. This blend or mix of conventional face-to-face instruction and Web-based distance learning has a potential to create an improved learning experience for the learner or student. As this mode of teaching and learning becomes more popular among higher education settings, it is crucial to understand how it could be best utilized. The intent of this paper is to explore blended learning concept; its potential benefits and challenges in higher education from the perspectives of faculty and administrators that have had direct experience with this form of course delivery. The paper will further discuss blended learning at the University of Botswana (UB). The paper will conclude by discussing the implications for higher education with particular reference to developing contexts (i.e. University of Botswana).

# Introduction

The infusion of web-based technologies into the learning and teaching process has recently brought the term "blended learning" into the limelight. The new technologies have created new opportunities for teachers to interact with their students; students with their peers, faculty, content both in and out of the classroom. Many challenges have taken place in the ever-growing and mobile society and today's constant and rapidly changing technology and resource. In response to these challenges, universities are often at the forefront on innovative methods of expanding learning opportunities, increasing interaction between students and between faculty as well as meeting ever-present challenges (Berg, 2001). There is also growing importance and immense pressure to increase use of technology in classrooms and to offer expanded online options. Young (2002) stated that, a new idea of technologyenhanced education is a systematic growth in hybrid, blended, or mixed-mode instruction.

The movement toward the hybrid course is very recent in both documented practice and available research. Literature on this mode of education began in 1996, with the majority after 2002. Despite this recent research base, some semblance of the hybrid course is visible as far back as the early 1990s. Early adopters of technology

incorporated basic email capabilities and from there added class listservs and distribution lists by the mid to late-90s. Even though they are frequent they only offered the basics for such a course, such as syllabi and lecture notes, websites offered by some faculty grew and developed. Just as faculty become comfortable with technology, students push for more technology-integrated solutions (Simonson, Smaldino, Albright & Zvacek, 2003).

City University of New York (CUNY), the largest urban university in the United States, made the conscious decision in 1999 to create hybrid classes before the development of fully online courses to accommodate their faculty (CUNY Online, 2003). Other universities are also adding these mixed-mode learning experience for their students, examples include the University of Central Florida and the University of Wisconsin-Milwaukee. Major conferences related to technology and education are more frequently beginning to address the ideas, issues and experiences of the hybrid classroom (Garnham & Kaleta, 2002). Professional groups are also paying attention to what many intuitively knew offered a unique educational experience for the students and faculty.

Research and practice are beginning to determine that it is not always necessary to make a division between face-to-face classroom and the distance education experience nor must it be an either or proposition. A growing trend toward hybrid classroom reveals that "the future of education should not focus simply on only distance education or on only traditional face-to-face classroom. The hybrid alternative can present the best of both worlds situation for the institution, the instructor and the student" (Dunkle & Leite, 2004:3).

Garnham & Kaleta (2002) analyzed data from the University of Central Florida that substantiates the connection that, students who participate in hybrid courses actually achieve better results than their counterparts within the face-to-face or fully online courses. Retention data also suggested that hybrid courses do better in this area than do the fully online or traditional courses. Spilka (2002) who has experience of teaching blended courses agrees and offers a caveat that when instructors utilize the hybrid model their students are better able to become more independent and interact in a more mature manner. This is true when considering interaction between students and between students and faculty (Masalela, 2006; Soules, 2000). Some scholars suggest that engaging students in blended courses that present activities such as case studies, tutorials, self-testing exercises and simulations changes the nature of the inclass sessions (Meyer, 2003). Consequently, the focus of the classroom shifts from a presentational format (i.e. lecturing and information dissemination) to one of active learning (i.e. discussion and debate). General views on blended learning posit that, this form of learning involves putting our students in situations which compel them to read, speak, listen, think deeply and write.

It is crucial that educators have a broad understanding of the opportunities afforded the students in traditional, distance education and hybrid courses. A significant number of universities utilize blended learning and this number is growing. A survey on e-learning activity found that 80% of all higher education institutions and 93% of doctoral institutions offer hybrid or blended learning courses (Arabasz, Boggs & Baker 2003).

#### **Blended learning defined**

"Blended learning" and "hybrid courses" are terms commonly used to refer to courses that combine face-to-face classroom instruction with online instruction. According to Graham, Allen and Ure (2003), the three most common definitions are those by Bersin & Associates (2003) and Thomson (2002) who view blended learning as a combination of instructional modalities. Driscoll (2002) defines blended learning as a combination of instructional methods. Other scholars view blended learning as a combination of online and face-to-face instruction (Reay, 2001; Rooney, 2003; Young 2002).

The first two definitions reflect the debate on the influence of media versus method of learning. Both positions look at blended learning in a much broader way that encompasses all learning systems. The two definitions do not capture the essence of what blended learning is and why the scope of blended learning is so intriguing to many people. The third definition accurately reflects the historical emergence of blended learning systems. It emphasizes the central role of computer-based technologies in blended learning (Graham, 2004). In essence, blended learning is the "thoughtful integration of classroom face-to-face learning experience with online experience" (Garrison & Kanuka, 2004). The goal of hybrid or blended course is "to join the best features of in-class teaching with the best features of online learning to promote active independent learning and reduce class seat time"(Garnham & Kaleta, 2002). In this paper, the term blended learning and hybrid courses are used interchangeably.

It is therefore essential that faculty members understand how to create effective blended learning experiences that incorporate both face-to-face and computermediated (CM) elements. For the institution to be engaged in blended learning there must be a concerted effort to enable the learners and the faculty members to take advantage of both worlds.

#### Is there a perfect blend?

There is no standard on how much or what part of the courses should go online and what part to be left for face-to-face interaction. Different institutions implement blended learning in different ways. The online component of a course replaces a portion of face-to-face (f2f) instruction with Web components thus allowing for the flexibility of utilizing Web resources to reduce the on-campus time, yet allowing faceto-face interaction as well. Even though it is not clear as to how much or how little online learning is inherent to blended learning, it is important to ensure that the effective integration of the two main components (face-to-face and Internet technology) takes place. Therefore, the online component should not just be an add on to the existing dominant approach or method (Garrison & Kanuka, 2004). The mix is influenced by many factors including the course instructional goals, student characteristics, instructor experience and teaching style, discipline, developmental level and online resources (Osguthorpe & Graham, 2003). Consequently, no two blended learning designs are identical.

#### Why blend?

Many scholars that have had direct experience with this form of course delivery suggest reasons why they might choose to design a blended learning course. Some of the reasons include (1) pedagogical richness; (2) access to knowledge; (3) social interaction; (4) personal agency; (5) cost effectiveness and (6) ease of revision (Osguthorpe & Graham, 2003). There is a steady increase of non-traditional college students who often find it difficult to come to campus due to family responsibilities, jobs and many others. Therefore, reduced face-to-face hours required to attend classes provide a better option for them to juggle between jobs, school and family. Universities are looking for ways to reach and retain these students. The online component of a blended course enables students to access the materials at any time of day and review it as needed which provides them with increased flexibility (Carroll, 2003; Johnson, 2002; Hopper, 2003). Reducing time and space commitment makes access easier for the students. Consequently students have come to prefer these courses over the face-to-face counterparts (Dziuban, Moskal, Hartman, 2004).

#### Potential Benefits of blended learning

Faculty and administrators are realizing a number of advantages in blended courses and many see them as offering the best of both instructional worlds. The ability of asynchronous Internet capabilities communication technology facilitates a simultaneous independent and collaborative learning experience (Garrison & Kanuka, 2004). When thoughtfully integrated, satisfaction and success of blended learning can be attributed to the interactive capabilities of Internet communication technology. Since this type of blended course combines face-to-face and computer learning opportunities, faculty members are able to use a variety of instructional techniques. Hybrid courses aim to tap on the best of both online instruction such as efficiency, high-order thinking and freedom to access information anytime with minimal effort. On the other hand, traditional face-to-face instruction enables students to work with the new information presented, the human presence of the teacher and immediate interaction with peers in the classroom is crucial for some students.

Three major themes identified from literature as reasons for blending are: 1) more effective pedagogy; 2) increased convenience and access and 3) increased cost
effectiveness (Garrison & Cleveland-Innes, 2003; Swan, 2001). These themes are not mutually exclusive (cannot be decoupled).

#### More effective pedagogy

Blended learning provides the opportunity to improve upon prevalent pedagogical practices in both computer-mediated and face-to-face environment. Things such as class duration, size and location can provide a formidable barrier to making changes to one's instruction. The online instructional component presents the range of instructional strategies. Proponents of blended learning state the following benefits:

- Increase in active learning strategies used (Collis, 2003)
- More learner-centered focus (Morgan, 2002; Masalela, 2006).
- A greater emphasis on peer-to-peer learning (Collis, 2003)
- A change in the way faculty allocate time allowing for increased mentoring of individual students (Waddoups et al, 2003) and
- The possibility for interaction with remote experts or remote peer review of projects (Levine, 2000).

#### **Convenience and access**

Learner convenience especially for more mature learners with commitment (such as work and family) is increasingly important. Many learners want the convenience of distributed learning environment yet don't want to loose the social interactions and human touch in face-to-face class environment. Access to learning is one of the key factors in the growth of distributed learning environments (Bonk, 2002).

#### **Cost effectiveness**

Cost saving is the goal for higher education institutions. In one of the most comprehensive reports on blended learning, Bersin and Associates (2003) indicated that blended learning solutions are particularly successful and cost effective for companies when the "learning situation" has the following three components: "a business critical problem, a large, dispersed audience and a short time to complete and deliver the solution." Blended learning environments are cost effective in three components because they provide a means of reaching a large, globally-dispersed audience in a short period of time.

It is important to highlight that the growing popularity of blended learning presents new institutional challenges for higher education instructors to provide the necessary teaching presence in a blended formation. Some key challenges associated with blended learning are identified in the next section.

#### **Challenges of blended learning**

In general the challenges can be grouped into four major categories.

- 1) Finding the "right" blend
- 1) Adapting to the increased demand on time
- 1) Measuring the impact of blended learning environment
- 1) Adapting the culture to accept blended learning environments

#### Finding the right blend

One of the most significant challenges of blended learning is identifying the instructional strategies that match well with the conditions that are present in these two quite different environments. For high institutions to achieve the right blend, both a learning and cost-effective standpoint should be evaluated (Carmen, 2002). The pedagogical standpoint should find an appropriate combination of the two environments that takes advantages of the strengths of each environment and avoids their weaknesses (Martyn, 2003).

## Adapting to the increased demand on time

To design, develop, and deliver blended learning environments takes a great deal of time. When higher institutions decide to utilize both face-to-face (f2f) and computer mediated (CM) learning environment for a single course offering, the time demands of the instructor increase because s/he must develop both f2f and CM instructional materials. There is also increased time of faculty interaction with learners in blended learning environment. This is so because in online environments learners can communicate with their instructors any time. Therefore, instructors have to adjust their schedules to accommodate more frequent interaction with students.

## Measuring the impact of blended learning environments

At present there is no large-scale means devised that allows higher education institutions the means to measure the impact of blended learning (Bersin & Associates, 2003). The only measurement so far has occurred on a small individual case basis.

#### Adapting the culture to accept blended learning environments

The culture of the institutions to fit with such learning environments as blended learning has always been a challenge (Graham, Allen & Ure, 2003). Some elements that related to culture include comfort levels with technology, personal levels of discipline, organizational and management support and learner responsiveness. Higher educational institutions need to provide learners with technology skills they need to increase their level of comfort. If students feel uncomfortable with their technology skills, they are likely to be intimidated by the online components of a blended learning environment (Mouza, 2000) thus, may be pressured in that environment. The online component of blended learning requires extensive self discipline on the part of the student because learning is to a large extent independent. For blended learning environments to be successful, the culture of institutions in relations to persistence must change.

Lack of organizational and management support may present challenges to the future pre-eminence of using technological tools in higher education. In higher educational institutions, faculty is often hesitant to adopt blended learning because they are not sure if they would get departmental support. Management support is crucial for effective blended learning environments because of their influential status.

#### Blended learning at the University of Botswana

The University of Botswana (UB), the only national university, has included in its vision statement "lifelong and open learning approaches" as focal points for the institution. The university also identifies student-centered learning as a key component in its vision, which is one of the important features of online learning. The UB has translated its vision into a strategic framework towards a clear long term rationale for the use of eLearning. The rationale for using eLearning at UB includes:

- Increasing the quality of learning and the success rate of students
- Creating and supporting new research opportunities
- Alleviating increasing administrative and teaching pressures on academic staff
- Supporting academic freedom and freedom of speech through information flows, and;
- Making teaching more rewarding and exciting for academics (Molelu & Uys, 2003).

In 2001 the UB embarked aggressively on diffusion of online learning. The Educational Technology Unit (Edu-Tech) was charged with the responsibility of training academic faculty members in the effective and appropriate use of educational technologies at the UB. Two state of the art Smart Classrooms were implemented as the first wireless application at UB. Semi-embedded computers are used to facilitate eye contact among group participants. The computers are laid out in clusters to support collaborative work. A Mimio-board is used to display, via a data-projector, what is written or drawn on the white board. Microsoft Net meeting is used to project the white board or any other aspect of the instructor's screen on the screens of all the participants, or the screen of any participant to all other participants. The Learning

environment includes WebCT, an online content management system that was acquired in 2002.

Each faculty member at UB has a Pentium computer, printer or access to a printer, access to the Internet and e-mail. The UB Internet servers are dependent on Botswana Telecommunications for quality of connectivity. Issues such as bandwidth significantly influence the ability of students and faculty members to access computer-based programs as well as online learning materials. Students' access to computers is problematic. Even though the university attempted to provide computer stations for students, issues of ownership and availability are prevalent (Lee, Giannini and Nkosi, 2003). These authors stated technical problems that affected online learning delivery at UB:

Each Faculty (department) has at least one computer room for student learning but because of the fundamental nature of computer literacy skills, these rooms are often occupied all day by computer skills classes. Furthermore, not all of the computers in these facilities are connected to the Internet. In addition, students who are not registered for courses in a particular Faculty are not allowed to use computers in another Faculty...Faculties and units responsible for computer literacy courses are either not adequately equipped for the number of students or have no student computer rooms allocated to them. Students who need to access online courses may be unable to locate a computer on which to access the course (Lee, Giannini & Nkosi, 2003: 20).

Faculty members who are involved in using blended learning at UB identified some benefits and challenges. Faculty members believe that the use of online component improved their teaching, fulfilled their personal desires to teach, provided opportunities for scholarship, innovative instruction and intellectual challenge (Masalela, 2006). With regard to students, faculty members believed that students tend to become independent learners, are more motivated to explore related topics on their own and develop critical thinking skills (Masalela, 2006). Other advantages stated include readily accessible information, enhanced learning, improved interaction and lifelong learning skills. One of the faculty participators in blended learning stated, "...online learning is essentially a good pedagogical device. Its basically a method that enhances participation of learners...given that the teacher can reach the learners wherever they are...also facilitates some kind of continuous learning. In other words, the students don't necessarily have to learn during the restricted or allocated period of the learning process."

Teaching a technology-mediated environment posed a number of challenges for adopters of blended learning at UB. The most frequently mentioned points related to the technology infrastructure that included limited space/computers for students, technical support for students, slow network and shutdowns and students' attitudes toward using online learning component (Masalela, 2006). The Smart Classrooms could not accommodate their large classes because the spaces allowed only thirty students at a time. Lack of incentives and policy for blended learning were some of the concerns for faculty participators in blended learning.

Faculty members who are not participating in blended learning had mixed reaction for not using blended learning. On the positive side, faculty members reported that the administration promoted blended learning by making it available and providing basic training and support. However, the faculty members raised a negative impression about the administrative role of the Edu-Tech. They believed that Edu-Tech should take a more proactive role of selling blended learning. One of the non-adopters of blended learning argued that, "in terms of sensitizing and selling the online and teaching package, would be to come to each department and assess the situation and try to address the unique circumstances under which we find ourselves." Other concerns raised by non-participators in blended learning included lack of infrastructure, quality assurance, poor management, lack of incentives and large classes. Personal characteristics and external constraints were repeatedly mentioned by this group. Those included fear or lack of confidence in using the learning management system (WebCT) and technology in general.

#### Implications

There are implications that are associated with the ideas presented by this paper to developing contexts, particularly the UB. The (UB) may be somewhat ready (infrastructural) to blend face-to-face with online media but the implementation environment is not completely conducive. Firstly, the lecturers/tutors who are involved with blended learning need to understand and appreciate the value of technology in teaching and learning. Secondly, lecturers need training to acquire skills for integrating technology into their practice. Prospective students should have adequate skills to use technology. Currently, a small percentage of faculty members at UB use blended learning. The university does not have any reward structures for lecturers using blended learning. There is a limited number of Smart Classrooms and computers for faculty members and student use. These Smart Classrooms are not only limited but they can only accommodate a small number of students. Access to the Internet facilities by students and poor connectivity hamper progress of blended learning at UB. For UB to succeed characteristics of change such as transformational leadership, collaboration and organizational culture should take place where integrating technology is considered as a way to help the university to be a more effective learning organization.

The Government of Botswana is currently developing a National Information and Communication Technology Policy (NICTP). "It is envisioned that the National ICT Policy will position Botswana for sustained growth in the digital age by serving as a key catalyst in achieving social, economic, political, cultural transformation society within the country"(Botswana Draft National ICT Policy, 2005:8). The NICTP goals are:

- Creation of an enabling environment for the growth of an ICT industry in the country;
- Provision of universal service and access to information and communication facilities in the country; and
- Making Botswana a Regional ICT Hub so as to make the country's service sector globally competitive (p.9).

The newly developed DNICTP if implemented could offer some hope. It recommends some programmes aimed at increasing awareness and access to Information and Communications Technology (ICTs) including rural areas. Some of those programmes include establishing Community Access Centers (CACs), Mobile Internet Units (MIUs) and ThutoNet. The CACs will provide everyone in the community with an on-ramp to the Internet and access to a broader range of information services while the MIUs will help citizens in rural areas of the country to benefit from ICTs and Internet connectivity. ThutoNet will focus on exposing children to highly effective education in ICT and other subjects required for success in the digital age. This process involves efficient infrastructure connecting all schools and learning centers (accessible, affordable and fast reliable network services).

The "Computers for Schools Programme will increase the ratio of computers to students in schools, extends its reach to the primary level and introduce computers in the classroom to facilitate the infusion of ICT throughout the curriculum"(Draft National ICT Policy, 2005:17). This initiative will also include a critical component-professional training and support of school heads, school IT managers and teachers so that they have a greater understanding of ICT and how it can be used both as a classroom tool and as educational content. If these recommendations become a reality, a lot of willingness to change and learn new and better ways of doing things will be required on the part of all the key players (lecturers, administrators, prospective and current students as well as other stakeholders in the education enterprise).

## Conclusion

This paper explored blended learning approach and how it could enhance the quality of learning in higher education. It examined the following aspects of blended learning: right mix of blended learning, the rational for using blended learning, potential benefits and challenges of blended learning, blended learning at UB and the implications for developing environments particularly UB. In blended learning, technology is used together with other forms of media to enhance the achievement of educational outcomes. Because online medium is neither constrained by neither time nor space, it can improve the quality of higher education students who are geographically dispersed from one another. It could afford them the opportunity to engage in reflective dialogue with each other and their lecturers/tutors in a way that enhances the process of knowledge creation. These ideas imply that technology resources need to be available, technology awareness needs to be heightened and that

there should be a change of mindset to learn by all involved in the teaching and learning process.

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## Fostering Meaningful Learning and Argumentation Skills Via an Online Forum within a Hybrid Course

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# Abstract

Meaningful learning takes place when students are actively engaged in exploration of and argumentation about the subject matter under study. To attain such meaningful learning, the course "Methodologies in Information Systems Development" was conducted as a hybrid course in 2006. Blending bi-weekly face-to-face class sessions with five-day periods of online forum discussions, the course required the students, who worked in teams, to explore and argue about topics such as Argumentation Support, Model-Driven Systems Engineering and Service-Oriented Computing. Each team had to read an assigned paper or chapter, open a discussion in the online forum, respond back to students' answers, and present summary and conclusions in class. The educational value students gained from the active learning that took place in this course is demonstrated by insightful examples of the vivid discussions that developed in the online forum and the feedback students provided on this novel course format. Recommendations for adopting this course structure for teaching technology-related issues in higher education are provided.

#### Introduction

Hybrid courses combine face-to-face with online teaching. This combination can potentially improve learning processes compared with traditional learning and Webbased learning. (Dean, Stahl, Sylwester & Peat, 2001; Singh, 2003; Frank & Barzilai, 2004). Students believe the hybrid approach improves communication and interaction, both between students and between the students and instructors. For example, Riffell and Sibley (2004) have shown that 66% of the students saw a marked improvement in interaction while 27% felt that communication was the same, while Mueggenberg (2003) has found that 90% of students in a hybrid course felt they learned as much or more than in a traditional course.

This paper reports on a hybrid course that combined online forum as its main computer-based educational element and on the educational values embedded in this hybrid course format as reported by students and as observed by the course professor.

The "Methodologies in Information Systems Development" course was conducted as a hybrid course for the first time during Spring 2006 semester at the Faculty of Industrial Engineering and Management at the Technion, Israel Institute of Technology. This is a graduate/undergraduate elective course aimed primarily at Information Systems Engineering students. The course goal, as stated in the syllabus, was to study and practice methods, approaches and techniques for developing complex systems and information systems and get exposure to new technologies, developments and trends in the areas related to systems engineering and information technology.

# The Hybrid Course Structure and Management

The main ICT-based element in the course was the online forum while the main faceto-face element was team presentations in class meetings. The 14-week long course, studied by 20 students (about half of whom were graduates and the other half undergraduates) was divided into seven two-week periods, each focusing on a specific theme. The course schedule and list of themes studied is listed in Table 1. All the course online discussions, management and material posting was done via Moodle (Moodle, 2006), an Open Source course management system software package. The class was divided into seven teams of three students each. Each team, and the class as a whole, were required to do the following:

- 1. Read an assigned paper or chapter on the subject that introduces and discusses the two-week period theme.
- 2. Using Moodle, open an online discussion in the forum assigned to this paper or chapter by posing two or more questions related to the article, which require argumentation.
- 3. Make sure they respond back to students' responses, so there is meaningful traffic in the forum they manage.
- 4. Read at least two more central articles related to the subject.
- 5. Prepare a one-hour class presentation, in which the team presents the subject and summarize the forum.
- 6. Using Object-Process Methodology (Dori, 2002), create a model of the domain under study to support ideas and claims made in the presentation.
- 7. Send the presentation to the course Teaching Assistant (TA) who put it on the Moodle course site by the end of the week of the scheduled presentation.
- 8.

Table 1. Course themes and timetable

Week	Theme	Tutorial
1	Introduction, divide into groups, get topic,	OPM with
	Systems Engineering Introduction	OPCAT - New
		features
2	TEAM 1 leads the forum on: Service-Oriented	
	Computing	
3	TEAM 1 presents in class and summarizes the	JAVA with
	forum	IBM's Eclipse
4	TEAM 2 leads the forum on:	
	Automatic Recovery from Software Failures	

5	TEAM 2 presents in class and summarizes the forum	XML and Java
6	TEAM 3 leads the forum on: Argumentation Support: From Technologies	
	to Tools	
7	TEAM 3 presents in class and summarizes the forum	Web Services introduction
8	TEAM 4 leads the forum on:	
	Systems Engineering: Framework and Lifecycle	
9	TEAM 4 presents in class and summarizes the	Web Services
10	TEAM 5 leads the forum on: Systems	with Java
10	Engineering Standards and Models Compared	
11	TEAM 5 presents in class and summarizes the forum	SOA
12	TEAM 6 leads the forum on: DODAF – Department of Defense Architecture Framework	
13	TEAM 6 presents in class and summarizes the forum	Web services mini project assignment
14	TEAM 7 leads the forum on: SysML – Systems Modeling Language	
15	TEAM 7 presents in class and summarizes the forum	Mini project execution advising

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In addition to the class meetings and online forum activities, the TA held a bi-weekly one-hour tutorial and hands-on session on XML, Java and Web Services, and one of the course requirements was to submit a mini-project on Web services. The course topics and timetable are presented in Table 1. The course grading weights are listed in Table 2.

Table 2. Course grading weights (out of 100)

Online forum leading	20
Online forum participation	15
<ul> <li>Summary &amp; class presentation</li> </ul>	20
<ul> <li>Final report with OPM model</li> </ul>	25
<ul> <li>Web Services mini project</li> </ul>	15
• Attendance	5

#### **The Online Forum**

The major online component of the course was the forum, in which each team posted a few questions related to the bi-weekly theme and all the students responded such that a viable discussion was taking place during the designated five-day period, at the end of which the team prepared a class presentation based on the original paper and other resources it found, and presented it in class. Following the class presentation the professor summarized the subject, often adding from his knowledge about it and stirring more discussion.

As an example for the way the forum was conducted, consider the example of the forum on Argumentation Support. The paper which served as the original basis for the discussion was "Argumentation support: from technologies to tools" (De Moor & Aakhus, 2006). This subject was scheduled as the third, so as to allow students to experience first-hand the online forum as an argumentation support tool. It should be noted that the online forum was conducted entirely in English, a second language for all the students. Still, they were able to express themselves clearly and fully. The team started with a short definition and posed several questions to the course participants. These are listed below, with very minor editing.

Argumentation (discussion) that is computer supported is a growing field and there is a need to match technology to human argumentation behavior. Here are a few questions concerning this topic. Thanks, Team 3.

- 1. Give example for common Argumentation (Discussion) that is computer supported. What roles take part in them? (You can consider goals, means, authorizations etc.)
- 2. What disadvantage arises from trying to model human discussion? The article describes the first step of analyzing the argumentation characters creating the Argumentation Models (As described in Table 2, page 97). As an example we will refer to:
  - *a. Issue networking HyperNews*
  - b. Funneling Voting
  - c. Reputation Weblogs

What kind of diagram would you choose to model each one of the Argumentation Models mentions above, and why? Which character of this model led you to choose it?

3. As described in Figure 2, page 97, we can see that Argumentation life cycle is consistently undergoing changes, due to gaps between the Argumentation Technology and Argumentation Routines, or, in other words, the Socio-Technical Gap. What kind of Designs Patterns would you offer for Argumentation modeling, in order to support this kind of life cycle?

Examining the questions the team posed, it is apparent that the students invested a fair amount of thought to come up with questions that would require their peers to think before they are able to provide an intelligent answer. To see this point, consider a response to question 2 above, provided by student K:

I think that one of the biggest disadvantages of modeling human discussion is that you miss the "human" involvement. What I mean is that in every discussion we are involved in, we apply some emotions and not every thing we "say" is relevant to the subject. When you try and model this behavior, you loose some of the most interesting ideas. Sometimes, the best ideas for solving something is by going in a direction that is not related to the issue and finding the similarities to what ever we are discussing. If we model this, we will loose some of there ideas. For example, if we use a voting button on an issue (like "closed questions"), we might miss some good ideas people have on the issue.

In response to this posting, Student D added:

...In addition to what K. said, by modeling the human discussion we're also losing the creativity and the spontaneous response which characterizes the human nature, that is responding using our emotions not only common logic.

Both the questions and the answers demonstrate application of higher-order thinking skills as the students reflect on human behavior and limits of technology. Such a level of discussion can hardly be expected from students in traditional class discussions.

#### Findings: Students' Feedback on the Course

In the last forum, which was initiated by the course professor, the students were asked to summarize the course by responding to the following questions:

- 1. What are the two things you liked most about the course?
- 2. What are the two things you disliked most about the course?
- 3. What suggestions do you have to improve the course?
- 4. Did you feel that you learned meaningful things in this course less, the same, or more than in comparable courses?

The responses are categorized for each question according to the items students related to.

Item	Examples	Freq.	%
Opportunity to learn about different subjects, modeling approaches, and presenting scientific subjects	<ul> <li>What I liked in the course was the glance it gave us to different fields that exist in the market by modeling them. We were exposed to a wide range of modeling methods and saw that it is valuable while designing new system.</li> <li>We got to cover a lot of topics. I don't think that in other courses we would have gotten to do so much. For example, SOA is a very "hot" topic but the first time I have encountered it was in this course.</li> </ul>	14	49
Active learning: Opportunity to participate in a discussion, think, respond, and learn more	• This course differs from regularly-structured courses by giving students the opportunity of active learning. Active learning is the only way to understand the subject. In regular courses this stage comes several days before the exam or project, and even if this is enough to understand the subject, the knowledge does not stay for a long time.	11	38

Table 3 – Respon	nses by items fo	Ouestion 1 -	things you lil	ked most about the course

	• There were many discussions in which I expressed my opinion and got to learn what other people had to say about the subject. It made me think about what I have to say and find arguments in order to defend it.		
Teamwork	• I enjoyed the benefits of teamwork while doing the assignment in my own while still having the feeling of teamwork that usually forces every team member to meet in the same time.	3	10
Learning how to make presentations	• Having to present the subject in class provides some practice which should be worthwhile in seminars or even at work later on.	1	3
Total		29	100

# 1.1. Teamwork:

1.1.1 I enjoyed the benefits of teamwork while doing the assignment in my own while still having the feeling of teamwork that usually forces every team member to meet in the same time.

1.1.2 Thinking about the questions presented in the forum individually and also reading the responses of others contributed to deeper and better understanding of the subjects.

1.1.3 It was an interesting new way of passing the knowledge to students. I think that it has a very good potential of becoming a really effective tool for learning.

1.1.4 I learned from the teamwork how the same subject can trigger different ways of thinking.

1.2 Active learning: Opportunity to participate in a discussion, think, respond, and learn:

1.2.1 After one answer I gave, I had more options to learn about the subject from me friends and give some more answer. It was not a one time submission like regular homework.

1.2.2 There were many discussions in which I expressed my opinion and got to learn what other people had to say about the subject. It made me think about what I have to say and find arguments in order to defend it.

1.2.3 It's rather effective learning, because each student is an active participant, and while answering the questions in the forum everyone needs to think about the subject, to look for additional material, to learn from other participants or to share own experience.

1.2.4 The forum discussions opened aspects that one can't think of alone, and as a forum leader, it motivated me and my partners to think of ways and ideas to interest the participants and encourage responds to the article.

1.2.5 This course differs from regularly-structured courses by giving students the opportunity of active learning. Active learning is the only way to understand the subject. In regular courses this stage comes several days before the exam or

project, and even if this is enough to understand the subject, the knowledge does not stay for a long time.

1.2.6 I liked the chance to experience a different kinds of learning. I had to do some research by myself, find articles and use them for the presentation. This was very nice since it allows you some freedom in choosing your subject (from the list) and articles.

1.2.7 [The course] encouraged "critical judgment" of the material and ideas presented in the articles, rather than just reading and summarizing them.

1.2.8 The course was seminar-like, with all students participation. This way you get more precise feedbacks on your work - is it presented in a clear, understandable way.

1.2.9 The main advantage is the requirement for participation of every student along the whole course. All the students had to be involved (through the forum and the discussion in the class) and had to prepare themselves before each presentation, which often made the discussion in the class fruitful and interesting. 1.2.10 I liked the forum. It was nice learning about new subjects from the articles and while sharing your opinion with the entire forum, learning new things from all the forum friends.

1.2.11 The forum allows the exchange of ideas by everyone and thus contributes to the knowledge in all the subjects. This is important because we only get a taste from each subject.

1.3 Opportunity to learn about different subjects, modeling approaches, and presenting scientific subjects:

1.3.1 *The first benefit is the opportunity to learn about different actual subjects.* 

1.3.2 What I liked in the course was the glance it gave us to different fields that exist in the market by modeling them. We were exposed to a wide range of modeling methods and saw that **it** is valuable while designing new system.

1.3.3 This course covered a lot of subjects that are very up-to-date, that way I got a nice overview of them all.

1.3.4 *I liked giving the lecture myself to the class, which involved learning the subject and explaining it to other students.* 

1.3.5 *There was coverage of many subjects, so everyone could find something interesting for himself.* 

1.3.6 I liked the diversity of the subjects. It is really nice sometimes to look on things that you would never touch and suddenly learn from them, because bigger picture always helps.

1.3.7 I got a high level review of several topics in system design.

1.3.8 *I liked the experience of giving a lecture to a class about subject I wasn't familiar before.* 

1.3.9 From the variety of subjects and articles on each subject I learned that each subject has different concepts and aspects.

1.3.10 We got to cover a lot of topics. I don't think that in other courses we would have gotten to do so much. For example, SOA is a very "hot" topic but the first time I have encountered it was in this course.

1.3.11 It was a very nice course and I hope to learn more about some of the subjects I got introduced to during the semester.

1.3.12 Compared with seminars, which are similar to our course in their scope, the course gives more opportunities for effective learning.

1.3.13 We got to cover many subjects during the course though not too thoroughly. Still, it allows you to find more information about a certain subject by yourself if you liked it particularly.

1.3.14 I think that overall I learned more meaningful things in this course relative to "conservative" courses. Due to the forum mechanism, everyone had the chance to learn not only about his/her subject, but learn about all subjects. In addition, in the tutorials and in part of the lectures the course staff talked about additional subjects, so overall the course covered many topics.

# Learning how to make presentations

1.4.1 Having to present the subject in class provides some practice which should be worthwhile in seminars or even at work later on.

Examining the rate of responses we see that opportunity to learn about different subjects is ranked first, followed by active learning and teamwork.

# Question 2 - things you disliked most about the course

2.1 Time constraints and technicalities

2.1.1 I didn't like the time management - the forum started to evolve only towards its end and those were the days it was hard for me to add responses...the time limit was insufficient.

2.1.2 The time frame of the forums was not clear enough and it caused people to answer after some forums have been closed.

2.1.3 The discussion started right before the forum closed so there was not enough time to react to people's opinions.

2.1.4 *I think that defining the forum time frame better (when it is opened and closed) is a must.* 

2.1.5 There were some mild technical problems, mainly regarding the course forums: it was not always clear when the forum start and close, there was no option for the forum leaders to open the forum themselves, and sometimes there were some problems with the e-mail notifications. Also, in beginning of the course, the "rules of the game" weren't clear enough (e.g. how to organize the questions, is it allowed for participants to add new questions or not, etc...).

2.1.6 I disliked the unclear times of the forums and insufficient time limit which caused many forum discussions to take place at the last two days.

2.1.7 I disliked the fact that the tutorials were two hours before the class, I think they should be attached to the lecture.

2.2 Grading and participation enforcement

2.2.1 I didn't like the fact that I knew I was graded in my answers so it limited me.

2.2.2 I didn't like the request to participate in each forum. Perhaps, not everyone has an experience, knowledge or interest in every subject for discussion. So, "indefinite" answers neither contribute to the forum no to student's knowledge.

2.2.3 I didn't like the mandatory participation in the forums. You don't necessarily have something useful to say in every forum.

2.2.4 I disliked the fact I was graded according to my answers and I think it made people try to answer pure answers sometimes because they were afraid of writing incorrect things.

2.2.5 People often wrote answers not because they had something valuable to say but because they were afraid not to be graded at the forum.

2.3 Lack of linkage between class and tutorial topics

2.3.1 I didn't see the connection between the tutorials and the classes. We learnt about web services but it was hardly noticed in the class discussions.

2.4 Insufficient depth

2.4.1 In regular courses one certain subject is discussed. Naturally, in comparison with our course, these courses give more deep knowledge.

2.4.2 Since the course spread over many different subjects, it stayed sometimes at a high level and didn't give us the opportunity to check the subject in practice.

2.4.3 The key for success is that the student should come to the forum with some basic knowledge of the forum subject. The forum articles in many cases did not provide this basis, and there was need to search for additional information.

2.4.4 Because of the coverage of many subjects we didn't go deep into none of those (except for the team that presented the subject).

2.4.5 I got from this course a relatively deep knowledge of the subject my team was leading and superficial knowledge of subjects of other teams.

2.5 Forum interaction

2.5.1 I think that the forum wasn't maintained very well, there wasn't enough interaction between the students in the forum, everyone wrote what they think without regarding other answers.

2.5.2 There is a phenomena in forums - when you dislike someone's posts from the start, you pick on this person for the rest of the time, you automatically disagree with all he says, and so on. We have seen it here.

2.5.3 Sometimes I felt some of the subjects discussed at the forum/class were too abstract and general and I didn't understand their usefulness.

Ranking the items, time constraints come up first, followed by grading and participation enforcement as well as insufficient depth.

# Question 3 - suggestions for improving the course

3.1 Staff participation

3.1.1 Maybe the course staff sometimes can participate in forums also, - to help in that situations then some topic is coming to "deadlock", or just to share their experience.

3.1.2 More participation from the course staff and sharing their large experience with us.

3.1.3 A small introduction should be given to the subject before the forum opens so the forum will be able to go deeper.

3.1.4 Perhaps the course staff should use some of the lecture or tutorial's time to introduce each new subject and create more interest.

3.1.5 *I think you can improve the course by having an additional lecture by the instructor for every subject. Another idea is to bring an outside lecturer from other companies to show us "the real thing..."* 

3.2 More subject choice and clearer time definitions

3.2.1 *Possible improvement is maybe to suggest larger amount of topics and let the students to choose among them.* 

3.2.2 Explicitly define the forums timing and format at the beginning of the semester. Maybe if the tutorials and the final project will be more related to the classes it will improve.

3.2.3 *Give more subjects than groups.* 

3.3 Course structure and participation enforcement

3.3.2 Make fewer topics but go deeper in each and every one of them, for example, do two presentations on each topic. In addition after each lecture make a tutorial on the presented topic. Then you'll have 2X2 hours of presentation and 2 hours of tutorial to discuss each topic. This seems to me enough to go relatively deep in each topic.

3.3.2 Divide the team presentation in two. The group first introduces the subject, so all the class has some common knowledge and has a week to extend this knowledge and participate in the forum. Then the group sums up the forum.

3.3.3 Encourage people to participate in forums, but not to make them do it. When you write about the topic you don't care about, your comments are not of a great value.

3.3.4 *There should be more connection between the tutorials to the rest of the course.* Here, staff participation and course structure and participation enforcement come up

as first suggestions for improving the course.

# Question 4 – comparison to other courses

This was an unsuccessful question. Most students did not respond to it directly, and those who did, explained they had not taken any similar course so they cannot compare. Instead, several students volunteered an overall summary:

- This course gave me some new points of view and strengthened the significance of modeling.
- This course structure seams to me more pleasant and fun than a regular one.
- *I enjoyed the course. I think this new way of teaching is quite successful.*
- I enjoyed the course. It was a fresh and welcomed changed in the standard Technion's course structure.

# **Summary and Recommendations**

Based on the students' assessment of the course, their satisfaction from the interaction via the forum—the main ICT component of the hybrid course—and the author's observations during the course, the structure of a hybrid course that combines intermittent bi-weekly class meetings for face-to-face presentations and discussions with periods of online student interaction in-between seems to be a promising format. Students welcome this fresh mode of teaching, feeling they cover a lot of ground while still experiencing meaningful and overall enjoyable learning via teamwork and the need to exercise their higher-order thinking skills, notably argumentation. Main points for improvement include higher staff involvement in the online forum, a short introduction to each topic prior to the forum commencement, and more linkage between the topics of the forum/class and those of the tutorials.

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#### **Blended Learning in High Schools and Tertiary Institutions**

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# Abstract

Blended learning is a concept that lacks a definite definition and hence has different meanings to different people. For some, blended learning is replacing elearning [1], some others it means online learning plus a face-to-face component or a blend of the different components of e-learning [2] or e-learning plus a face-to-face component. Blended learning is all about models and ways of enhancing the delivery of e-learning for the students and teachers involved in learning.

What makes e-learning a blended learning is not only the technology, rather, the proper variation and blending of resources made available by technology, including face-to-face interactions. Technology remains the key drive in e-learning.

*E-learning that is well blended easily adapts to the students needs and not the students adapting to e-learning against their conveniences. In a sentence, e-learning is made for man and not man for e-learning.* 

The criteria for e-learning are scalability [3], sustainability and enhanced learning.

This paper discusses how e-learning can be made a blended learning, discusses blended-learning at secondary and higher school levels and suggests a model for blended learning.

## Introduction

Blended learning is a flexible form of e-learning that comprises a proper blend of all the components of e-learning including all forms of face-to-face interaction and tutoring. It is simply adding a face-to-face component (F2F) to e-learning. [4]

The material object of blended learning is e-learning. E-learning is learning mediated by technology. It is the use of electronic technology which includes computer, computer network, communication and mobile technologies to enhance and extend learning, deliver and access education and information [5]. E-learning is not limited to online learning which is only online based, and hence a subset of e-learning, but rather encompasses other components of learning based on electronic technology. The key trend in e-learning is technology and the power of e-learning is in its content and delivery

Online learning or web-based learning is one of the basic components of e-learning. Online learning could be from a distance or not. When online learning is from a distance it is called distance learning.

Online learning (O-learning) can also be achieved through the use of mobile technologies and in this case called mobile learning. Computer based learning (CBL) is all learning done with the assistance of a computer. All mobile learning (M-learning) is not online or distance learning (D-learning) and vice-versa. However, there are many things in common among them.

The various forms of learning can be related in a Venn diagram as shown in fig 1. Blended learning is the Universal set having members E-learning, D-learning, Olearning, M-learning, Computer based learning and F2F learning. Computer based learning is common to all forms of technological based learning.



# Figure 1. Venn diagram illustrating the relationship among different forms of learning.

Components of blended-learning include among other things classroom teaching, student-to-student interaction, teacher-to-student interaction as shown in fig 2.



#### Figure 2. Components of F2F-learning

The goal of blended-learning is to enhance learning beyond f2f-learning and hence deliver knowledge effectively. The key trend in e-learning is technology and the power is in its content and delivery [6].

Education is in a state of flux and researches so far have shown that blendedlearning would revolutionize the educational system. Blended-learning has a lot of benefits which are not available with e-learning or f2f-learning. The weaknesses of elearning and f2f-learning are the strengths of blended-learning. Blended learning promotes lifelong, self-paced, discovery-based [7] and collaborative learning among students and teachers. Learning is both teacher-centric and learner-centric and also individualised for each student. The implementation of blended learning in high schools can encourage cross border learning and collaboration amongst high school and graduate students in different parts of the world as a result of advances in technology.

#### 1. Blended learning in High Schools and Tertiary Institutions

E-learning focuses a lot on self-study. Self-study is little appreciated by high schools or secondary schools students. They depend a lot on the confidence of the teacher and how the teacher impacts the knowledge. High school students read a lot from the teacher's facial expressions and character. The teacher's devotion to his/her teaching profession and other professional activities have a direct influence on the students too. Students at the lower level of high school prefer traditional classroom tutoring because their confidence level is low. Through tutorials and assignments they begin to have access to self-study. At higher levels of their school education, their dependence on the expertise of their teacher is shared, because they begin to see themselves as experts too, and have confidence in themselves. They become familiar with self-study and find e-learning valuable and necessary at tertiary level. They later discover that e-learning cannot solve all their problems, hence, begin to yearn for a mix of the two, blended-learning.

Hence, it is a sine qua non for e-learning to be blended in high school levels and undergraduate levels.

The advantages of f2f-learning contrasted with e-learning builds up friendship among students, encourages competition among them, and builds up the character of each student. These factors reduce drastically the drop-out rate of f2f-learning.

Researches on online learning have revealed high attrition rates in online learning. Many students enrol for courses online and less than 60% of them complete the courses. The reason being that the students lack motivation to finish the course. Some experience some sort of cultural isolation, some find the whole online program boring, and some see it as an exercise of just accessing online educational databases. There are many other reasons for students dropping out from online courses.

Blended learning is e-learning with face-to-face tutoring and interaction amongst teachers and students. With blended learning, attrition rates would be highly

minimized because blended-learning combines the advantages of e-learning with that of f2f-learning.

What makes blended learning powerful is the choice of the blend (mix). There is usually a custom approach to the blend [8]. When the blend is fruitful then blended learning can be sustained.

Blending technologies should take students and teachers convenience into consideration. Highly interactive synchronous technologies such as, live video courses using video conferencing tools, interactive Televisions with TV cameras mounted at strategic positions to enable the lecturer see all members of his/her class, make e-learning a splendid learning experience [9].

Undergraduate education does not require much traditional classroom tutoring as the high schools. It could be 50% traditional classroom and 50% virtual classroom tutoring.

In the post graduate level the traditional classroom setting may not be required at all except for orientation courses.

In an online lecture (for distance learning) via live video tools, the lecturer can be seen by the students in a wide display, the students themselves can be seen by lecturer with the aid of TV cameras and the students can press buttons to ask a question.

The essence of making e-learning a blended learning is for students and lecturers too to embrace e-learning. If e-learning is implemented in a school and students are not attracted to it then the whole plan would be a failure.

E-learning is meant to enhance the mode of learning and not be deficient in the pedagogies of learning.

# 2. Blended-learning in Tertiary Institutions and High Schools in Nigeria

In years to come, Nigeria would move from a phase of absolute face-to-face learning to blended-learning. Blended-learning is not yet under implementation but under debate in Nigerian secondary schools and tertiary institutions. There are many reasons owing to its not being implemented and these reasons can also be seen as huddles to its implementation in secondary schools and higher institutions as well.

However, there are few institutions like the National Open University of Nigeria, University of Jos Plateau State Nigeria and private universities that have started implementing e-learning on a small scale.

The National Open University of Nigeria is an online campus that awards online degrees to students who enroll and complete online courses in this university. It is the only and qualified Nigerian university that can boast of offering online and distance learning courses. It is located in Lagos, Nigeria and offers about 50 programmes at undergraduate level.

The University of Jos ranks first among the premier universities in Internet connectivity and networking facilities. Some departments and lecturers have taken the initiative to start e-learning with the hope to make it blended with time.

These few institutions are yet to get the hang of e-learning before making it a blended learning. There is no secondary school in Nigeria that has started e-learning.

A few of the economic factors that affect the implementation of blended-learning in Nigerian institutions are

- Low standard of living
- Sub-standard education/ computer illiteracy
- Lack of infrastructure and basic amenities

Unavailability of steady power supply

# 3.2 Low standard of living

About half of the Nigerian population are poor. Many spend most of their lifetime in pursuit for the basic necessities of life. These basic necessities include food, clothing, means of paying accommodation rents, clean water supply, gas, and so on. Some families cannot even afford educating their children and this is why the Government sponsors free education in public schools throughout lower grade level. Some Nigerians unbelievably leave their homes and live in sub human conditions in order to keep bread on their tables. Some students also take part in the bread-wining process and hardly have time to study. In such situations facts about improving learning standards would be seen as luxury.

# 3.2 Sub-standard secondary education/ computer illiteracy

Some secondary schools especially those in the rural areas suffer many privations. They usually do not have enough teachers talk less of experienced teachers. Some teachers are not as dedicated while searching for greener pastures. The end result is that the secondary school students are poorly educated if at all. They also lack well equipped laboratories, libraries and all amenities expected in a functioning secondary school. Many of these students and their teachers have not used a computer talk less of getting involved in e-learning. Many have never had an experience of the Internet and some never heard of it.

In Nigeria, technology is not trusted but marveled at. New technologies cannot be easily afforded. Many teachers are intimidated by machines or computers. The fear is sort of transferred to the students as well. On the other hand many Nigerian tertiary school students are taught the theories of computers but they never lay their hands on one. Interested teachers and students have to make personal or private arrangements to attend computer training schools and bear the cost. Often some forget what they have learnt shortly afterwards as they cannot afford to buy one to practice what they have learnt. Some other teachers that enrol for computer training do so not necessarily because they are keen on using it, but rather to obtain computer certificates (certificate of computer literacy) that would qualify them for promotion or earn them better jobs. In practice, not all that attend computer training schools can use the computer.

The ratio of students to a computer in a typical tertiary institution is 50:1. In some cases, there are no computers at all for the students. The high schools in Nigeria that have computer training as part of their curriculum can be counted. Computer training is not a major aspect of the secondary school curriculum, even if it were, the computers are not available.

# 3.3 Lack of infrastructure and basic amenities

Infrastructure is the foundation on which e-learning is built. Infrastructure, which includes technical infrastructure, building infrastructure all web accessible technologies, are needed to support and even enable e-learning in high schools and tertiary institutions in Nigeria. There is need for reliable computer networks, broadband connectivity, or fibre-optic backbones to interconnect offices and departmental blocks in the school.

Generally, some tertiary institutions have Internet connectivity in business centres in their institutions, but not an integrated Internet connectivity for the whole institution, that can support all the processes of e-learning. Many high schools in Nigeria, except some private secondary schools, do not even have internet connectivity of any form talk less of having an extensive infrastructure for e-learning. The infrastructure has to be reliable and secure. Blended learning can eventually be started when the infrastructure exists.

# 3.4 Unavailability of steady power supply

Generally, there is poor and inadequate supply of electrical power in the whole country. The Federal government is however, working towards improving the generation and distribution of electrical supply in the country. It is a norm to experience power failure everyday, and it is also common to have low voltage supply of power that does more harm than good. When power is not continuous, e-learning would not be utilised in its great capacity and the goal of enhancing or making powerful blends for e-learning is defeated.

# 3. Making E-Learning A Blended Learning

# 4.1 The Choice Of The Blend

Face-to-face learning is not to be devalued, but integrated with e-learning to make a blended-learning. It is difficult to make a blend [7] as the name implies. The traditional learning approach has been on for centuries; e-learning started not more than half a century ago, hence the basics of the blend and what constitutes the blend is the main question.

The problem then arises in the choice of the blend and how students can be put on the driving seat and motivated to embrace their studies and hence attain high educational success rates. The world requires new solutions that must be technologically based and face-to-face as well. The approach towards the blending would be lifelong and evolutionary.

# 4.2 A Model for Blended Learning

There should be a combination of planned approaches towards making a blend [10].

The primary components of the blend are e-learning and face-to-face learning and a proper blend is got by integrating e-learning and f2f-learning in the proper proportions. The factors affecting the blend ratio would include the

- Educational level i.e. high school, undergraduate or post-graduate
- Context/environment i.e. whether the needed technological resources are available or affordable.
- Complexity of the subject matter: This makes it possible to know what should be taught in an f2f class and what should be supported online with rich media resources.
- Content structure: content is normally structured in a proper curriculum.
- Availability of delivery mechanisms: The delivery mechanisms are varied and their availability depends on how developed the country or area of learning is.

 Training of teachers: Learning should not be left ad hoc. Teachers should be educated on blended learning approach.

The reasons for the blend are to

- Enhance and increase access to knowledge
- Improve the pedagogies of learning [9]
- Make learning affordable or cost-effective to all [11]

A successful achievement of these reasons or goals for blended learning would subsequently

- Make all students or learners embrace blended-learning
- Improve learning on a cross-border basis and reduce the global digital divide.

There can be different categories of blend depending on how it is introduced. A blend could either enhance the learning system or totally transform the learning system. The former is called enhancing blend brings about some little and incremental changes in the learning system. It enhances the delivery mode, introducing new approaches to the existing approach and also removes obsolete approaches in the traditional mode. The latter is termed a transforming blend that brings about a radical change or total transformation of the pedagogies of learning. Some transforming blends may no be culturally accepted.

The model for blended learning proposed here would be an enhancing blending model. The blend starts off along a migration path i.e. blended learning in introduced with whatever resources are available at hand. More resources are introduced with time.

Figure 3 below gives a model for blended learning in schools from the students' perspective and figure 4 shows an educational reform model of blended learning. The student has access to varied learning resources and collaboration tools as shown.



Figure 3. A Model for Blended Learning

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Figure 4. An educational reform model of blended-learning

There are 5 stages in this approach to blended learning.

- Learning goals or objectives
- Migration path
- New Learning activities
- ICT-based collaboration and interaction
- Assessments and
- Evaluation.

Learning objectives is the beginning of the stages in which learning goals are defined. The learning curriculum, outline of courses, fall within this level. This is needed to go to the next level of development.

Migration path as stated earlier determines the scope of the blend. Whatever resources are available are introduced in the blend. This means that all resources must not be available for blended learning to take off in schools.

New Learning activities comprise the modes, methods and processes of learning. It basically comprises synchronous e-learning, asynchronous e-learning and traditional learning methods.

ICT-based collaboration and interaction comprises all forms of interaction among students and teachers that are technologically based.

Assessment gives a quantifiable result of the graduates of the schools. Determines whether the students are qualified graduates, productive and employable.

Evaluation is a rating of the whole blending model. The approach to blended-learning is iterative as the needs of the nation, students, teachers or schools may change. The goals can be reassessed and changed. The evaluation redefines the learning goals for the next iteration and is fed back to the learning objective.

The five stages make up a phase in the model and each phase can be seen as an iteration. Hence this model is iterative. Each iteration is an improvement of the previous iteration.

# Conclusion

Blended learning is superior to the traditional learning method and any other form of technology enabled learning because it is a blend of all of them. E-learning has been gaining a lot of popularity but measures should be taken to make it blended. Blended learning would motivate or encourage all students to embrace e-learning. A fruitful blended learning would depend on the proper variation and combination of the different components of blended learning just as a tasty soup would depend on the proper combination of the stuff making up the recipe.

Blended learning is all technology enabled learning (e-learning) plus traditional face-to-face learning.

It is evident that blended learning would act as a catalyst for positive educational change in a few years to come.

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# Integration of E-tutoring in a Blended Learning Course in Mathematics

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## Abstract

The teaching of Mathematics in a University setting is becoming ever more difficult, with students often seeing the discipline as a backdrop to other studies without applying themselves to the intrinsic concepts inherent in the field. This paper describes the experience of the University of Bergamo where a second year course in Mathematics has been delivered in blended learning mode for a number of years. Some time ago tutors were introduced into the course structure and this paper evaluates their effectiveness and describes the evolution of the "tutorship project" whereby tutors are effectively used both in the classroom and in an online environment. We also discuss the tutor-student relationship from a pedagogical viewpoint highlighting how a successful tutoring relationship can support students in the development of lifelong learning skills

## 1. Introduction

School and university are, in general, the places where society can create for its students the possibilities to express to the fullest their own learning abilities. These possibilities arise when both learning and teaching exist in constant interaction when the student is assigned a pro-active role. E-learning technology represents a fundamental resource in such an approach. It allows for a level of flexibility that permits lecturers to follow a creative teaching pattern of active teaching even in subjects where the theoretical aspects are prevalent, such as mathematics.

In every educational institution the teaching of mathematics has had to face growing and more specific problems, especially in relation to modern students' attitude towards this discipline

coupled with a general decline in students' mathematical abilities. Teachers and lectures are finding that mathematics is held in low regard by many students who fail to apply themselves and as a consequence have more difficulty in mastering the subject. As Peter Gates states in his *Issues in Mathematics* "I see mathematics envisaged by pupils, parents and teachers as little more than a collection of techniques to be captured rather than an approach to be understood." (Gates, 2002)

Within a university setting lecturers are finding that students come to them with lower competences in mathematics and therefore have to spend some time making up ground. This is especially true of students within the Faculty of Economics, where many students treat the subject as merely a starting point to better understand the disciplines of economics and statistics, where the more theoretical aspects of mathematics are considered to be an overarching structure that to many students is difficult to understand and assimilate. Lecturers find themselves having to discuss topics from the point of view of their actual application, rather than their conceptual worth which then leads to a weakening of learning potential that in turn means students have a superficial understanding of mathematical concepts. This is connected to the importance of a university education that guides students towards research as a fundamental skill to be gained by students in the process of life-long learning. These and other considerations have lead us to undertake new teaching practices in which classroom lectures are intertwined with valuable experiences online.

From observations made on the students both in the classroom and online, it would appear that as regards the discipline of mathematics, students' cognitive styles remain completely personal and lend themselves with difficulty to collaborative group activities. For example certain problems set by lecturers in the online environment encourage students to engage in a virtual dialogue with the lecturer without the students dialoguing amongst themselves in order to obtain a solution. In mathematics blended learning courses, students are set tasks wherein they had to correct certain mathematical problems. The lecturer noted how each student duly produced answers online that often necessitated the same corrections on the part of the lecturer without first collaborating with their peers in order to come to a collective answer. It seemed therefore important to promote more collaborative attitudes and autonomy amongst students of mathematics with an eye to future research in the subject by the students. Developing research skills is a valuable lesson that can be learned through an online environment and ones that are fundamental in the study of subjects such as mathematics.

It is within this context that the questions surrounding the definition of the role of lecturer and tutor arise (tutors may be experts in the field or senior students.) It is crucial to define each role and the relationships and collaborative work undertaken by these figures as regards the collaborative arena that is e-learning in order to achieve the results required from the students on behalf of active participation. As Crosta and McConnell point out (2005) Italian online courses often have the distinction of separating the tutor and lecturer role between the tutor who is the "online" expert and the lecturer as "content" expert.

In section 2 we outline some pedagogical reflections of the relationship between lecturer and tutor: in section 3 the paper presents an experiment that has taken place within a mathematics course delivered in blended learning mode at the University of Bergamo and involving senior students; section 4 outlines a project and modus operandi of a tutorship project and lastly section 5 offers some conclusions.

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#### 2. A note on tutoring and autonomous learning

As well as being a specific educational technique, tutoring can be appreciated for its role in creating relationships of varying kinds and therefore seen in a more complex light of "tutoring process".

As with any type of relationship different levels co-exist: the *inter*-personal that is reworked by degrees (in a co-progression between the participants) and the *intra*-personal sense (that is, of personal development.) The "tutoring process" as a whole brings into focus questions on dependence and autonomy. As Ehlers (2004) points out "a learning process is not something that is delivered to a learner by an e-learning provider but rather constitutes a process of co-production between the learner and the learning-environment." Or rather, how can a lecturer not fall into a tutoring relationship that creates barriers to true student autonomy? How can one work with a student to instil genuine lifelong learning skills through a didactic presence in accordance with the student's personal style of study rather than resorting to study techniques aimed at short term performance goals?

This idea of guiding the student to lifelong learning skills occurs when the student "learns" to participate actively during the tutoring process and can therefore assume for themselves tutoring skills. Within the relationship that is created in the tutorial process it is crucial for tutors to develop the ability to "be able to receive" and then they can create the complementary ability "to be able to ask" in the student. The tutor emerges as an important bridging factor between cultural, disciplinary and contextual experience. Such a figure should be able to create ties and interactions between the many steps in the educational life of the student. The tutorial also has the role of promoting life-long learning by removing obstacles that stand in the way of effective participation on behalf of the student in courses, by identifying and developing the complex needs that are manifest in the educational, social and professional culture of the student. However the tutor should know how to create and maintain a relationship with the student that does not fall into a dependence on the part of the student but rather safeguards and helps promote his or her growing autonomy. Dependence occurs when there exists a strong asymmetry between tutor and student, that often can emerge in the differences in ability and knowledge typical in higher education contexts. In such cases the student loses faith in his/her own knowledge, in his/her decision making abilities and begins to focus on a role that highlights performance rather than looking at concepts and innovation that would help the student project him/herself better in a professional context. The tutor must be able to active a dialogue that is not totally defined by the role/goals envisaged by the task in hand. They must be able to create an empathetic environment where all members can exchange ideas typical to each participant in a tutoring relationship. It should be stated that autonomy does not mean the absence of any relationship, but is, rather, the ability to engage actively in these very relationships. Within a tutorial process the student can develop the skill of "resilience", that is, the ability to bear, tolerate (to a certain degree) and rework hardships (included those on a psychological level) that are inherent in an educational life which can derive from minor failures, bureaucracy, personal management, expectations etc. The ability is in some way activated, acknowledged and considered by the student him/herself thanks to the tutoring they have received during their university life.

In general, tutorials lead by lecturers, remain discipline specific and essential in the discovery and understanding of crucial subject points and those on which to work during the tutorials autonomous.) Such skills are tied to the teaching role that is transformed into a softer role whereby the lecturer takes on the role of tutor in the sense above. Considerations that emerged from teaching experience lead us to define a tutorial function of a different level that is less discipline based but rather focuses on more specific collaborative relationships. By observing the dynamics in the relationships between students on a specific university course it became evident that the relationships created with more experienced students who served as mediators between course contents and skills proved highly efficient. Such interventions work both on a linguistic level and on a motivational method. Above all in certain disciplines, such as mathematics (as stated earlier), the advancement of knowledge has to be promoted through situations where "natural" defences and student diffidence need to be broken down. Whatever a lecture does in this context can often prove ineffectual, as they place at the centre of their relationships a certain linguistic rigor and assume a certain motivation on the part of the students. It is therefore crucial to introduce new figures as tutors who, on a linguistic level, can encourage the interaction between personal language and language tied to the discipline and on a motivational level can support attitudes that lead to greater curiosity and openness on the part of the students. As Breuer points out (based on his own and other studies) "successful e-learning always requires the existence of a teacher or tutor who coaches the students...communication does not adjust itself between the learners simply by bare request" (Breuer 2004)

methodologies of monitoring and evaluating formative processes (be they internal, external or

## **3.** E-learning in Mathematics courses.

Starting from 2004-2005 the Advanced Mathematical Methods course in the Economics faculty was delivered in blended learning mode. The course took place with modules each one over 4 weeks and the activities contained therein echo the classroom structure of the course by developing topics and deepening knowledge through practical activities, tests and exercises. The lecturer noted how interaction in the e-learning part of the course was solely lecturer-student, with students constantly referring to the lecturer's superior skill and knowledge of the subject completely bypassing other students (even when for example the same question had been posted in a discussion room and indeed been answered already by the lecturer). Students divided into two broad camps: average-low ability students, who preferred to undergo practical activities, exercises and tests and showed little interest in participating in forums or more collaborative problems and average-high students to problems set by the lecturer. The lecturer was interested in drawing out the average-low level students in order to give them the confidence to participate more and therefore learn to interact more spontaneously with their peers in an elearning context.

The following year (2005-2006) a tutor system was instigated whereby certain students from previous courses who had demonstrated both skill in the discipline and active interest in the elearning part of the course were engaged as tutors. The idea being that someone who was closer
to the students themselves would be able to assess their needs, abilities, be able to oversee their online participation and bring out those who needed it. As the student-tutor had already participated in the course previously as students it was felt that they would have certain pre-requisites, namely:

- they have enough subject knowledge to answer questions posted up in discussion rooms;
- having had personal experience of life as a students on the course they would be able to understand, capture and resolve any difficulties that students on the course were having.

As McPhearson and Nunes point out e-tutors should have skills that "provide advice on different levels of access to learning materials according to the need of individual participants" (McPhearson and Nunes, 2004). The idea of using senior students is that they are closer to the students' needs on some levels than the lecturer. Tutor training was established so that the first phase took place before the start of the course where the student tutors would go over the material to be used with the lecturer and together would offer advice, suggestions etc in order to improve the scope and aim of the materials to be used. This kind of collaborative work means that the tutors themselves feel more ownership of the course and have more invested in making it succeed, vital, according to Kennedy and Duffy (2004) to the success of any distance course. This phase was very successful with tutors engaging actively with the lecturer in providing new direction for the materials to be used. The second phase then took place in the first 2 weeks of the course where the tutors would overview forums and discussion rooms without actively participating in order to gain an understanding of the problematics and difficulties students of the course were having. The third and final phase took place in the last two weeks of the course where the tutors would be free to intervene directly in the elearning environment when they thought it necessary by answering questions, posting up appropriate exercises and generally guiding students as they saw necessary.

These second and third phases did not prove as successful as the first phase, in that students in the course made little connection with the tutors and therefore the tutors had little visibility within the course. The fact that the tutors kept wholly to the online environment meant that the students on the course did not fully recognise them or their roles within the course and therefore continued to refer to the lecturer as their sole source.

For the course this year (2006-2007) the tutor role has evolved somewhat to become a "holistic tutor", that is, tutors now engage with students within the classroom as well as the online setting. The use of the word holistic denotes a role that encompasses all aspects of both the course and the students' path through it. The holistic tutor not only operates on a didactic level but also maintains a watchful eye on the students' welfare. This role serves especially to promote life-long learning skills in conjunction with subject matter. The aim of using a holistic tutor is to create a figure that the student can refer to for whatever issue he/she may want to discuss. As Crosta (2006) notes in her description of a blended learning course, "I became more and more aware of how the moral, psychological and affective support was crucial for the participants' learning experience, more than the need for explanations of the content." This is possibly even more relevant in a subject such a mathematics, where students who are in difficulty can find it extremely unnerving to ask for help from a lecturer. In keeping with our philosophy of tutoring as expounded previously in this paper, the holistic tutor is the one who can draw students into a reciprocal tutoring relationship where the boundaries of mentor/pupil are levelled to create a more equal relationship of giving and asking. One of the benefits of blended learning that tutors are able to interact face to face with students and it was felt that

perhaps by taking advantage of this fact in order for the students to come to know the tutors would mean that they responded to them more. The idea behind the holistic tutor is a senior student who becomes a reference point for the current student other than the lecturer, where different dynamics take place in the relationship. The tutors role is much more informal and allows as student who may not be too confident in his or her ability to make contact with a far more approachable figure. It was also hoped that tutors could encourage a certain collaboration amongst students.

#### 4. Tutorship project

The experience described in this paper has demonstrated the potentials and weaknesses of the diverse forms of traditional tutoring and has demonstrated the need for greater integration between activities in the classroom and online by tutors.

The principle aim is to develop the relationship between student and both in the classroom and online. Rather than have a tutor that is a discipline expert or acts as a facilitator online, the tutorship project (which will come into effect the next academic year 2007-8) will assign different activities to various tutors to undertake in the classroom (exercises, seminars etc) depending on each person's strengths. Tutors were chosen from students who performed particularly well in different activities in the previous years course. In parallel to classroom activities, each tutor will create a personal discussion room in the e-learning part of the course. Each forum is wholly managed by the tutor who uses it to maintain contact with the students and to stimulate participation. In this way students are more eager to participate as they know the person they are dealing with and what type of questions they can put in each forum. Tutors are in a sort of "competition" with the aim of having the "most successful" discussion room, thus tutors are stimulated to take on responsibility for their forums and become more autonomous themselves. The lecturer takes on a more supervisory role of a subject expert intervening when he or she becomes aware of difficulties that need his/her particular attention.

The course then becomes the "property" of each stakeholder (lecturer, tutor and student) where they can achieve personal professionalism in a truly collaborative environment.

In particular the project regards a Mathematics course that lasts 12 weeks. As on the course mentioned in Section 3, tutors will be involved in the creation of course material with the lecturer and organisation of the forums. In this phase the tutors can gain a good understanding of the pedagogic approach of the lecturer and become much more involved into the course project.

Each tutor has a different context and various tasks in order to support the different needs of the students and their particular approaches to study. In 2 hours weekly face to face time with the students the tutors can have personal contact with them in order to facilitate on-line collaboration and to have a good feeling of the going head of the course.

Each tutor has a personal forum and is in close contact with the teacher of the course in order to resolve problems and to ask for a direct intervention of the teacher if needed.

In weekly meetings with the lecturer the tutors discuss problems and organize the activities of the next week.

It is important that each tutor has very clear environment and a high level of autonomy in proposing and performing activities.

Three tutors involved have been assigned the following roles:

Tutor	Context	Tasks
Traditional tutor as discipline expert	Each week this tutor takes a lesson face to face in which he proposes the solution to exercises and suggests some others which will be published on the e-learning course. In this way there is a connection between the activities in the classroom and the on-line communication.	Creates practical activities in the classroom and posts up problems for students to discuss on the website
Tutor facilitator	Frequently most students in mathematics courses had problems in using e-learning in an efficient way to create texts, publish materials, post messages. The tutor facilitator aids the students in this aspect.	Supports students in the production and publication of materials
Holistic tutor	This tutor participates in some of the lessons and is available for discussions with the students taking some appointment, if needed, for individual work.	Supervises students in their individual study paths by making suggestions and encouraging the use of all the available tools

At the end of the course tutors help the students to prepare for the exams helping the lecturer to evaluate the personal path of each student. It is not the single on-line activity that is evaluated but the entirety of the work of each student and autonomy and original approach is taken into account.

The role of the lecturer is to deliver the lessons and to oversee the on-line process giving suggestions to the tutors and proposing new activities; the aim is to make the lecturer a supervisor of the on-line course but very much involved in it.

## 5. Conclusion

We have discovered in the course of examining a mathematics module over 3 academic years that the use of tutors in a blended learning environment, both in the classroom and online can be highly beneficial for students. Through the experience we have undergone we have decided to change the role of tutor from a disciplined based "teacher" to one which is more focused on the students' interests, and so have created different tutoring roles. Evidently, these roles are in many ways "tailor-made" that is, they match skills senior students demonstrated when enrolled on the course as students. In this way we hope to bridge the divide between lecturer and student, between mentor and learner and allow students to develop for themselves skills that go beyond the subject matter in order to develop possibilities that signify that the students themselves will be able to fully partake in the tutoring relationship in an equal manner. In a subject such as mathematics, such a relationship is keenly sought if the students are to develop a fuller understanding of the discipline. Furthermore as university students it is imperative that they gain expertise which goes beyond disciplines and enhances their lifelong learning skills. As Holley

notes higher education institutions should the produce graduates who are theoretically and practically prepared for working in an information age (Holley 2002).

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## **PARALLEL SESSION #3**

## **OPEN SOURCE INNOVATIONS**

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#### The Open Source Online University

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#### Abstract

The Open Source movement has transformed the development of software and is making major inroads in higher education. Online programs have similarly impacted universities. This thought piece explores the possibility of linking these two trends and creating a transformational institution: a completely open source online degree-granting university.

While use of "open source" has been widely and imaginatively addressed in the world of software (think of Linux), comprehensively applying the notion of open source to an educational institution has yet to be tried, even in the world of higher education where we might expect to see some leadership. Yes, there have been a handful interesting open source applications in higher education—MIT's iLabs (remote control laboratory experiments) and "Open Courseware" initiatives at MIT, Notre Dame, and Yale, (syllabi, lectures, and exams for hundreds of courses), MERLOT's rich website of online learning materials, and open-source course management systems such as SAKAI and Moodle, to name some of the best known. But the notion of a completely Open Source Online University (OSOU) remains to be debated, much less implemented.

It's time to start the dialogue.

#### **Online Education, Open Source, and the Academy**

What does higher education do? It teaches, explores, trains, provides opportunities to learn, assembles intellectual talent and resources, and it creates. Like many other enterprises, higher education increasingly does these things online. And this is where the strengths of the open source movement fit in.

#### What would an OSOU look like?

To "see" the OSOU, stakeholders would look on the Internet. The OSOU would be virtual; the OSOU campus would be in cyberspace, constructed with the tools, technologies, and practices

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that support online communities today. In "real" terms, this means that the OSOU will cost far less to build and maintain than brick-and-mortar universities. For example, many faculty could and probably would choose to work "off-site," in the ether, because they would prefer to teach their students or pursue research outside of a physical office on campus. Likewise for many admissions, registration, technical, and HR staff and course developers.

There would be only limited need for "on-campus" physical facilities. Sports and social events for students can take place online-chess clubs, sororities, virtual soccer, bridge tournaments, clubs, and public service activities could meet and interact online both synchronously and asynchronously. An OSOU could support students' access to academic or pre-professional internships at the physical sites of their choice.

An Open Source University (OSOU) would make use of the high quality open-source software that is increasingly available. It could, for example, use a course management system like Moodle or Sakai, a Foxfire browser, a Linux operating system, Apache server software, Koha for the library, and an office productivity word and spreadsheet suite like Sun's StarOffice. Right now, the OSOU may have to depend on proprietary software to run some of the university's back office operations such as admissions, registration, financial aid, human resources, and financial management, but probably not for long; it would contribute to the development of free or lowcost open-source equivalents.

#### How would an OSOU develop first-class courses and degree programs?

As computer and web-based instruction has advanced in the past decade, many faculty have enhanced their now web-based syllabi with dozens of valuable links, problems, lectures, reading assignments, simulations, student-faculty and student-student exchanges, self-tests, quizzes, blogs, essay topics, audio-visual materials, group projects, bibliographies, glossaries, and learning objects. These enhanced web-based syllabi are arguably of much greater value than the typical two to four page paper syllabi that faculty members have traditionally distributed to their students.

The question is how to make best use of these resources? How could the OSOU entice talented faculty at campuses all over the world to share their enhanced syllabi with OSOU? Because course syllabi and course content for either traditional or online courses are arguably the intellectual property of the faculty who develop them, many faculty are reluctant to share their syllabi, much less give them away by posting them on the Internet.

The answer is to treat the proprietary syllabus as a thing of value, like a textbook. Here's a scenario: Professor X at the State University of Y hears about OSOU, likes the concept, and submits his enhanced syllabi for an Intermediate Calculus Course to OSOU faculty for review. OSOU math faculty examine the syllabus and determine that it is first-rate. OSOU accepts the course and Professor X signs a textbook-like agreement turning over the syllabus and course rights to OSOU. OSOU agrees to pay Professor X a \$5 royalty per student for every OSOU student who takes this course over a four-year period. Professor X also agrees to update and enhance his syllabus on a regular basis and incorporate new textbooks, readings, explanations, and problems as appropriate. If Professor X is diligent in his updates and enhancements, his royalties are renewed annually during the four years of the contract. At the same time, OSOU might accept several alternative Intermediate Calculus Course syllabi from other faculty who

choose different textbooks or employ other learning methodologies. With guidance from their academic advisors, OSOU math students could select any one of these alternative courses when they need to take a calculus course at this level.

The advantage of the "royalty for syllabi" model is that it initiates a worldwide academic culture of participation while holding down the costs of creating the OSOU's intellectual property. Faculty who create courses with a substantial student demand will generate a regular flow of income. For difficult-to-develop courses, OSOU might add a financial bounty to stimulate proposals.

#### How to translate the syllabus into a course?

A terrific syllabus does not guarantee a great online learning experience. Sophisticated course development professionals must embed the syllabus and course materials in a course management system and then beta test the completed course package. This course development process would most likely be managed by OSOU's own course development experts, with outsourced specialists completing the bulk of the work. Either OSOU's faculty or Professor X would work with the course developers to prepare the course for teaching by providing explanations, mini-lectures, and problem sets. Large upfront costs could again be avoided by paying a modest royalty stream to the course developers. Other faculty, students, or independent stakeholders who suggest particularly valuable course enhancements might be acknowledged in the online course credits, might be offered a modest one-time payment or perhaps a piece of the royalty stream; or they or Professor X could direct that royalty stream to the campus scholarship fund or endowment.

#### How to invite in the outside world?

Interested experts from across the world would be invited to criticize and to offer suggestions to improve both the courses and OSOU's software. These ongoing curriculum and software reviews and enhancements would be assessed by OSOU's in-house faculty and technology staff. OSOU would accept appropriate enhancements and incorporate them into the course curriculum much as top managers at Linux review and accept new code. A strict process of review by inhouse faculty and administrators would be essential for OSOU to obtain and retain both regional and disciplinary accreditation, without which a reputable university cannot flourish.

Thegional accrediting agencies would be delighted by the complete transparency of OSOU's curriculum, administrative and faculty credentials, library, and assessment process. Accreditors and state licensing agencies would also be impressed by OSOU'S insistence on meticulous assessment of all of its programs. Using the online "footprint" records of every student, OSOU's Director of Assessment would ensure that all OSOU students receive a comprehensive knowledge and skill assessment when they begin and complete their degree programs. This assessment would measure the value-added element of the university education. OSOU might use the American College Testing (ACT) CAAP test or a comparable instrument to measure the effectiveness of its general education programs. Similarly, at the completion of a student's academic program, OSOU could employ the Major Field Tests from the Education

Testing Service (ETS) or an equivalent assessment for widely accepted and consistent evaluation of what their students had learned in their chosen fields such as biology, math, business, or education. The process would be far more transparent than most assessment practices at conventional institutions are at this time.

Because the OSOU would start its institutional life with a relatively clean slate, it would not be burdened by the legacy systems, bureaucratic fiefdoms, and institutional practices that make the operations of many universities so opaque. A key attribute of OSOU would be ongoing accountability to its students, faculty, potential employers, trustees, licensing and assessment agencies, and the public. OSOU would highlight the output of the institution, what students have learned, not the input measures traditionally so dear to institutions of higher education and their accreditors.

#### What about developing an innovative curriculum?

OSOU's academic curriculum could emphasize multidisciplinary programs but also offer the traditional academic majors. A multidisciplinary curriculum might include a number of the following traditional subject areas: math, science, health sciences, social sciences, business and technology, education and training, humanities, ethics, law, religion, Great Books, and the arts.

With the course-royalty model, OSOU should be able to attract a number of U.S. and non-U.S. faculties to develop a rich mosaic of cross-national and cross-disciplinary courses in culture, language, literature, politics, geography, history, math, science, and education. Over time OSOU would create a richer curriculum than would be possible in any single brick-and-mortar university. Initially, the, OSOU would develop its courses in English, but it would be open to new courses in any language. There would be a special emphasis on developing entire programs suitable for students with disabilities.

#### How will OSOU courses be taught?

One of the typical criticisms of online courses is that students have no personal contact with other students or with the faculty. This criticism, often from individuals who have never taken or taught an online course, flies in the face of testimony from faculty that they often get to know their online students better than their traditional classroom students. The reason for this enhanced relationship in the online environment is that students are required to participate more intensively in a high-quality online class, both with the faculty member and with their peers. With threaded discussions, chat rooms, group projects, peer reviews, regular faculty office hours, and multiple writing requirements, a good online course leaves no room for the isolated student.

The next generation of online courses can be expected to provide for even greater interpersonal contact in the online classroom. In the next version of online courses, peer-to-peer voice service from *Gizmo* and peer-to-peer real time video from *SightSpeed, Skype* or an open source equivalent will be incorporated into the online classroom environment. No doubt online smell, touch, and emotional vibes won't be far behind.

#### Who would teach?

OSOU faculty would be chosen primarily for their demonstrated capability as great online teachers. This teaching-track faculty wouldn't be burdened with a "publish or perish" culture and would be judged mainly on how well their students learned. OSOU could also have a number of faculty who are traditional scholars and researchers. A majority of faculty might be adjunct or part-time; they could be recruited from a global pool, competitively compensated, trained to teach with the best practices in an online environment, rigorously assessed to determine how well their students learn, and made to feel part of a cutting-edge university community with a global reach.

## What would the OSOU students be like?

Students would be attracted to OSOU for a number of reasons. It would offer high-quality academic degree programs; it would be a unique laboratory school; it would have a participatory curriculum; its culture would focused on students' learning rather than on the for-profit side of the university; it would have buzz; it would be held up as a model to other universities and accreditors; it would offer a broader range of online programs than its competitors; it would offer courses that are constantly updated; it would be global in orientation; it would tailor its courses to individual learning styles; it would focus on student success rather than on departmental concerns or on the scholarly careers of the faculty; and student feedback would play a crucial role in retaining faculty and maintaining a high-quality curriculum.

Online higher education often appeals to non-traditional students, many ofwhom are age 24 and older. Today, 70% of students who rely upon online education claim that they would be unable to pursue a higher education degree or certificate at a traditional campus. Their reasons are basic and often insurmountable: demands of work or family, handicaps, travel, or distance from a conventional campus. This is an enormous pool of underserved students to work with.

A typical OSOU student, let's call her Roberta X, might be a mature working mother who wishes both to complete an undergraduate biology degree begun some years earlier and to advance her career. Roberta would be attracted by the convenience, flexibility, and cost of online education and by the ability to retain a sense of community by interacting with faculty and fellow students, using video, audio, and written communication.

Roberta would be drawn to OSOU because she could preview every aspect of each course she might take, because there would be alternative course versions and schedules for many courses, because her online-and at-home labs would be imaginative and thorough, and because she could preview the biographical sketches of the faculty who might teach her courses. She would be aware that OSOU's faculty were hired and retained solely on how well their students learned.

Roberta would be impressed that her biology program at OSOU, which would be the result of collaboration by academic experts and scientists in five countries that it is regularly reviewed by outside experts and businesses that hire graduates in this field, and that her actual learning would be carefully assessed so that she could be certain she was mastering broad knowledge and relevant skills. Roberta might note that thirty-seven universities in the U.S. and overseas were using the OSOU biology program and perceive that this vote of confidence increases the

credibility both of the program and of OSOU. She wouldn't have to worry that OSOU was so transfixed by financial concerns that it would inevitably cut corners in delivering her education.

#### What about the university's role in spreading its curriculum?

As soon as OSOU was in operation and its programs carefully assessed and accredited, it would begin to make its courses and programs available to any college or university that wished to use them. OSOU's major impact would be on the hundreds of colleges and universities worldwide that could chose to offer OSOU courses to their own students, dramatically expanding educational opportunity and economic development.

# Why do we need an open source university? What would it be like? How could it be created?

There are a number of intriguing answers to these questions.

As an institution of higher learning an OSOU can create and spread knowledge, opportunity, and world-class education more broadly than is the case with our current mix of campuses, with their tightly owned and branded intellectual property and the constraints imposed by their physical presence.

An OSOU can set high quality standards for online education in particular and higher education in general. Under the current higher education system, it is difficult or impossible to review or compare the courses offered by thousands of faculty across the nation. No one knows which courses taught behind closed classroom doors or in password-protected online classes are outstanding and which are mediocre or worse. Under the current system, individual courses and entire programs are rarely, if ever, compared with high- or low-level benchmark equivalents.

The nation's regional accreditation commissions are only now beginning to enforce a higher level of assessment, but even current standards are hardly comprehensive or consistent across institutions or regions. Currently, accreditors don't require comparisons of specific campus programs or program outcomes with demanding, nationally benchmarked standards and learning outcomes. An OSOU could facilitate such comparisons. Indeed, as a transparent university with a curriculum, teaching and learning standards, and fully assessed outcomes that would be open, measurable, and ready for comparison with other university programs, OSOU would set, not reflect, top-level standards.

Right now there are many online courses in higher education, but only a relatively modest number of complete online degree programs are available in the United States and abroad. Most students at traditional brick and mortar colleges are fortunate if one or two complete online majors are available on their campus. The OSOU would provide freely available and complete majors, minors, and cross-disciplinary programs that other colleges could readily borrow, giving students greater flexibility as they pursue their chosen programs. With the easy availability of flexibly scheduled courses and programs, more students would complete their degrees; do so more expeditiously, and, in the process, save families and the nation millions of dollars.

Finally, unless more high-quality and low-cost online degree programs are made available, much of the rich diversity of the nation's private and public colleges might disappear under the

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juggernaut of the huge and rapidly expanding for-profit sector, led by the billion-dollar revenue operation of the University of Phoenix. Although Phoenix offers a valuable learning opportunity to many students, few would rejoice if Phoenix's for-profit model were eventually to dominate higher education.

The peril faced by traditional universities from the for-profit sector is clear. The consulting firm *Eduventures* calculates that the for-profit sector now accounts for 37 percent of all online students nationwide and 47 percent of new online students. The for-profit sector, by contrast, has only 5% of total brick-and-mortar enrollment nationwide. Continuing their recent explosive expansion, the for-profit sector of higher education grew by 54 percent in 2004 and 39 percent in 2005

#### How might the Open Source University come into being?

Many of the innovations in online higher education have been supported by foundation seed money. For example, the MIT OpenCourseWare initiative was funded jointly by the Hewlett and Mellon Foundations. The same two foundations also provided seed funding for SAKAI. The Sloan Consortium, for its part, has funded research and innovations to enhance and encourage online education. So a foundation or several of them might come together to launch an OSOU initiative.

Other funding alternatives might include the backing of imaginative corporations that perceive the advantages of simultaneously sponsoring a first-class online university to serve their own education and training needs and providing a public service by making their programs available to individual students and to other universities. Or perhaps an imaginative individual or entrepreneur might decide to leave a mark on twenty-first-century education by giving the necessary seed funding.

Much of traditional philanthropy flows to educational, health care, cultural, or religious institutions. Most of these gifts have little impact beyond the institution receiving the grant or the region around it. Establishing the first Open Source University in the world, by contrast, could have an immense effect on higher education both in the United States and in other countries.

Investing in the first OSOU would have a powerfully scalable impact. For the first time, universities in America or in any country could borrow for their students a library of well-crafted, reviewed, and accredited undergraduate and graduate courses and complete degree programs.

#### **OSOU's financial stability**

OSOU's medium and long-term goals would be to operate in the black. OSOU would earn revenue from student tuition, from modest fees charged to colleges and universities that used its courses, from institutional or corporate partners who send their students to OSOU to enroll in courses or programs not available on their own campuses, as well as campus partners who request that OSOU handle some of their back-office functions or provide course design, backup faculty, or online tutoring for their students. As part of its non-profit mission, OSOU would charge reduced fees or no fees to institutions in academic distress, to campuses with a high proportion of low-income students, or to universities in developing nations.

Unburdened by a legacy of programs and policies that constrain innovation, OSOU would experiment with creative scheduling options as well as with course and program payment alternatives. For example, OSOU could offer some courses at a discount if enrolling students agreed to a flexible start date so that the course might reach its maximum capacity. OSOU might provide airline-like discounts if students agree to sign up and pay for a course 21 days before it starts and impose a walk-up surcharge for enrollments on or after the day a course commences. To discourage dropouts, students could be given discounts if they finish their programs ahead of schedule or complete a fixed number of courses each year.

And in the meantime, the OSOU would aggressively pursue foundation and government grants to develop innovative programs and courses that reflect the expansion of knowledge and to conduct experiments in learning and assessment.

## The **Opportunity**

An open source online university has the potential to meld the best of online education with the creativity of the open-source movement, allowing stakeholders to freely and efficiently use the best features of both for both individual and social advantage. An OSOU creates a new paradigm in higher education, a paradigm waiting to be developed in a creative and dynamic fashion.

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#### Abstract

In the 21st century, all providers of higher education will need to have some stamp of quality assurance provided by something other than the ministry or bureau that gives them license to exist and award degrees. In the United States, there is a tradition of several decades of peerreview accreditation. In almost all other parts of the world, the last twenty years have seen the birth and growth of a vast array of national and multi-national agencies that grant some form of quality assurance. It is in this context, then, that this paper and presentation discusses the opportunities for quality assurance appropriate for a new international virtual higher education enterprise structured around Open Courseware, OSOU.

As the head of the largest regional institutional accrediting commission in the United States, I discovered that as I read the proposal for OSOU my thinking shifted back and forth between two questions: (1) is this a reasonably well-conceived proposal for a new and innovative higher education entity and (2) could this entity as proposed reasonably expect to gain institutional accreditation in the United States? Then, knowing that I would be traveling to Jordan to share in this panel, a third question intruded: (3) can this type of institution gain reasonable credibility in the international higher education marketplace?

I defer to other experts in on-line education who are on this panel as to the strength of the model proposed for creating and delivering courses and programs through OSOU. By and large most of us in the institutional accrediting business in the U.S. have decided that some of the essential hallmarks of quality in e-Learning are the same for any other delivery systems in higher education. In fact, we have argued that we do not need a separate set of standards, and, therefore, we can evaluate e-Learning by applying our single basic criteria for educational quality. For example, we expect that for all educational programs, no matter the level,

- some identified core of academically-competent people are responsible for determining the types and variety of courses and programs the university chooses to offer through e-Learning;
- the curriculum is created by, taught by, and evaluated by people who by training and experience are competent to determine what students should learn and whether they have learned it; and
- the delivery should integrate as many best practices in teaching and learning as the technology allows, including active learning, student-to-student interaction, quick feedback on student work, and so forth.

Other than the use of open source software and open courseware, nothing in the OSOU proposals strikes me as remarkably different from arrangements we have found to be acceptable in other virtual institutions and other institutions heavily engaged in e-Learning.

It might be not be uniformly accepted throughout the U.S., but by and large most of us in the quality assurance business have come to understand that e-Learning in one way or another changes the nature and role of the faculty. We understand that the keys to successful teaching in this electronic environment may not be the same as those in other settings. Therefore we evaluate how institutions support faculty in mastering and using effective teaching techniques. By and large, we have come to accept the fact that in this new environment, effective faculties need to be embedded in a team rather than expected to be e-Learning experts themselves. We know that large-scale e-Learning enterprises rely heavily on adjunct faculty who might be scattered around the world, and I think we are somewhat less comfortable with all of this, even though we have accepted it in several institutional settings. Most of us are comfortable with the concept and language related to unbundling the faculty. OSOU presents interesting variations on all of this, but it is hardly new to us.

In quality assurance our attention has for some time been focused less on the content of course or program than on the kinds of support services provided by the institution both to enrich the learning experience and to assist students in succeeding in their educational goals. Early on we worried a lot about student access to resources common to libraries and campus learning resource centers. Now we know that students can access and use all sort of electronic resources, yet we still wonder whether on-line students know that a very significant world of research and information exists outside of the Internet. My agency has partnered with WCET, a U.S. organization known for its excellent work in distance education, in providing workshops on best practices in electronic student services, services that are transforming the traditional student services provided campus-based students. We pay attention to whether technical assistance as well as access to tutoring or other learning needs are available on schedules fit the schedules of e-Learning students, typically 24/7. Moreover, we have all come to understand that for most institutions, the integration of technology into the academics generally and into e-Learning specifically often involves a level of outsourcing and contracting not considered typical to the academic functions of the institution. We have seldom raised serious concerns about accepting contracted course management software, use of contracted electronic databases and library services, and contracting for 24/7 service desks and tutoring. OSOU appears to understand the importance of these things, so the judgment will largely revolve around how well and how dependably the institution provides these services.

Apparently fairly soon there will be a new wrinkle in quality assurance of distance education in the U.S. that OSOU should be aware of, particularly if it chooses to seek U.S. accreditation. Let me provide a brief background. When the Higher Education Act—the national legislation that establishes most of the major federal financial aid and grant programs—was renewed in 1992, Congress exempted certain institutions from participating in federal financial aid programs. Shorthanded as "the 50/50 rule," the Act held that any institution that offered over 50% of its programs and enrolled over 50% of its students in correspondence education could not participate in federal financial aid programs. As e-Learning emerged, the

United States Department of Education, for reasons unclear to me, defined e-Learning as correspondence education. Therefore, all virtual institutions were ineligible to offer students financial aid, as were institutions whose offerings and enrolled students triggered the 50/50 rule. By the late 90s, Congress and the Department of Education came to understand that this needed to be changed, so in the last reauthorization—1998—they structured a special project through which some institutions could qualify to offer student aid, but only under careful Department monitoring. From all of that came the Department's recommendation that e-Learning no longer be treated as correspondence education. A somewhat skeptical Congress appears to be ready to agree, but continues to operate on the belief that e-Learning probably should have some special monitoring. When the Senate and the House over three years ago began to rework the Higher Education Act, various proposals came forward, including requirements for special quality standards for e-Learning and special tracking of all e-Learning programs and students. Finally some workable compromise has emerged that appears to result in only a few new requirements for accrediting agencies to apply to e-Learning programs, such as assuring that evaluation teams have appropriately trained peer reviewers and that agencies monitor institutions that seem to be expanding too dramatically. But the biggest change, and probably the most difficult to put into place easily, is a requirement that federally-recognized accrediting agencies will require the institutions they accredit to be able to authenticate their e-Learning students. I hedge a bit on all of this because we are not quite sure whether the House of Representatives will follow the lead of the Senate, which has passed its revisions to the Act. The wording as it exists in the newly passed Senate version is:

the agency or association requires an institution that offers distance education to have processes through which the institution establishes that the student who registers in a distance education course or program is the same student who participates in and completes the program and receives the academic credit.

Already a variety of institutions and commercial businesses are ramping up to market solutions including new hardware and/or software as well as specifically modified information security systems that enable authentication. In deciding about the type of quality assurance it needs OSOU will want to decide whether it will meet this new U.S. requirement.

I also defer to others to assess whether OSOU can make its way in a competitive marketplace that is already somewhat crowded, particularly in the United States. Moreover, in the U.S. large for-profit providers heavily influence that e-Learning marketplace at this point. While it is true that the not-for profit sector, particularly the public sector, has been slow in creating the kind of scalable entities that seem to gain a large percentage of the U.S. distance education student body, that is changing. Not only has University College of University of Maryland shown that it can hold its own, but the University of Illinois has just funded its Global University with the intent that it will become a significant player in this market. As far as I can tell, two of the big keys to success are building a model for rapid scalability and having deep enough pockets to make massive investments in marketing and recruitment. OSOU appears to be prepared for scalability, but in the marketing and recruitment end of the industry, the for-profit sector wins hands down over and over. If the fate of U-Next.com offers any lessons, it is that co-branding with well-established and well-known universities appears not to give the marketing advantage many think it should and will.

All of this brings to the fore the issues of acceptance and credibility. In the United States, the broader higher education community becomes more comfortable with e-Learning as every year passes. I hear less and less frequently the knee-jerk judgment that courses and total degree programs completed through e-Learning are automatically of lesser quality than those provided in face-to-face classroom settings. So OSOU may be able to find college and university partners willing to integrate OSOU courses into their certificate and degree programs. I still hear too much background noise about the potential for fraud in virtual entities. You all should know that the Internet has been a boon for degree mills the world over, but I am talking about the stories relating the discovery of five students instead of one doing the course work. Or the tales, whether apocryphal or not, about an overloaded or unexpectedly ill faculty mentor who turned the on-line work over to a spouse. The federal requirements on authentication get at only part of this challenge. I should also mention that employers seem to be not as uniformly taken with the convenience of on-line learning as e-Learning champions had anticipated. Many human resource managers still state a preference for blended or hybrid programming for their employees. This has influenced how deliverers of e-Learning think as well. Almost every major e-Learning conference I have attended over the past two or three years has included significant programming about the virtues of hybrid and blended courses and programs.

So far I have addressed rather broadly the environment of U.S. regional accrediting agencies generally toward on-line learning. While it is safe to say that every regional agency has dealt with one or more institutions for which e-Learning is a significant part of its education activity, it is also probably safe to say that most agencies accredit very few virtual institutions such as OSOU will be. Even fewer have within their membership something as unique as OSOU will be. To be sure, four of us cut our e-Learning teeth on Western Governors University a few years ago, but I think some of the participating agencies see WGU as *sui generis* rather than a model for other institutions. But a quick survey of regionally accredited virtual institutions will probably show that the experience—and one assumes, therefore, comfort as well as expertise—rests with a only a couple of agencies, mine being one of them.

Let me, then, move on to proposing some of the quality assurance issues OSOU should consider in its planning. If OSOU intends to be an institution offering U.S. degrees under some form of U.S. accreditation, then it must make three big decisions.

The first revolves around where it chooses to incorporate and draw its legal authority to offer degrees. If it wants to be a university located in a nation other than the U.S., it will need to find a regional commission that will extend U.S. accreditation to it. My Commission's bylaws rule out that possibility; but as far as I know, all of the other regional agencies have extended accreditation to one or more foreign entities. It is not easy, but with the right Commission, it is probably doable.

The second, then, revolves around what state to choose if OSOU intends to locate its incorporation or headquarters in one of the states in the U.S. Not only will OSOU need to consider the obligations required by the state, but it may need to consider the receptiveness of the regional association that provides accrediting services to the state. At this point, an institution that functions completely outside of the physical boundaries of the U.S. but holds U.S.

incorporation and degree-granting authority will fall under the region that includes the state of incorporation or licensure as a degree-granting institution. This is how Middle States Association has come to accredit several of the "American Universities" located in places such as Paris, Beirut, and Cairo. Some of the newest "American Universities" were spun off of U.S. universities, so the New England Association covers an institution in Bulgaria, and the Senior Commission of the Western Association has included an institution in Armenia. My agency is brand new to this business, having only recently extended candidacy to a seminary that operates out of Austria yet it is an Indiana corporation and, therefore, grants degrees under Indiana legal authority. Of course, if the U.S. presence is more pronounced, then the issue will rest largely with the accreditation expectations of the regional agency.

The third is whether in seeking accreditation through a U.S. agency, OSOU wants to qualify to granting federal financial aid to students who qualify for those funds. If this is a goal, then OSOU needs to begin exploring with the Department of Education how a whole myriad of regulations will be interpreted to fit the unique nature of the University. The Distance Demonstration Project confronted everything from the difficulty in accepting unique calendars, to out-dated seat-time standards, to arrangements through which the credit-granting institution (and the institution processing financial aid) was beholden to other institutions for most of the curricular content taken by the student. I don't think the financial aid rules have become much more readily navigable even though a Department program has proposed that they should be. Let me be very simple and clear: an institution cannot qualify to administer student financial aid without accreditation, but accreditation does not automatically qualify an institution to administer financial aid to students.

I would like to complete my contribution by proposing that OSOU should consider the rapidly shifting nature of higher education quality assurance throughout the globe. This is particularly true if OSOU plans to have an international presence and an international student body. Over the past two decades, scores of new quasi-governmental national quality assurance agencies have emerged. In 1990 the International Network of Quality Assurance Agencies in Higher Education (INQAAHE) came into being. Other than the U.S. system of accreditation, it could count less than a dozen other national systems then that existed outside of national ministries. When it convened its biannual meeting in Toronto this past spring, it reported 133 agencies of one type or another holding membership, with over seventy nations represented. Thirty years ago, as our first colleges and universities ventured into establishing international campuses or delivering a program or two at international sites, I struggled to identify where, other than the Ministry of Education which usually focused only on public education supported by the state, to go to get a read on the legal status of the U.S. entity or program. Now through INQAAHE, UNESCO-OECD, the Council on Higher Education Accreditation (CHEA) in the U.S., and the ENQA (European Association for Quality Assurance)-to name only the most visible—a rich set of conversations are occurring. New global standards for quality assurance agencies and new protocols for cross-border higher education have resulted. You should also know that in fairly rapid order, regional networks are emerging to identify and share best practices and to enable mutual recognition of stamps of quality assurance.

I suggest that those parenting OSOU study this rapidly evolving environment with care. The processes of U.S. regional accreditation fail to meet some of the new global standards, particularly standards on transparency of process and findings and standards on the incorporation of students and employers in the evaluation. As the Europeans create the register of recognized quality assurance agencies for the European Higher Education Area—the name for the geography now included in the Bologna process—all of us in the regional agencies know that we would be in some trouble if we had to gain inclusion in that listing.

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Ultimately it would not be wise for OSOU to base its quality assurance primarily on U.S. practices and standards. Instead, it might wish to propose the challenge Western Governors University presented to the regional associations in the United States. Namely, for a new international entity providing quality higher education courses and programs around the globe, could several different national agencies come together to create and implement a quality assurance program that would give OSOU global credibility. I will admit that while this seems like an exciting and promising possibility, you may not have the luxury of the time all of the negotiations might take. But if the relationship can be collaborative design and build, then the product at the end might be the better for it. At the very least, it is worth study and consideration.

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## An Open Source Online University OSS and OER Factors in Developing Countries

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#### Abstract

Although many educators will find the notion of an Open Source Online University (OSOU) inherently appealing, the effectiveness of such an institution will be based on whether it is relevant to local needs, is affordable, and whether it improves accessibility in developing countries. The paper will address these criteria in terms of open and flexible education, and selected characteristics of Open Source Software and Open Educational Resources.

## 1. Online Education, Open Source, and the Academy

An Open Source Online University would adopt open source software and open educational resources, while applying the principles of commons based peer production (CBPP) where possible to enhance access to education. Such a university could significantly reduce virtually all access barriers to education including learner fees. Although the focus of this paper will not allow a treatment of CBPP it is worth noting that it is an economic model developed by Yochai Benkler [1] [2] that explains the motivation of participants in open source projects and demonstrates why CBPP can emerge as a highly efficient form of creative participation and organization.

An "open" university is one that reduces and eliminates access barriers to education. For example, distance education has historically been tied closely with open universities and colleges because it reduces some of the time and geographic access barriers that classroom-based education imposes on learners who are not able to attend classes in physical locations at specific times. The advent of the Internet opened opportunities for Online Learning (eLearning) to supplement and replace traditional correspondence and video-based distance learning methods. Simultaneously, during the past decade, open source software (OSS) has become an important part of the technology infrastructure through which online learning has been delivered and educational resources have been developed. Furthermore, the licensing, distribution, and development methods used in OSS have been adopted by producers of educational resources (OER). Some of the highest profile OER activities include the Open Courseware (OCW) Initiative, which was pioneered by MIT's OCW project.

The *openness* in OSS and OER promises to enable the free use and reuse of resources that are critical to the educational enterprise. OSS and OER could reduce the cost barriers to education in so far as it is fee free, and reduce cultural access barriers in so far as it is free for modification and reuse to meet local educational needs. Many open education providers are turning to OSS and OER to help them better meet their mission of widening access to high quality education. There is dialog about applying the general principles and economic models that underlie OSS and OER to other functions of the university such as teaching, research, and student services.

James Fay and Jane Sjogren [3] outlined a model for an "Open Source Online University" (OSOU) in their foundation paper for this panel discussion. In their paper they describe a university that operates virtually, delivering online courses and programs, with a distributed student body, faculty, and staff. They also identify the need for content, outline a process and incentive model that attracts faculty to license their syllabi using a traditional royalty-based compensation plan, then use internal and outsourced experts and learning designers to develop courses based on the syllabi and provide quality control. The design and development approach shares some significant similarities to those adopted by many traditional open and flexible learning providers that have moved into online learning. Heavy emphasis is placed on the development of quality resources, outcomes-based assessment, and transparent processes to help ensure accreditation and promote disclosure to potential learners.

There are a number of assumptions wrapped into the OSOU model that merit discussion relative to higher education in developing nations. These assumptions and the OSOU model framework serve as the foundation of thispaper. The notion of an organization committed to affordable open and flexible education, developed to meet the needs of learners living in a variety of circumstances, adopting Open Source Software (OSS) and Open Educational Resources (OER), is broadly appealing. It appeals to our senses of connectedness, opportunity, commitment to public good, and innovation.

#### 2. The Notion of an Open Source Online University in Developing Regions

The framework outlined by Fay and Sjogren promises to deliver high-quality education at low cost, which is obviously a desirable set of characteristics for developing and developed countries. It is worth taking some time and exploring which features of the framework are most conducive to meeting needs in developing regions of the world. In a recent series of postings on Terra Incognita<sup>1</sup>, Penn State World Campus' Blog, focusing on the impact of OSS and OER on education, contributors from developing countries and multicultural environments reported that the benefits of open resources include cost reduction and customization. Cost reduction was important because it decreases barriers to entry into online learning, while customization is important for localization to help ensure relevance in local contexts. In the larger context, beyond the use of OSS and OER, the OSOU might also function as an open and flexible learning provider to reduce barriers and better meet the needs of more diverse populations of learners.

#### 3. Open and Flexible Education

Open and flexible education has been closely tied to the tradition of distance education in the United States since the late 1800s, creating flexibility in terms of place and time and openness for learners belonging to groups that had been marginalized in terms of access to higher education. Open and flexible learning has a number of dimensions that relate to different types of access. Generally speaking, the more open and flexible the provider is, the more accessible education becomes. Some of the key dimensions of open and flexible education include a) time, b) place, c) cost, d) programming, and e) admissions. Each of these dimensions also has characteristics. See Sharma [4]. For example, the time dimension can be thought of in terms of when study can take place and the duration of study. Can the learner study any time during the

<sup>&</sup>lt;sup>1</sup> Terra Incognita: <u>http://blog.worldcampus.psu.edu/</u>

day, and is the course of study restricted to prescribed periods of time, such as semesters? Are there geographic constraints that restrict the learner's mobility or dictate where the learner must be physically located? Are the costs associated with tuition or fees, textbooks, activities, and other necessary resources prohibitively high for many learners? Are the programs relevant to learners? Are they context sensitive, leading to recognized certificates, in appropriate languages, pedagogically appropriate, and current? How open is admission to programs? These are the types of questions that strike at the types of openness and flexibility that an OSOU might actually provide.

Universities and colleges will be differentially open and flexible, exhibiting openness and flexibility on some dimensions and being much less so on others. For example, the Penn State World Campus is relatively open in terms of place with very few programs having geographic constraints. For example, with just a few exceptions, World Campus students never have to leave their home to meet program commitments. One exception is the *i*MBA<sup>2</sup> program, which requires a group internship at a company site followed by educational programming at a Penn State campus. It can be argued that the residency requirement reduces access for learners who are not able to participate in a residency experience. It is also argued that removing the residency will reduce program quality, and enhanced quality offsets the potential access barrier.

Although the World Campus learner can study virtually any time of the day because there is a commitment to asynchronous learning design, the courses run on a semester schedule, limiting when a learner can join and complete a course. This was not always the case. Many World Campus courses had their roots in traditional independent learning, which allowed for learners to enter the course at any time and complete the course within 2 years. The transition from "self-paced" to "semesterized" courses places some access barriers to highly mobile learners and learners who serve actively in the military who have unpredictable commitments, arguably making the World Campus less open for a segment of learners. The World Campus reduced its *openness* in this case because it found that learner completion rates increased by over 20% when courses were semesterized.

The World Campus' fee structure is designed for a student body in a fully developed economy, placing cost limitations on many learners, and all courses are online requiring learners to have Internet access, which restricts participation, particularly for learners from economically developing countries. In addition, the programs are offered only in English and are designed principally with the needs of a North American and European audience in mind. The World Campus is typical in that it is more open and flexible for some learners than for others. That is, like other education providers it has a well-defined target population and tries to optimize its operation to meet that population's needs based on their characteristics and the characteristics of the service environment.

The extent to which the OSOU will meet its objectives of delivering high-quality educational services, at a very low cost in a sustained manner, in developing countries will be impacted by which open and flexible dimensions it optimizes. In many developing areas there is a lack of participation in higher education and an enormous need; access is determined by cost and availability of technology, while quality is associated with how useful and relevant the educational offering is in the local context. The ability for the OSOU to optimize these dimensions will be influenced by its use of Open Source Software, Open Educational Resources, and the organizational structure that it adopts. In the following sections I will identify qualities of

<sup>&</sup>lt;sup>2</sup> iMBA program description: <u>http://www.worldcampus.psu.edu/iMBA.shtml</u>

OSS and OER that can help the OSOU achieve its goals and some current activities and projects that are leading the way.

#### 4. Open Source Software

*Open Source* is a term coined to describe the creation and distribution of non-proprietary software. Many Open Source Software projects have been lead by volunteers providing broader benefit to society. There are now thousands of such software projects operating in a global context with tens of thousands of volunteers. Given the central role of Open Source in the OSOU and its frequently blurred meaning, it would be helpful to briefly describe what is meant by *Open Source Software*. Literally, *Open Source* refers to the terms of distribution for software, which includes but is not limited to the openness or transparency of the source code, allowing anyone to access, evaluate, and modify and reuse the code. The Open Source Initiative (OSI) provides a widely accepted and comprehensive definition of OSS on its Web site<sup>3</sup>. Although OSS might be fee free, there is nothing in the definition that mandates it. The Open Source Initiative (OSI)<sup>4</sup> Web site provides descriptions of approved licenses.

One of the most frequently cited qualities of OSS is the community that supports it. The community will help ensure code quality, so even though there is no legal reason prohibiting anybody from downloading and modifying source code, that does not mean that the modifications will be included in subsequent official software releases. Different communities operate differently. Refer to Eric Kim's [5] *An Introduction to Open Source Communities* paper for original case studies that illustrate differences among OSS communities. In addition to code development and maintenance, the OSS community often supports open forums for the exchange of ideas, certifies commercial services providers to support the product, develops documentation, user guides, and training materials, and organizes user events. The quality of the "software" is a combination of code and the support and user communities [6].

The nature of the code and community will be an important success factor for the OSOU as it operates in developing regions. The assumed benefits of reduced cost and localization to be derived from the use of OSS will depend on the nature of the specific software selected and how closely it comports to the OSI definition of OSS and the freedoms conferred to the user. Although much OSS is fee free, its maintenance and operations are not. The nature of the software code and the community that supports the code will influence the short- and long-term costs. For example, two of the most popular Open Source learning management systems are Moodle and Sakai. They have different architectures, programming languages, issues around scalability, and community composition. The fact that Moodle is based on a (Linux, Apache, MySOL, and PHP) LAMP stack and Sakai is based on Java J2EE will impact the skills needed to support these applications and contribute code to the community or customize the application. Some skills and competencies are easier to come by and less expensively acquired than others. The transparency and quality of the code and size of the community will influence how easily the software will be localized and how much localization may have already occurred. Some of these metrics have been explored by Udas and Feldstein [7] and placed in a comparative framework for application evaluation and selection.

<sup>&</sup>lt;sup>3</sup> Open Source Initiative Definition of OSS: <u>http://www.opensource.org/docs/osd</u>

<sup>&</sup>lt;sup>4</sup> Open Source Initiative Site: <u>http://www.opensource.org/</u>

For the purposes of the OSOU in developing countries, an OSS system that is easily deployed, supported, and modified to meet local conditions is important. We can take some direction from universities and NGOs operating in developing regions. In a recent Blog posting, Jean-Claude Dauphin [8] of UNESCO outlined the significant involvement and contributions that his division has made directly to Free and Open Source Software and to developing networks that support Open Source for education. In addition, he iterated UNESCO's intent to explore producing a complete Free and Open Source Software (FOSS) Education Solution for higher education that would integrate a stack of software tools, guidelines, and good documentation, and outlined a rough project plan. Working with UNESCO on this type of project would help ensure that the ICT infrastructure for the OSOU would be able to address the needs of developing countries.

#### 5. Open Educational Resources

The production methods developed in Open Source Software communities is also being applied more broadly to the creation and distribution of college and graduate school courses and course materials, also known as Open Educational Resources (OER). OER includes both the development and open distribution of teaching and learning materials used in education. Examples of OER efforts can be found at the Open Courseware Consortium<sup>5</sup>, the Creative Commons OER<sup>6</sup> site, and WikiEducator<sup>7</sup>.

There is incredible potential for the impact of OER in developing countries, by reducing access barriers due to lack of local expertise, lack of context-relevant content, and prohibitively high cost of materials generated in developed economies and controlled through proprietary licensing and for-profit delivery channels. Once again, like OSS, OER will have to provide low cost and provide the flexibility necessary for localization for the resources to promote the OSOU goals in developing countries. The term *Open Educational Resources* was first adopted at UNESCO's 2002 [9] Forum on the Impact of Open Courseware for Higher Education in Developing Countries. OER are educational materials and resources offered freely and openly for anyone to use and, depending on the license, they may be remixed, improved (localized), and redistributed. There are examples of large-scale translation projects such as the China Open Resource for Education (CORE) program, which works closely with the MIT Open Courseware Initiative (OCR) and other major universities with a commitment to localizing, translating, and teaching over 100 MIT OCR courses. This activity has resulted in CORE commitment to generating local OER courses for distribution and reuse.

The extent to which an OER is "free," is in large part defined by its license. The fewer restrictions on the license, the more open the resources become. For education in developing countries, the ability to modify and redistribute is critical because it enables localization. Although this is widely accepted, there is a lot of discussion about the affect of including a non-commercial restriction (NCR) on OER licenses. Some educators and policy makers claim that the NCR renders the OER closed, negatively impacts the usability of the content, reduces the transparency open licensing systems try to achieve, and weakens the ecosystem needed to sustain an open commons-based community. Others feel that the negative impact of NCR is minimal

<sup>&</sup>lt;sup>5</sup> Open Courseware Consortium: http://www.ocwconsortium.org/

<sup>&</sup>lt;sup>6</sup> Creative Commons OER: <u>http://creativecommons.org/</u>

<sup>&</sup>lt;sup>7</sup> WikiEducator: <u>http://www.wikieducator.org/</u>

<sup>&</sup>lt;sup>8</sup> Forum Final Report: unesdoc.unesco.org/images/0012/001285/128515e.pdf

given that it enhances participation within the education sector, because many faculty members and universities that might be comfortable with sharing content are not comfortable with it being used for commercial purposes.

Although many of the North American open courseware initiatives apply the NCR to their materials, this is less often the case among OER projects internationally. Among the more interesting efforts that the OSOU might follow is the Commonwealth of Learning (COL) supported WikiEducator project that not only supports numerous Free Libre Open Source Software (FLOSS) and OER projects, but has made a commitment to developing a complete open university curriculum by 2015, using the Creative Commons Attribution-ShareAlike 3.0<sup>9</sup> license. Among the many important OER projects hosted on WikiEducator is the FOSS4Edu<sup>10</sup> project operating in Africa and now other developing areas, a free textbooks network<sup>11</sup> project, and the Commonwealth Computer Navigator's Certificate<sup>12</sup>, which is supported by COL and UNESCO with voluntary contributions of universities from Africa, Asia, the Caribbean, North America, and the Pacific.

In addition to licensing decisions, there are other characteristics of OER that impact its usability in developing regions. As the OSOU considers how it is going to adopt open content and distribute it for reuse, from a developing countries perspective qualities such as granularity, modularity, the use of open file formats, and packaging must be considered. These qualities impact the ease in which content is redesign and use across technology platforms.

#### 6. Challenges, Opportunities, and Decisions

The OSOU is an idea with significant potential. Some of the obvious challenges included in the framework are achieving high quality through rigorous review and learning design, ensuring content and pedagogical relevance across cultural and social contexts, and providing accessibility through delivery modalities, while maintaining affordability for learners in developing countries. Success in developing countries will mean overcoming some basic challenges associated with affordability, technology availability, and socio-cultural adjustments to online and distributed learning. Recognizing the challenges will vary based on local conditions. As the OSOU framework described by Fay and Sjogren is still a developing concept. It is ambiguous in some critical ways relative to how likely it is to achieve its goals within the operating parameters in fully developed as well as developing economies. Although there are many distance and online education providers, as well as institutions that are considered open and flexible providers, few have turned to OSS and OER as strategic and mission-central ways of achieving accessibility, affordability, and global relevance in developed and developing regions. These challenges are measured alongside of the opportunity to provide high-quality educational services in developing regions where participation is low and unevenly distributed across gender.

Given the OSOU framework and the potential for positive impact in developing regions, it is important to consider how organizational structure will impact its effectiveness. Three potential organizational models include:

1. The OSOU operating as a centralized organization based in North America that will deliver educational programs globally, including developing countries.

<sup>&</sup>lt;sup>9</sup> Link to License: http://creativecommons.org/licenses/by-sa/3.0/

<sup>&</sup>lt;sup>10</sup> FLOSS4Edu project Site: <u>http://wikieducator.org/FLOSS4Edu</u>

<sup>&</sup>lt;sup>11</sup> Free Textbooks Network Site: <u>http://wikieducator.org/Free\_Textbooks</u>

<sup>&</sup>lt;sup>12</sup> CCNC Project Support Site: <u>http://wikieducator.org/Commonwealth\_Computer\_Navigator%27s\_Certificate</u>

- 2. The OSOU operating on a "franchise" model that is replicated in various parts of the world and operated independently or with significant autonomy.
- 3. The OSOU operating as a global university with decentralized and multinational governance.

Variations on these organizational types will impact how the educational needs of developing countries will be prioritized. Currently, most universities operate under the first model; however, as Fay and Sjogren point out, we have the opportunity to rethink assumptions and design a new form of educational organization. Our overarching organizational model should not only take full advantage of the potential benefits of OSS and OER, but it ought to also enable as many benefits as possible for open and flexible education. How the OSOU framework is operationalized will liberate or stifle the potential of open and flexible education, OSS, and OER as outlined above.

#### 7. The Opportunity

There is no question that the idea of the OSOU is timely and increasingly important for developing regions. OSS and OER are both viewed as critical parts of the "massification" of education in parts of the developing world, while open and flexible education provides us not only a set of values to achieve access but also a rich source of experience and ways of thinking about the multiple dimensions of openness and flexibility. Identifying and prioritizing the dimensions of openness and flexibility that the OSOU needs to meet its goals in developing regions will help the organization understand its commitment to OSS and OER and the characteristics they must possess to be successful. With clarity of purpose and focus on how to leverage the benefits of OSS and OER, the OSOU framework can potentially serve developing as well as developed regions.

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#### Impact of MIT-OCW Electronic Content on Learning in Tanzania

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#### Abstract

The Massachusetts Institute of Technology–Open Courseware (MIT-OCW) was first introduced at the Open University of Tanzania in 2006. It was installed as a mirror site on OUT website and made available within its Local Area Network since the beginning of 2007. The Open University of Tanzania (OUT) is a public-funded Institution of higher learning providing education through Open Distance Learning (ODL) to students in Tanzania and abroad. Operating through its 25 regional centres all over Tanzania, the University is a necessary component in the current drive by the Government to increase graduates, including the highly needed teachers in secondary schools, especially those for Science and Math. Traditionally the Open University delivered through print media, which of late has consistently stressed due to limited resources, both financially as well as logistically, compounded by the increased number of enrolment. This shortfall, if not arrested through alternative means, will have adverse effect on the expected impact, not mentioning the compromised efficiency. The most appealing alternative is delivery through electronic means – the E-Learning.

*E-Learning initiatives are well underway with accelerated internal development through expansion of computer facilities in Regional Centres and development of E-Learning facilities and e-content under various formidable initiatives. The availability of the MIT-OCW has provided a window for assessing impact of electronic content on learning. Its usage has gone well beyond our expectations and possible beyond that of other countries where such material has been available for a longer period. Well organized material has become available in areas where only scanty material was available to students before. This paper presents the use, access and impact of MIT-OCW material on teaching and learning at the Open University of Tanzania, and assesses problems associated with its delivery.* 

## 1. Introduction

The Open University of Tanzania (OUT) is a public funded university in Tanzania, providing education at tertiary level. It operates through 25 Regional Centres spread out all over the nearly million square kilometers in order to reach the students in all corners of rural Tanzania. It began its operations since 1994 to give an opportunity to individuals who could not gain access to, or due to their life commitments cannot commit themselves to full-time, campus-based universities.

As of June 2007, the Open University of Tanzania has a cumulative registration of more than 30,000 students, 3,000 graduates and about 12,000 are active learners at any one time.

#### 2. From print towards electronic delivery

Traditionally, OUT delivers its educational services using print media from the Headquarters in Dar es Salaam, to the students through the established 25 Regional Centres. The exercise involves transporting back and forth huge volumes of materials such as study manuals, assignments, tests and examinations between students and tutors mainly using road communications and the postal service. This is a slow, labour intensive and costly process that is difficult to track and monitor for timely and appropriate deliveries to students and tutors. The University also conducts Face to face sessions and practical exercises through the Regional Centres once again presenting, logistic and financial strains on scant resources.

With the explosion of information and communication technologies (ICT), over the past three years the Open University of Tanzania has made concerted efforts to move to ICT-based delivery, starting with areas that support the primary activities of the University. This drive is consistent with the University's vision to be a leading provider of quality education to majority of Tanzanians. Records show that while in 2004 there were less than 72 computers at the Headquarters and 40 in the Regional Centres [4], there are more than 300 at the Headquarters and 100 in the Regional Centres today, a four fold increase.

To facilitate this delivery the issue of connectivity has also been addressed. The OUT Headquarters in Dar es Salaam is fully connected with a fibre optic LAN. The OUT Headquarters is connected to an Internet link through a dedicated 256/128 Kbps connection to the Internet via a service provider who in turn is connected through a satellite link. All Regional Centres have at least two PCs with one open for use by students. Where computer rooms have been set up, they are also connected to the Headquarters through the internet. One Regional Centre close to the Headquarters is connected by a wireless link. Efforts are underway to have all regional centres connected to the internet. For example lately funds have been secured for establishing computer laboratories in 10 Regional Centres and providing training to staff and students in those centres.

Nationally, Tanzania is yet to take advantages of existing fibre optic connections within the country and also to get connected to the global fibre optic network. This being beyond the mandate of the University, the only efforts made are to join the other stakeholders in pressuring the authorities to exploit this opportunity.

However, it was understood early that physical facilities by themselves will not bring about the change of system unless several other enabling factors are introduced. Staff training and practice is required to put this technology full into use. It is not quite simple to introduce the use of computers to staff and students, which is a new dimension to the way they used to do business. However by just having personal computers (PCs) in the offices, libraries and computers rooms has aroused sufficient interest that has been tapped by providing basic training in computer skills, to the already receptive audiences. Awareness among students scattered all over the country is a challenge that the university is now addressing by combining twice a year ICT training face to face sessions in the Regional Centres to both the students and supporting staff. The existing technological setup is viewed as the positive beginning towards a fully established and efficient system to service the dream of IT-mediated delivery. Parallel efforts are being made to move to the next step in providing education electronically. Opensource Learning Management Systems (ATutor and Moodle) are available for use; and staff training is going on through training programs. Many features of these electronic learning systems have been put to use, as a controlled pilot, with students undertaking the B Sc ICT degree. Other electronic systems that are in place include a students' record management system (SARIS), a student admission module (APIS) that has been decentralized to the regional centres for use to process large numbers of admission applications submitted to Regional Centres. An electronic library system (WEBLIS) is also in use to access the main library through the LAN or the internet for the users at the headquarters and outside respectively. A University website <u>www.openuniversity.ac.tz</u> is a valuable source of information and has become an essential tool in increasing communication with students spread far and wide.

#### 3. The Content

The next step, with its clear importance is electronic content. It is undisputed to accept that "content is the key to knowledge and skills"; it is the key ingredient in facilitating learning. All the rest of the technical paraphernalia, both hardware and the software, which may dazzle users, cannot function to deliver the university vision without content that meets the needs of expected academic excellence.

Open University of Tanzania's experience in imparting knowledge at tertiary level by distance methods has enabled it to produce study materials that are geared for this purpose. More importantly it is local content, which is an achievement compared to other such Universities. The choice of a faster downlink and a fraction uplink speed presumes this lack of content, since it is perceived that when using the internet one is expected to receive far more information than providing it. The African Virtual University (AVU), under its ODeL (Open Distance Electronic Learning) has embarked on using expertise from participating universities in 10 African countries to develop well designed electronic content in science, mainly in Mathematics, Physics and Chemistry and ICT across curriculum. In the process the project will entail capacity enhancement to content development and delivery through the internet to the students as well as staff.

#### 4. MIT-OCW in a Box

The inadequacy of electronic material in appropriate pedagogic format should not hinder adoption of e-learning methods. While the University is embarking on capacity building towards this end, the offer by the Massachusetts Institute of Technology (MIT) through its Open Courseware (OCW) programme, to open its electronic doors in 2002 for the world to freely use its material has been a great contribution towards this end. It has given an impetus to convert OUT's existing ordinary and mainly paper based material into electronic format.

MIT-OCW provides a full range of material required in conducting a course: It includes all the essential components in the form of syllabi, reading lists, lecture notes, class presentations, blackboard notes, discussion materials, assignments and examinations. These are all available for many courses that are relevant at our University. An added feature achieved by the OCW project is the standardized and systematic manner of delivery that can be easily followed by teachers and learners alike from across the world.

This programme, known as MIT-OCW in a Box was conceived to overcome the problem of unreliable and costly bandwidth in many parts of the developing world. It provides free of charge, with support from the Maxtor Corporation and UNDP, an external hard drive containing MIT's Opencourseware as a mirror site to African educational institutions with an aim of distributing 100 sets by the end of 2006 [3]. The Open University of Tanzania received the Box in 2006 following the signing of a Memorandum of Understanding [5].

#### 5. Performance of the MIT-OCW Programme

At the Open University of Tanzania, the MIT electronic material has been brought in a Maxtor "OneTough III" 200 GB external hard drive the size of a thick novel for use within the LAN at OUT Headquarters. A separate server was purchased and has been installed since March this year. The OCW in a Box has been placed at the OUT Headquarters where there is a concentration of academic activity due to its location. It is accessible through the server using a local IP address or through the University website with a strategically placed link to attract attention occasional users also. The link connects the user directly to the OCW hard drive via fiber optic connection from any PC, and so has allowed students and staff to browse with ease. Since it is placed in local network, it has become local content, and takes the pride of place as such.

Over the past six months it has received attention of users with nearly 9,000 hits per month [2], well above the maximum hits of about 7,000 hits per month earlier reported in a 2005 survey [3]. With this data, the Open University's experience has been seen as unique by the OCW project team for its quick adoption and use of their material when compared with other institutions in Sub Saharan Africa.

It is only a few months (since March) that OCW has been available on our network but we have been able to get initial results from an ongoing survey [1]. Mainly multiple choice and a few free text questions were extracted from MIT's 2005 survey of their OCW [3] for use in this survey. They were categorized in terms of access, use and impact of OCW. Thirty questionnaires and several interviews were used to get preliminary opinions about the Opencourseware. Students formed two thirds of the respondents showing their higher use due to very high student to staff ratio in a distance learning institution. More than half of the respondents were already aware of the existence of OCW indicating success in publicizing it using a well placed link on the University website which is invariably used as an electronic source of information. Word of mouth was also found to be a predominant method of spreading the word about the OCW. Speed of access was found to be fast or very fast by nearly half the users, indicting a need to reconfigure it for better access since there should be no compromise in speed in a fibre optic network environment. Recent experience of the OCW mirror site port being blocked due to software error may have been responsible for the problems in access.

Users indicated that they used the OCW material for gaining extra knowledge and complement their own course material. Two thirds of the users utilized the mirror site for text based materials, most likely due to lack of awareness of use of such methods. Nineteen out of twenty responses indicated satisfaction with the site's speed and subject matter of materials.

As would be expected from a survey so close after being aware of the OCW, very few (one third) offered an opinion on the impact on their educational experience but of those who did, more than three quarters said it had made a positive impact. The one third who responded about the negative impact of OCW noted the lack of material relevant to their courses. With an engineering focus in MIT's courseware, the preliminary survey has found that they need to browse through courses in many disciplines before they hit upon material suitable for them since appropriate content is available but hidden deep within the courseware. Faculty staff could advise on special interface to locate material on OCW which is relevant to courses offered by OUT.

The survey analyzed above is ongoing and more concrete opinions will be extracted so as to improve access, delivery and impact of the OCW. The survey will be extended to other users of OCW and other electronic resources in Tanzania.

#### 6. Way Forward

The Open University of Tanzania has produced distance learning books in more than 500 courses, but many still remain to be written [6]. Having limited number of text books in the libraries, MIT-OCW provides tutors and students with valuable electronic study material to reduce this gap as well as providing supplementary reading material and practice questions. The fiber optic LAN also ensures that the material is accessible to users throughout the campus at speeds that can be astounding even for large sized pdf documents, saving precious time and reducing frustrations.

Previous trials with using electronic content at our University were with the Open University, UK, which provided such content for a few courses in CDs that were distributed to Regional Centres. MIT's OCW provides a far more extensive but compact package. The challenge is to get this content available to all regional centres with computer rooms for students. It cannot be expected that Internet connectivity will improve in the near future so other options are being considered. The lead we can take from MIT-OCW is to convert our own paper based distance learning materials, and place them systematically as learning objects in a suitable Learning Management System.

To improve access to this electronic material by students across all Regional Centres is to link up with the Tanzania Internet Exchange (TIX) which is an Internet hub that specifically channels all local content between different service providers using microwave links, without the need to go through satellites every time. Microwave connectivity has greatly improved in Tanzania over the last few years with a dramatic explosion of mobile telecommunication services. Passing local content through TIX will improve connectivity, increase speeds and reduce costs and spur the development of local content. With the explosion in the use of mobile phones they can be expected to become the medium of choice for accessing the electronic content such as that provided by OCW IN A BOX.

One area where there is a glaring gap in electronic content is in access to research work published electronically. Such material is so enticingly available on the Internet; but except for a few brief insights gleaned from the abstracts, the main body of the work remains hidden behind a wall of shopping carts that can only be obtained by rolling in unaffordable amounts of electronic cash. This is an area where MIT could provide support, as it did with its OCW learning material, to open up, at the source, the creative potential of millions of people in developing countries

#### 7. Conclusion

With an extensive spread across the vast rural areas of Tanzania through its Regional Centres, the Open University of Tanzania is endeavoring to adopt ICT-based technologies to delver high quality education through e-Learning. The MIT-OCW in a Box program has provided opportunity to access reliable electronic learning materials in thousands of courses used at MIT. In turn this has provided an impetus for us to convert our paper based local content, developed specifically for distance learning, into electronic content. Though only recently installed, a high usage has been recorded, compared to similar mirror sites and far above that of the parent site from African countries. Preliminary results indicate a positive impact of OCW on learning but improvement is required in wider access to students spread across Tanzania through faster and cheaper internet. While the University is forging ahead to avail reliable connectivity to its remote centres, this usage is expected to grow further as awareness of MIT-OCW increases among students spread across Tanzania.

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## e-Saf Moodle LMS in Saudi Higher Education: Implementation and Experiences

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#### Abstract

We present an e-Saf Moodle LMS implementation in Tabuk University (TU). Also, we present our experiences on how we communicated and promoted the new system among the faculty members and TU learners (i.e. students, community members). The e-Saf impact on the learning activities is evaluated through an online questionnaire. The results demonstrate high impact and high satisfaction levels with e-Saf. However, issues of privacy and security limited wide acceptance.

## 1. Introduction

Educational methods have become advanced and changed dramatically in the last decade. The revolution in communication technologies, especially after the invention of the internet, has introduced new methods of teaching. At the top of the list is distance learning, where virtual classes and schools are established all over the world. People from different places, cultures, races and languages who probably never meet each other, take the same classes and learn from each other. Furthermore, they participate in producing fantastic projects and artifacts [8][9].

In the United States, alone, thousands of educational programs have been launched in the last few years in different schools. These schools have introduced online courses, with a variety of choices, ranging from liberal, and science majors to Finance, Information Management, Software Engineeringvand Nursing. Students or learners acquirevknowledge while they work full-time. They can do their assignments and projects from home or during their spare time.

In addition, the distance-learning paradigm provides a variety of alternatives for students to attend classes virtually. They can communicate with the instructor, chat with him or her and with each other or be involved in a conference room. At the same time, they can communicate through bulletin boards, email, or email lists that are used to broadcast or disseminate information among groups [4][9].

Distance learning has many advantages over the traditional face-to-face paradigm. However, it has drawbacks. The nature of this technology requires extra preparation and infrastructure. Schools are very concerned about the privacy and convenience of their students. Students should be able to access their accounts and records securely and conveniently. Schools and colleges need to verify the identity of their students, since students and instructors meet only virtually. Additionally, the universities and colleges need to comply with the state and the accreditation
In the last few years, universities and colleges have tended to introduce distance learning as a main trend in their curricula. Different variations of distance learning such as e-learning and online learning have been implemented all over the US [2][3][5]. The overall advantages of distance learning technology are obvious to both learners and instructors. The distance-learning paradigm has also played a noticeable role in reducing the cost involved in delivering educational materials.

#### 2. e-Saf

Tabuk University (TU) was created in 2006, integrating existent colleges in the Tabuk area; mainly Tabuk Teachers College, tabuk Community College, Tabuk Banat College, and many others. Due to the specialties of these colleges, the sensitivities of the Saudi community, and the separation of the male teacher from his female students, these institutions focus on distance learning activities, offering high quality online services, excellent networking infrastructure and flexible classroom time.

Motivated by the fact that virtually every educational institution has by now adopted a Virtual Learning Environment (VLE) or CMS (Course Management System) for use either as an adjunct to its traditional courses (often called a "blended" or "hybrid" course system), or as a tool for its distance education program; Tabuk University decided to create common services for their distant campuses for added prestige and easier accreditation processes.

Some students and instructors were excited to see the technology implemented in their school. One student expressed his feeling saying, "I think e-Saf can be a powerful tool in order to make DL [Distance Learning] classes more exciting, and enhances attendance and participation". Another student thought that the school should adopt new technologies such as virtual environments (i.e. Second Life) other than traditional systems. He was quoted saying, "It would definitely be better if instructors and students can have more control and the ability to change their perception of reality". TU had a year-long experience in blended-learning courses and in funded projects with WebCT, and a smaller experimental experience with BlackBoard; both of which are expensive to license and which are rather rigid in the ways that they can be used. These two LMS yet serve only a very limited number of courses of early-adopter instructors: the largest part of courses simply distributed electronic documents through shared folders on the network or Yahoo groups.

To serve broader teachers and learners, a new LMS had to be chosen, and the choice was made to use Moodle as a basis for e-Saf. Moodle is an open source tool that adopts the Socioconstructivist approach to learning 3 and has a very user-friendly discussion forum layout that includes mug shots of the participants as an aid towards "community building'. Moodle is the brainchild of Martin Dougiamas, who designed the program while working on his Ph.D. at Curtin University of Technology, Perth, Australia. Dougiamas programmed Moodle in PHP, a programming (or more strictly, "scripting') language that can create web pages based on user input and data-based information; which integrates well with other course discussion forums we implemented (www.tabukttc.com/vb) based on vBulletin [11]. Moreover, we enhanced E-Saf with GISMO (Graphical Interactive Student MOnitoring tool), a module that generates relevant visualizations of student tracking data logged [6][7]. These visualizations are useful to get a synthetic overview of online activities, and proved effective especially for tracking completely online modules

A common component of all CMSs is the discussion forum or "bulletin board" feature which allows the students to interact with their instructor and the other students on special topics. Moodle delivers from many systems in that its messages are not only archived in the course but are also sent as e-mail to the student's registered e-mail address as long as the student has subscribed to that special forum. (When setting up a forum, the instructor can force-subscribe all students when necessary). With Moodle, students will

always know when new, relevant messages have been posted (as long as they check their e-mail regularly)

# 3. Promotion and Communication of e-Saf

In order to facilitate the adoption process of the platform in TU, two main activities were undertaken:

- 1. All the online courses available onWebCT were automatically migrated to e-Saf and, upon request of the respective teachers, the digital learning material that was previously stored in the Tabuk University intranet shared folders was moved to e-Saf;
- 2. Series of workshops on the use of e-Saf, both from a technical point of view and from an educational one, was offered to all teachers and teaching assistants of Tabuk University.

In addition, an online module about the basic features of e-Saf was developed and put at the e-Saf users' disposal. Finally, one-to-one assistance with ad hoc modules was o ered for teachers who could not take part in the workshops and requested it.

#### 4. Usage Evaluation of e-Saf

In February 2007 a survey was conducted through an online questionnaire in order to evaluate the satisfaction of e-Saf users, especially devoted to faculty members. 87 faculty members (out of a total of 140: 40.7%) polled-in the questionnaire. The main results of the evaluation phase are here reported, divided into five sections:

 Use: The participants' answers show that e-Saf has been mainly used as a tool for distributing and sharing learning materials (slides, papers, handbooks, and so on; 79.3% of respondents used widely this functionality). Among the other tools o ered by e-Saf, only the communication forum (www.tabukttc.com/vb) and the online submission have been widely. Other available functionalities, such as quizzes, chat and journals have been used only by a small number of teachers in each faculty or department.

- 2. Satisfaction: 85% of respondents are satis ed with e-Saf. Teachers appreciated in particular the possibility of communicating with students also out of the class lessons, the ease of managing digital material and the possibility of making it available to every student at any time.
- 3. Impact: 60% of respondents noticed positive changes in their courses after the adoption of e-Saf; the remaining 40% did not notice any relevant change
- 4. Security and Privacy: In the perception of the teachers who answered the questionnaire e-Saf had a positive impact on students: 70% of respondents think that students had a positive reaction to the introduction of the platform and reported no privacy problems or cheating. However, female students shied away from using the system or used fake id's to conceal their identities and registered with male names..
- 5. Ease of Use: 59% of teachers claim that students had no di culties in using e-Saf.

#### 5. Conclusion

We presented the implementation of the e-Saf LMS in Tabuk University based on the open source software Moodle. We discussed our experiences and acceptance by faculty members, as well as the usage evaluation of e-Saf. Deep interviews and comprehensive document analysis combined with detailed surveys would be a great technique to uncover unknown reasons behind the resistance to adopting advanced features offered by e-Saf technolog such as chatting and online quizzes. Such long-term broad research should be

conducted at different colleges and schools in order to bring more diversity in terms of race, gender, religious affiliations and experiences.

In addition, it is recommended to focus on security issues since most teachers emphasized its importance as well as privacy issues since most of female participants refused to reveal their real names. Only privacy and security issues are limiting wide adoption of the system. To overcome these issues, we are enhancing e-Saf with biometric authentication devices.

Moreover, enhancing e-Saf with Second Life and other virtual environments (i.e. Sloodle [10]) are planned. However, it would be helpful to investigate the logistical and technical aspect of the implication of implementing virtual environments technology on traditional educational institutes.

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# **PARALLEL SESSION #4**

# **CASE STUDIES**

# Impact of Information and Communication Technology in Higher Education Development (Baghdad University Model)

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#### Abstract

Investment in higher education should be address to build and develop a real integrated e-education technology, in order to graduate students with skills and knowledge permit them to enter job market and open the door for the opportunity to continue their study as well.

Since any new development in education sector is a university specific ta **B**aghdad University had been started since 2005 to implement its own development program project for using new technologies in education and research. Father more, to get a neutral impact on knowledge retention and to identify whether the e-learning advantages could be occurring within the customs environments at Baghdad University a blended learning program was used (2005-2007). Thus, more than sixty five live collaborated lectures have been implemented through electronic class room (web based system) for university professors from Canada, UK, Australia and south Koura to students at Baghdad University.

Also, the Portal for Baghdad university (<u>www.uob.edu.iq</u>) has been established (beta version, 2007), which will be a one-stop client-oriented web site that personalizes the portal's tools and information to the specific needs and characteristics of the person visiting the site, using information from university databases. Also, Baghdad university portal must provides all collaboration tools for direct connection between students and teachers, as will as the direct access to information, lectures, electronic and virtual libraries multimedia systems and learning tools.

#### 1. Introduction

In the ever-changing world filled with new technology, our university faculty members and students require the right information, from the right sources, today. Having direct access to industry information gives the competitive edge needed to succeed. Student and researches performance can be improved when the enhancement of teaching and learning using technology is adopted as the norm.

Through the use of advanced computing and telecommunications technology, learning can also be qualitatively different. The process of learning in the classroom can become significantly richer as students have access to new and different types of information, can manipulate it on the computer through graphic displays or controlled experiments in ways never before possible, and can communicate their results and conclusions in a variety of media to their teacher, students in the next classroom, or students around the world.

Information and communication technology (ICT) has become, within a very short time, one of the basic building blocks of modern society. Many countries now regard understanding ICT

and mastering the basic skills and concepts of ICT as part of the core of education, alongside reading, writing and innumeracy. One of UNESCO's overriding aims is to ensure that all countries, both developed and developing, have access to the best educational facilities necessary to prepare young people to play full roles in modern society and to contribute to a knowledge nation. Maintaining a capacity to advise national governments on the use of technology in schools and, in particular, on the optimal balance, given local circumstances, between ICT and older educational technologies and assisting countries in developing educational soft-ware and materials that reflect their own national and regional cultures are key components of the Organization's strategy to achieve the Education for all goals.

As an educator, we must take into consideration the changes happening every day in today's businesses. It is the responsibility of our universities to provide the necessary tools for students to transition into the workplace. Take a look at this information to see what changes are going on in the workplace today.

A broader definition of technology is used to mean a tool ornstrument which helps us to organize and accomplish specific tasks and goals. Old technologies in university include: learning spaces, learning schedules, learning frameworks (subject areas), learning assessments, Peverly [1].

For technology to serve the purposes of change, it must be tied to a coherent, university-wide instructional agenda.

For education professionals and researchers computer networking creates a professional bond between university faculty members and administrators, ends isolation.

For students a new system of knowledge will enhance collaborative learning; alternative assessment; and individualized learning.

Just what the future holds is often difficult to predict, but technology has been especially difficult to predict. Often, technology has been underestimated in terms of its impact.

#### 2. Technology Uses in Education

A Series of components, including the collection of public and private high-speed, interactive, narrow and broadband networks that exist today and will emerge tomorrow. It is the satellite, terrestrial, and wireless technologies that deliver content to homes, businesses, and other public and private institutions. It is the information and content that flows over the infrastructure whether in the form of databases, the written word, a film, a piece of music, a sound recording, a picture, or computer software. It is the computers, televisions, telephones, radios, and other products that people will employ to access the infrastructure. It is the people who will provide, manage, and generate new information, and those that will help other do the same. Preverly [1].

#### 2.1 Technology and Systemic Change

The roles of technology in promoting change

- Access to New Sources of Information
- Information Transfers
- Professional Development

• New Learning Experiences

In the educational forum, the following elements of success were also identified:

- A well articulated vision of change with a primary focus on engaged learning and empowered teaching.
- Attention to professional development and user support.
- Active participation in the change process by all stakeholders including learners, teachers, parents, administrators and others from the community.
- Technology plans that are open and grow able.
- Funding plans that clearly establish costs/benefits and are both reasonable and sustainable.

A plan that addresses:

- Network How the information gets there
- Hardware What equipment you need to manipulate this information
- Software The programs and configurations to use this
- System Admin The people/training to support the equipment
- User Support The people training to solve the task at hand using the technology. This includes: training, on-site training, tutorials, help-desk support
- Content The content specific information that is the specific reason to use the technology
- Organization change The organizational support and changes to utilize the technology well.

# **2.2** How Will Students And University Faculty Members Are Impacted With The Implementation Of New Technology?

- There is less "teaching" when learning is happening online.
- Teaching in an on-line setting challenges university faculty members to shift paradigms and use a constructivist model of learning that creates roles for other mentors and experts." [1].
- Teacher from sage on the stage to guide on the side: mentor and coach.
- University faculty members collaborate more.
- University faculty members and students become producers, not just users, of information.
- Students take part in advanced placement courses, archaeology programs originating from the bottom of the sea, chemistry experiments, college courses and enrichment programs.
- University faculty members network with each other to share instructional practices.
- University faculty members and students access information more frequently and cost effectively

Students take more responsibility for their own learning, work at their own pace and correct many of their own errors.

#### 3 Suggested Agenda For Technology Application At Iraqi Higher Education Sector

Higher education sectors are required an integrated e-Leaning solutions and introduce and apply technology in their education atmosphere. I.e. Universities are mainly required to develop study curriculums and courses, developing instructors/professors skills, developing education methodology, developing study delivering techniques, employed education standards [2], use education management systems, synchronous collaboration systems and developing university's communication and IT infrastructure.

Investment in higher education should be address to build and develop a real integrated eeducation technology, in order to graduate students with skills and knowledge permit them to enter job market and open the door for the opportunity to continue their study as well. The suggested agenda can be summarized as following:

- Be continuous and embedded into the regular university routine.
- Be sustained and intensive, in contrast to the superficial, one-shot training that university faculty members often receive.
- Help university faculty members integrate technology into their regular instructional practices.
- Be hands-on, allowing university faculty members ready access to hardware and software and time to experiment.
- Emphasize both content and pedagogy and embody good research and practice.
- Require recipients of state technology funds to use a portion of their technology budgetssay, 30 percent-for professional development.
- Provide incentives to university faculty members to learn more about educational technology, such as take-home computers or credit toward classroom computers.
- Provide on-site resources, preferably a full-time person, to provide training and technical support to teachers.
- Adopt state teacher certification requirements that address proficiency in technology.

Infrastructure and Finance

- Join forces with other education institutions, public agencies, community groups, and small businesses to bargain with local utilities for lower infrastructure and connectivity costs.
- Become self-sufficient, university-based Internet node that sell connectivity services to small businesses and community people.
- Use existing inventory in different ways or in conjunction with newer purchases.
- Provide state and federal incentives for private sector investment.
- Seek advice from the private sector about infrastructure design.

Role of Federal Government

- Support and Encourage Local Efforts
- Establish Funding Priorities and Direction
- Provide a Broad Vision
- Support Information and Knowledge Transfer
- Promote Collaborations and New Partnerships

- Support Technical Standards That Encourage Open Competition and User-Friendliness
- Encourage and Promote Equity

Federal officials have been exploring how to encourage greater and more effective use of modern computers and communications in the nation's universities. A federal Secretary of Education must be established to develop a strategy for effective utilization of the new technologies in the nation's classrooms.

#### 4. Baghdad University Model for Using New Technology in Education

As we concluded form previous sections that education development is a university specific task, Therefore Baghdad University, from the beginning of 2004, had been established its own program for using new technology in its educational and research atmosphere. A Higher committee for e-learning had been established (2005) at Baghdad University to supervise and performs the transfer of new technology to Baghdad university colleges and institutions. Several education and management consultant members are included in this committee with consultant and technical support from e-learning technology campus (IESI-Canada) according a scientific and educational agreement with Baghdad university [3].

E-learning is a broad term that encompasses a variety of educational contexts in which technology is used to enhance or facilitate learning. It is useful to think of e-learning as a continuum, as illustrated in Figure 1. Here we see fully face-to-face teaching at one extreme and fully distance teaching at the other extreme.

E-learning describes all of these types of teaching and learning. As we move along the continuum from fully face to- face teaching, more and more technology is used to replace the face-to-face elements. Initially, this has very little impact on how teaching is organized because the technology is used primarily to enhance the face-to-face teaching.

But as we move further along the continuum (from left to right) the nature of teaching and how it is organized is affected by the technology. Somewhere around the middle of the continuum we have what is called **mixed-mode teaching (blended or hybrid are other terms commonly used)** where significant amounts of the face-to face element are replaced by technology mediated teaching. Fewer class sessions are held as technology is used increasingly to deliver the teaching and to facilitate the learning. Once we reach the extreme right of the continuum, there is no longer any face-to-face teaching, Mark [4]

All teaching is technology-mediated. According to this framework, e-learning is that part of the continuum that begins when technology is used to replace some of the face to-face teaching to the extreme right where it replaces it all. Accordingly, we can have what we call mixed-mode e-learning in which there is a combination of face-to-face and technology mediated teaching or distance education e-learning in which all teaching and learning is done without teacher and learners ever meeting face-to-face. Note that, according to this understanding of e-learning, distance education is an overlapping concept that may or may not involve e-learning.

So that to get a neutral impact on knowledge retention and to identify whether the new technology of education (e-learning) advantages could be occurring within the customs environments at Baghdad University, a blended learning program was used (2005-2007). Thus, more than sixty five live collaborated lectures have been implemented through electronic class room (web based system) form university professors from Canada, UK, Australia and south

Koura to students at Baghdad University; Table 1.; with group connection scenario is used for limitation of internet band width (64/128 Kbs) shown in Figure 2.

TO A			
	EARNING		
2	DISTANC	E EDUCATION	

Figure 1. e-learning as a continuum [4]

Some of the implemented on-line lectures are sheared between Baghdad University and Khrabla University (150 Km south of Baghdad) in the field of e-learning technology Figures 3 ,4. Also, several lectures were sheared with ministry of health (MOH) in field Avian Influenza Infections in Humans. Figure 5.

An additional activity for using broad casting learning systems in Baghdad university for research development was On-line participation from three different locations Baghdad to attend the (women - health conference), London UK 25-3-2006, see figure 6.

Figure 7 shows one of the on-line lectures in field of wireless communications implemented by Prof. Dr Ahn Hanyan univ (South Korea) for college of engineering students at Baghdad university.

The effectiveness of using the collaboration technology in education development has been shown when it is used to develop new advanced robotics course for MSc students at mechatronics engineering department at Baghdad university 2006-2007. This course has been designed and implemented by visitor professor, (Dr Husssain mechatronics eng. Dept ,Guelph university, Canada) and robotic professor (Dr bahaa, Baghdad university). Good results have been obtained by adding new teaching approach and good using for information shearing between the teachers and students from different universities. Figure 8.

Table 1. Implemented international On-line program for work-shops and lectures at university of Baghdad through broadcasting internet system 2005-2007

Attendees from	n Iraq	Lecturer an country	ıd	lecturer	Lecture Name			No.
College of e university of e	engineering- Baghdad	Prof. Dr Talib Al-Janabi (canada)			Artificial Inelegance and One lecture	fuzzy	logic	1

College of medicine and	Mohammed	Al-ali,	Avian	Influenza	Infectio	ns in 2
science- university of	PhD		Humans			
Baghdad and ministry of	Australia		Four lect	tures		
health						
College of engineering-	Prof. Dr Ahn		Wireless	communicat	tions	3
education -university of	Hanyan univ		Four lect	tures		
Baghdad	(south Korea)					
College of engineering	Prof. Dr Hussei	n	Advance	ed Robotics		4
University of Baghdad	Guelph Univ- C	anada	Ten lect	ures		
Training and development	Drof Dr ala Alr	20	E loomi	a tashnalar		5
Training and development	FIOL DI ala All	10			у	5
program for faculty staff	President of	e-learning	More th	an 40 lecture	;	
members - university of	technology univ	r <b>.</b>	Continuo	ous program		
Baghdad	Canada					
C						

# 5. Development Of University Of Baghdad Learning Management System. (e-Portal <u>www.uob.edu.iq</u>)

The e-Portal for Baghdad university (ww.uob.edu.iq) has been established (beta version, 2007), which will be a one-stop client-oriented web site that personalizes the portal's tools and information to the specific needs and characteristics of the person visiting the site, using information from university databases. Also, Baghdad university portal must provides all collaboration tools for direct connection between students and teachers, as will as the direct access to information, lectures, electronic and virtual libraries, multimedia systems and learning tools.[5].

A one-stop client-oriented web site that personalizes the portal's tools and information to the specific needs and characteristics of the person visiting the site, using information from university databases. Also, Baghdad university portal must provides all collaboration tools for direct connection between students and teachers, as will as the direct access to multimedia systems and learning tools.

The goals of a Baghdad university Portal

1- Make it easy for people to find University information targeted specifically at them.

2- Use a single consistent web-based front end to present information from a variety of backend data sources.

3-Provides direct link between student and teacher.

4-Provides a content management system for developing the courses contents according learning standards.



Figure 2. group connection scenario for Live Synchronized Interactive lectures at Baghdad university (on-line lectures)

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Figure 3. Live discussion between the Iraqi lecturer at Baghdad University and the lecture from IESI-Canada



Figure 4. New e-learning concepts Live workshop from IESI-Canada.



Figure 5. workshop from Australia (Avian influenza infection in human).



Figure 6. participation in women health conference at UK from three locations at Baghdad.



Figure 7. lectures from South Korea (Wireless communications).



Figure 8. Lecture for MSc students from Guelph univ.-Canada (Advanced robotics).



Figure 9. Baghdad university portal. (www.uob.edu.iq).

## 6. Conclusions

- 1. Technology offers the opportunity to change the roles that university faculty members and students have traditionally played. With technology dispensing information, university faculty members are free to coach and facilitate students learning. With technology monitoring learning, students can become active learners, working to effectively acquire new skills as they solve problems.
- 2. The Technology Effectiveness Framework must be developed to assist educators, researchers, and policymakers in evaluating technology and technology-enhanced programs/curricula against specific reform goals for a university, district, state, or service agency
- 3. It is that universities interested in technology begin by thinking about education reform articulating their activities around the needs of students and a set of instructional principles. From there, careful consideration can be given to the contribution that technology can make.
- 4. The successful transformation of student learning and accomplishment in the next decade requires effectively bringing together three agendas an emerging consensus about learning and teaching, well-integrated uses of technology, and restructuring.
- 5. Good technology planning does not stop with the submission of the first plan, many participants agreed. Planning should be an ongoing process that involves evaluating current technology programs, keeping abreast of new applications, assessing new needs, and modifying plans accordingly.

6. Baghdad university model for using technology in education show good results for the present scope and for current situation of Iraq, this model can be improved and expanded to include more institutions and scientific programs at Baghdad University and other universities in Iraq and out side Iraq by using new technology in education for all stage of education. This needs a general long term plane with stabile resources of foundation from Iraqi government for the next ten years.

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# The Virtual Learning Environment: A Case Study on the Preparedness of Staff at the National University of Rwanda

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#### Abstract

The National University of Rwanda (NUR) has adopted a Virtual Learning Environment (VLE) as a means to improve upon her teaching and delivery of academic didactic material in order to play a major role as a premier university in Rwanda in the accelerated socio-economic development of its country. Although, NUR already has some infrastructure in place, which can enable it start in earnest the VLE program, there are still major issues such as readiness of academic staff, preparedness of students. In this paper, we present the results of a survey carried out to find out how prepared is NUR to embark on Virtual Learning Environment. The survey reveals that although, there is an appreciable student to computer ratio to enable the university start the virtual learning, there is still a lot to do to get the lecturers prepared. The paper also suggested some methods as to how to get the lecturers fully participate in the introduction of the Virtual Learning facilities in the university

#### 1. Introduction

The authors of [1], [2] reported that knowledge of use of technology by both the teachers and the students is essential for a successful implementation of a VLE in an institute. Entonado et al [2] recommended that the email facility is a minimum infrastructure needed for an institute to initiate a VLE. The NUR plans to its virtual learning environment by the beginning of January 2008 [3]. To avoid any disappointments we have to work out strategies to execute this new teaching method successfully.

In this paper, we give a brief about NUR as a university, which has a mission to fulfill and to champion the socio-economic development of the country. We also emphasize why it becomes necessary to introduce a new learning system. We then proceed to discuss the existing facilities in the university, which can help to begin an e-learning curriculum. In order to come up with suggestions and concrete solutions to how to start the new system, we sent out questionnaire to assess the preparedness of the academic staff. We present and discuss the responses to the questionnaire. We concluded that by giving some suggestions as to how we can successfully start the new learning environment.

#### 1.1. About the university

The principal objectives of the National University of Rwanda (NUR) in order to play its major role as the premier university in Rwanda in the rebuilding of the country are to provide qualified university trained manpower, especial emphasis on science and technology, to promote development oriented research; and finally to provide services to the community. With the scarcity of academic staff and high dependent on visiting lecturers, the university decided to adopt a Virtual Learning method in order to achieve its goals and to have an accelerated positive impact on the development of the country.

#### 1.2. Existing facilities for virtual learning at NUR

NUR recognizes the pivotal importance of ICT in its drive to become a truly modern, efficient and effective university. Substantial investment has already been made in developing a modern IT infrastructure in the university. The ratio of students to computers is now around 15:1. It is expected to improve to 12:1 by the end of the academicyear 2007. The university has also installed WiMAX system to provide broadband wireless wide area coverage to support the already existing fiber network for Internet service.

NUR has already in place the African Virtual Open Initiatives and Resources (AVOIR) Open source virtual learning platform which has been adopted by the as the framework for the Virtual Learning. The Centre for Instructional Technology (CIT) is already equipped to support the training of staff as well as students in virtual learning. Research in Open Source, Software and Systems Initiatives (ROSSSI), an AVOIR node of excellence in Free and Open Source Software development, is in place to give the technical support to the open source AVOIR learning platform, Knowledge Environment for Web-based Learning (KEWL) [4].

The facilities already existing in the university can make the introduction of a Virtual Learning Environment (VLE) possible [1] as the University moves from a teacher-led to a student-centered learning environment. The questionnaire, which is prepared to evaluate the preparedness of the teachers to start this new teaching technique, considers the following three issues:

- Knowledge in Internet technologies and purpose of usage.
- Infrastructure needed to meet the challenges.
- Knowledge in using basic equipments and use of software packages for teaching

#### 1.3. Method used in the collection of the data

We have used random sampling for our research. The total number of teaching staff is around 800 and we have chosen 144 respondents, randomly from various departments and not missing any of them. Fortunately, the university has two units, namely, the CIT and ROSSSI, are responsible for planning and implementing the Virtual Learning method in the university.

#### 2. Presentation and discussions of the results

#### 2.1. Knowledge in internet technologies and the purpose of using them

The basic element for VLE is to have the knowledge in browsing Internet [2]. In figure 1, it is clear that the majority of the lecturers are able to browse the internet



Figure 1. Knowledge in browsing internet

#### 2.2. Main purpose of using internet

The next question is about the purpose of browsing the Internet. we proposed three answers to this question. As shown in figure 2, about 8 % and 9% of the respondents use the Internet for academic purpose and social only respectively. However, 83 % browse the internet for both social and academic purposes.



Figure 2. Purpose of using internet

According to the previous questions we have found out that nearly 97 % browse Internet, we then, raised a question whether they know what chat/forums and groups are and whether they have used them before.

#### 2.3. Knowledge about forums, groups and chats

We found out in figure 3 that almost 50 % of the respondents in the NUR do not have the knowledge in Forums, Groups and Chats. These three components play an important role in the VLE.



Figure 3. Knowledge about forums, groups and chats

#### 2.3. Knowledge about forums, groups and chats

We continued to find out whether the academic staff has any knowledge of eLearning. In figure 4 it is seen that only 41% of the 144 respondents are positive about eLearning. Out of the 41% of the respondents who said that they know eLearning and about the knowledge about the blended mode of teaching, surprisingly we found that only 31% of the respondents replied that they know it and remaining 69% replied that they have no idea about it.



Figure 4. Knowledge about eLearning and blended mode teaching

#### 3. Infrastructures needed to meet the challenges

ICT infrastructure plays a key role for a successful implementation of VLE [2]. We tried to find out the present infrastructure in the National University of Rwanda. According to the basic requirements a lecturer should have to prepare the courses related to the VLE and also must have

access to a computer and Internet in order to respond to the mails and participating in the online activities.

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#### **3.1.** Computer at the desk

When we asked the question about how many of the respondents have computer on their desk, we received the reply that only 43% of the respondents have computers on their desk figure 5, and among the 43%, 19% have desktop computer, 17% have laptop and 7% have both figure 6. So nearly 57% do not have computer which is the basic requirement of VLE.



Figure 5. Computer at the desk

Also to implement effective usage of VLE all the lecturers should have access to Laptop, which will help them in teaching in the classroom. But according to the figure 6 we found out that only 17% have laptop.



Figure 6. Type of computer

#### 3.2. Average time spent on computer per week

Next we have asked about the time a lecturer spends working at computer per week. For this question we found out that nearly 31% of the respondents are spending less than 5 hours per

week and 13% spend around 10 hours per week and 56% spend more than 10 hours per week figure 7. From the above information's we found that most of them who don't have computer use Center for Instructional Technology Laboratory for accessing the Internet.



Figure 7. Average time spent on computer

## 4. Basic knowledge in using ICT equipment set and software packages for teaching

### 4.1. Basic knowledge in connecting accessories

We tried to find out the basic knowledge in the usage of ICT equipments and the use of software packages required for teaching. For this question we have found out that approximately 60 to 70 % of the respondents have the knowledge in using ICT equipment such as printers, flash etc. figure 8.



Figure 8. Connecting basic accessories

# 4.2. Knowledge of using LCD projectors

Surprisingly we have found out that, as shown in figure 9, nearly 54% of the respondents do not know how to operate and connect LCD projectors, which is the basic requirement for teaching.



Figure 9. How to use LCD projectors

# 4.3. Knowledge in presentation application software sets

Finally we asked about the knowledge in Microsoft Office, which is the commonly used software for preparing course contents and presentation for teaching.



Figure 10. Knowledge in Microsoft Office

In figure 10, nearly 3% respondents replied that they do not have idea about Microsoft Word, 10% said that they do not have any idea about Excel but surprisingly nearly 30% do not have idea about PowerPoint.

#### 5. Conclusion and recommendations

The National University of Rwanda has facilities to introduce a new form of teaching. However, due to poor knowledge of the academic staff, which is to embrace this method of teaching and dissemination of knowledge to the students, there is a trait of failure if these lecturers are not properly trained. Although there is only four months to start the new system, it is necessary to organize a comprehensive, training for all academic staff. The training must first of all start with synthesizing all lecturers about the VLE, the gain in terms of time, doing away with chalk and duster although not completely. It is important to stress on how easy it would be to review the lecturers and it will minimize teacher student contacts. With this advantages known to the lecturers it will be easy to start intensive course on the use of software packages, such as power point, usage of words, etc. which can support the lecturers to prepare notes.

A pool of well trained technical and support staff must be ready to help put notes, graphs and tables on power point for lecturers will be a great help. There will be the need for the lecturers to be trained on how to use the power point to deliver lectures will encourage the lecturers to fully participate and embrace the new teaching environment.

Regular intra-departmental and faculty workshops will help reduce the risk of failure and boredom. The training program which is being prepare will focus on the weakness of the lecturers. Some of these weakness are using forums, groups and charts. We shall also concentrate on improving their ability to use words for preparing notes and power point for preparing presentations. This will help the lecturers to be independent on others in preparing notes and presentations. It will also help them correct and improve upon their teaching materials.

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#### **AOU Experience on Applying e-Learning Strategy**

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#### Abstract

Arab Open University is one of the first organizations that adopted an e-learning methodology in the Arabic region. AOU has partnerships with the United Kingdom Open University (UKOU) and other national educational institutes. In this paper, our experience of using two e-learning platforms FirstClass, and Moodle is clarified. Further more, we discuss the developments and enhancements that have been done in-house over the learning management system; specifically Moodle; to employ our regulations and rules over this platform and to facilitate its usage for our students. A description of integrating the learning management system with other electronic systems such as student information system and human resource system is discussed. In addition to that the quality assurance strategy of the AOU is presented.

#### 1. Introduction

The growth of Internet-based technology have brought new opportunities and methodologies in many fields including education and teaching represent in e-learning, online learning, distance learning, and open learning. These approaches are typically use in place of traditional methods and mean that students deliver their knowledge though the web rather than face-to-face tutoring.

Researchers and practitioners were divided into two camps when the concept of distance learning was proposed. Some believed that online and distance learning will reduce the quality of education based on the absence of face-to-face relationships between students and their tutors, and between the student themselves [1]; [2]; [6]. Others supported using Internet-based education, and proved the effectiveness of it by applying both methods in parallel on some courses and comparing student's results, which were nearly equivalent [19]; [5].

In the same respect, many studies address the challenges of distance learning to be accepted in the education community [3]. Johnson et al. [4] claim that "the primary among these challenges is how to meet the expectations and needs of both instructor and the student and how to design online courses so they provide a satisfying and effective learning environment". Owston [7] agrees that "the key to promoting improved learning with the web appears to lie in how effectively the medium is exploited in the teaching and learning situation".

E-learning is a new trend of education system, where students deliver their materials through the web. E-learning is the "use of internet technology for the creation, management, making available, security, selection and use of educational content to store information about those who learn and to monitor those who learn, and to make communication and cooperation possible." [8].

Kevin kruse [17] addressed the benefits of e-learning for both parties: organization and learners. Advantages of organizers are reducing the cost in terms of money and time. The money cost is reduced by saving the instructor salaries, and meeting room rentals. The reduction of time spent away from the job by employees may be most positive shot. Learning time reduced as well, the retention is increased, and the contents are delivered consistently. On another hand, learners are able to find the materials online regardless of the time and the place; it reduces the stress for slow or quick learners and increases users' satisfaction; increases learners' confidence; and more encourages students' participations.

In this paper the e-learning platform of the AOU is described in section 2. The integration process between learning management system and other computerized system is presented in section 3. Section 4 discussed the requirements and the strategies of quality assurance unit at AOU. Finally, section 5 concludes this paper.

#### 2. The e-learning platform of the AOU

Arab Open University was established in 2002 in the Arabic region, and adopted the open learning approach. An open learning system is defined as "a program offering access to individuals without the traditional constraints related to location, timetabling, entry qualifications."[12].

The aim of AOU is to attract large number of students who can not attend traditional universities because of work, age, financial reasons and other circumstances. The "open" terminology in this context means the freedom from many restrictions or constraints imposed by regular higher education institutions which include the time, space and content delivery methods. Freed et al. [9] claimed that the "interaction between instructors and students and students to students remained as the biggest barrier to the success of educational media". The amount of interaction plays a great role in course effectiveness [10]. For this purpose and to reduce the gap between distance learning and regular learning, the AOU requires student to attend weekly tutorials. Some may argue that it is not open in this sense; however the amount of attendance is relatively low in comparison with regular institutions. For example, 3 hours modules which require 48 hours attendance in regular universities, is reduced to 12 hours attendance in the AOU.

In order to give a better service to students and tutor, to facilitate accessing the required material from anywhere, and to facilitate the communication between them, an e-learning plat form is needed. A learning platform "is software or a combination of software that sits on or is accessible from a network, which supports teaching and learning for practitioners and learners."[18]. A learning platform is considered as a common interface to store and access the prepared materials; to build and deliver learning activities such quizzes and home-works; support distance learning and provide a set of communication possibilities such as timetables, videos, etc.

AOU has partnerships with the United Kingdom Open University (UKOU) and according to that at the beginning the AOU used the FirstClass system as a computer mediated communication (CMC) tool to achieve a good quality of interaction. The FirstClass tool provides emails, chat, newsgroups and conferences as possible mediums of communication between tutors, tutors and their students, and finally between students themselves. The most important reason behind using FirstClass was the tutor marked assignment (TMA) handling services it provided. However, the main servers are located in the UKOU which influences the control process, causes delays, and totally depends on the support in UKOU for batch feeds to the FirstClass system [11].

To overcome these problems, AOU use Moodle nowadays as an electronic platform. Moodle is an open-source course management system (CMS) used by educational institutes, business, and even individual instructors to add web technology to their courses. A course management system is "often internet-based, software allowing instructors to manage materials distribution, assignments, communications and other aspects of instructions for their courses." [13] CMS's, which are also known as learning management systems (LMS) or virtual learning environments (VLE), are web applications, meaning they run on a server and are accessed by using a web browser. Both students and tutors can access the system from anywhere with an Internet connection. The Moodle community has been critical in the success of the system. With so many global users, there is always someone who can answer a question or give advice. At the same time, the Moodle developers and users work together to ensure quality, add new ,modules and features, and suggest new ideas for development [14, 15]. Moodle also stacks up well against the feature sets of the major commercial systems, e.g., Blackboard and WebCT [16]. Moodle provides many learning tools and activities such as forums, chats, quizzes, surveys, gather and review assignments, and recording grades.

Moodle has been used in AOU mainly to design a well formed learning management system which facilitates the interaction among all parties in the teaching process, students and tutors, and more over to integrate the LMS with the student information system (SIS) and the human resource system (HRS).



Figure 1. The unified image of the AOU e-learning systems

In addition that Moodle is easy to learn and use, and that it is popular with large user community and development bodies. Moodle is flexible in terms of:

- Multi-language interface,
- Customization (site, profiles),
- Separate group features, and pedagogy.

The unified image of the e-learning platform of the AOU from the starting web page shown in figure 1, the users will be able to:

- Connect to the SIS, where they could do online registration, seeing their grades and averages as presented in figure2.
- Perform learning activities through the LMS, such as submitting assignments, do online quizzes, etc.
- Retrieve resources through AOU digital library subscriptions.



Figure 2. The SIS of the AOU



Figure 3. LMS course activities and administration

# 3. Integrating LMS with other computerized systems at AOU

The learning management system (LMS) is software that automates the administration of training events. The term LMS is now used to describe a wide range of applications that track student training and may include functions to:

- Manage users logs, course catalogs, and activity reports
- Provide basic communication tools (email, chat, whiteboard, video conferencing)
- Manage competency (e-Tests, e-Assignments)

- Allow personalization (user profiles, custom news, recent activity, RSS)
- Enable monitoring activities (QA, accreditation, external assessment).

The usefulness of the LMS could be summarized as follows:

- Simplicity, easy creation and maintenance of courses.
- Reuse, support of existing content reuse.
- CMC, TMA, Tests, Progress, learner involvement.
- Security, secure authentication/authorization
- Administration, intuitive management features
- Technical support, active support groups
- Language, true multi-lingual
- Affordability, maintenance and annual charges.

AOU has many computerized systems that facilitate services to students and staff. In the following subsections we will discuss the integration process done on Learning Management System (LMS) with Student Information system (SIS), Human Resource System (HRS), and the enhancement needed to integrate such systems together.

# **3.1 Integrating LMS with SIS**

The student information system (SIS) is an Oracle based program which provides the necessary information such as students' information, courses registered, faculties, grades, etc. LMS integration with SIS (or LMS-SIS) is a system used inside the university to reducing accessing time, automatically generating accounts, minimizing faults, mistakes and errors to null, obtaining availability of requirements and simplifying registering, entering and filling process as shown in figure 4.

The integration process added a lot of facilities which reduces time and cost in the following ways:

- Automatic structure enrollment: each student is provided with a username and password which enable students to register automatically.
- Automatic course enrollment: students are automatically enrolled into LMS courses they have been registered.
- Automatic group enrollment: students are automatically enrolled into LMS courses group, as they registered this group in the university.
- Automatically withdraw students from courses where students want to drop or have some financial problems.
- Student semester grades: students are enabled to see their grades through the LMS rather than bringing it from registrar.
- Students registered courses: where students could see the registered courses information such as their groups, time, course names and short names.
- Student's financial issues: where students could see their financial status and payment schedule.





The system is intended to satisfy the special needs and methodology adopted at the AOU. The SIS is flexible enough to adapt to the specific needs of branches while maintaining a unified

standard that facilitates the interoperability of the system amongst branches and the headquarters. The SIS performs all aspects of students' information functions from filing an application to admission up to graduation, within the AOU methods. The SIS deals with all the entities involved and facilitate an easy and reliable way of the entities to perform their functions.

# **3.2 In-house development and enhancements**

To fit the AOU requirements and specification, a number of modifications and customizations were made (see Figure 3), including:

- Log records. Logs are replicated into other isolated tables, to increase performance, and to keep track records for long period, while removing these log records from original tables.
- Activate questionnaire for students. Redirect students to fill the questionnaire of each course they study.
- Export questionnaire results to Excel files in special format.
- Students' attendance and absences sheets are provided.
- Grades customizations (fractions) excel sheets are available.
- Randomly captured assignments for quality assurances purposes.

# **3.3 Integrating LMS with HRS**

AOU uses a computerized system called human resource system to serve the employees and to keep all employee's records and transactions including:

- Basic information and details related to the employee and the changes that take place.
- Personnel information related to the employee.
- Academic qualifications of employees.
- Practical experience of employees.
- Personnel documents and attended workshops.
- Allowing all employees to take leave or vacations and following up on the rejection or acceptance of these online.
- Do all financial tasks and issuing salary slips for employees and emailing them to the private account of employees.
- General different types of required reports

By connecting LMS with HRS, all the required information regarding tutors and other academic teaching personnel information will be automatically migrated from HRS to the LMS. This process saves a lot of efforts and reduces time and redundancy of storing information, in addition to the increase of efficiency and accuracy. The process starts at the beginning of each semester by creating the groups for ever offered course over the LMS platform. All required information for creating groups and assigning tutors are migrated from the semester timetable in the SIS system. The time table contains group details in addition to tutor identification number. The rest of required tutor information such as email, department, major, title, etc are collected from the migration with the HRS. Many further studies regarding the integration of SIS with all computerized systems still in progress to obtain more efficient procedures within AOU daily functions.

# 4. Quality assurance strategy at AOU

Arab Open University with the collaboration with UKOU performs a number of procedures to guarantee the quality of learning process. The descriptions of these procedures are summarized in the following points:

- TMA marking template: Tutor marked assignment template is a form filled by the tutor of a course for each submitted TMA by students. It contains the deserved grade for every part of the TMA along with the feedback comments to the students.
- TMA monitoring: A form filled by the course coordinator and the program coordinator designed for monitoring tutors marking and filling the TMA templates.
- TMA samples: Three TMA samples should be collected for each section. One with a good grade, one is average, and one with a low grade.
- Quiz samples: Three samples should be collected for each quiz.
- Final exam samples: Three samples should be collected for each section of every course.
- Student questionnaire: A questionnaire filled by the students of every section to monitor the tutor, the course, and the tutoring environment.
- Tutor view questionnaire: A questionnaire filled by tutors to monitor the course content and the tutoring environment.
- Face-to-face preview: A form filled by the program coordinator to monitor tutor performance after attending a tutoring session of a specific tutor.
- Final grade statistics and distributions: grades reports and distributing of grades generated by SIS system after submitting student final grades.

At the end of each semester, each course coordinator has to prepare a complete folder that contains the following documents:

- Three samples of a marked TMA for each tutor in the course, each sample should be associated with its marking template and its monitoring form approved by the program coordinator. Notice that the three samples should be selected randomly; one is good, one is average and one is weak, and this is done automatically nowadays.
- Three samples from each quiz during running the course. One sample from each of the good, average and weak categories.
- Three samples from the marked final exam of the course. One sample from each of the good, average and weak categories.
- 4-The face-to-face monitoring form for each tutor.
- The tutor monitoring forms
- Results of student questioners on the course level and for each tutor.
- Students' grades
- Grade distributions and statistics.

One of the duties of the program coordinator is to supervise the preparation of the above documents for all courses in the program and send them to the headquarter of the university to be reviewed from the external examiners whom usually come from UKOU.

Notice that preparing and performing such documents consume the time and efforts of many administrational and educational members of the university including tutors, course coordinators, program coordinators, and secretaries.

### 5. Conclusion

The open learning and distance learning become widely used as a way of teaching in the education community. The need for learning management systems to deliver the courses online becomes a significant issue. We discussed the efficient features of Moodle as a learning management system used in the Arab Open University. In this paper, a complete description of the improvements that have been conducted over the learning management system at AOU is introduced. The university strict regulations on the learning process to assure the quality of delivering all learning activities in an optimal way. Accordingly, there is a need to improve the existing learning management system to guarantee the implementation of such quality assurance regulations electronically to save effort and to perform all required procedures. We presented the integration process between learning management system and student information system and the human resource system that has been applied in the Arab Open University. Having consistent data is one of the main cores of the integration process in addition to the saving of efforts of time and cost. Moreover, this integration facilitates a lot of services which were done manually, basically the automatic enrolment process.

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## **Quality Assurance in e-Learning: Issues for Developing Nations**

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## Introduction

"Quality" has been defined as 'fit for purpose'; hence 'quality assurance' will refer to a process of assuring that services provided are fit for purpose. Quality assurance could thus be defined as a set of procedures designed to ensure that quality standards and processes are adhered to, and that the final product meets or exceeds the required technical and performance requirements. Quality assurance covers activities including product design, development, production, installation, and servicing, as well as proper and effective utilization.

e-learning has two sides, the 'e' or electronic, technical side, and the 'learning' side which is mainly human.(Ipaye, 2007) Quality assurance in e-learning therefore focuses on the two sides of e-learning; the design of the technical equipment, the design and development of learning materials i.e. the software and the installation of the software. Next is the human side. Quality assurance focuses on the delivery methods, the support services that use technology to get learning materials unto the learners. Hence, in e-learning, quality assurance is an approach integrated into the production of hard and software to improve upon product delivery and the meeting of societal requirements and expectations. Fortunately, no society does not want quality education.

## **Quality Assurance in on-line education:**

In education, the main goal of quality assurance is ensuring that the final product meets or exceeds the customer's expectations. In achieving this in e-learning, there are a variety of main processes involved. These can be described as:

• Ensuring a quality assurance mindset throughout the educational system but specifically within the institution providing e-learning services ; including it's infrastructure, ( i.e. the 'e' or electronic/technical component) it's controls and job management, its worker's competence, skills and experience, as well as less tangible elements such as institutional morale and motivation, corporate culture, and integrity ( i.e. the 'learning' or human component)

- Using a variety of controls to monitor, report and analyze problem areas, and work immediately to reduce or eliminate them. In many cases, this area of quality assurance falls back on ideas such as close monitoring, accurate collection and collation of data, analyzing data to identify areas of faults, leading to correcting issues before they become widespread or worsen.
  - Full testing of products whether referring to hardware products or software products. In industries, this step of quality assurance looks at testing a product to it's point of failure and then measuring variables or identifying problem areas, while in education it looks at testing a product as well as the process to the level of identifying the barest minimal errors or what is called 'safe failure point'. In addition to hardware issues, this step also includes the proper training of staff, particularly support staff, on-line tutors; course materials reviewers etc. to spot issues, as well as making sure they are adhering to known process that will not result in premature failure of the product, process and practice.

#### Developing nations and quality issues in e-learning:

A number of African universities had started the dual-mode of distance education whereby the universities provide distance education to off-campus students by various means including online provisions, in most parts of Africa today, Distance Education is often implemented in form of e-learning or on-line learning by external providers. Often such educational provision is not indigenous to the country since it is transported from the developed nations with all the features of a 'Northern design', and exported across the border into the recipient African country. It has been variously described as trans-border education, Trans- National Education, cross border education etc. While many of these countries that export such educational provisions have standards in their own countries, very few if any of the providers bother to apply such standards when they export their provisions to the developing nations of Africa. Trans-border education in Africa is mainly in two forms. Direct face to face provisions in which the providers establish institutions in the recipient country and do direct didactic teaching. The second approach is by elearning and on-line programmes. This approach is growing so rapidly in many African countries that the governments of such countries may have lost count of the number of such programmes within their boarders.

If well implemented, Trans-border (cross-boarder) education is a promising avenue for enhancing equity, access and the quality of higher education in the developing nations and assist in reducing the current huge gaps between demand and supply of higher education. (see Ipaye, in press). The fact remains however that in many of these African countries, if in any at all, the growth being witnessed in the provision of cross-border education is not accompanied by effective quality assurance mechanisms. (Masinde, 2007). This is because, among other reasons, the developing nations, unfortunately, are dumping grounds for dis-used technologies and technical components from the West. Not only that, the Far East finds ready market in the developing nations of Africa for sub-standard products including of course soft ware for education and hardware for e-learning purposes. Here, standard and quality do not matter. Hence in both the supply of hardware and software as well as in the delivery of services, quality is often down-played.

Quality Assurance, however, is an important aspect of educational provisions and more so for elearning. One area where this is well illustrated is in the Instructional Design (ID) process for producing e-Learning modules. Instructional Design and materials development in ODL is an intricate process usually involving a team of professionals and experts such as the lecturer, the course writer, the instructional designer, graphic artist, the editor and library staff. Each of these professionals 'speak' his or her own professional language, while working together as a team to produce a quality e-Learning deliverable. Each person needs to have an understanding of the overall process, how they contribute to it, and what their jointly identified checks and balances are along the way. This is an essential first step in quality assurance. It is doubtful if most of the providers of e-learning programmes in Africa adopt this approach in instructional design.

How do we ensure quality assurance?

## i) Needs Assessment:

Africans are hungry for western education. The desire to acquire university degrees is most intense in most developing nations. The rush to become skilful in the use of emerging technologies and to apply that skill to socio-economic and technological development is apparent. Education is the only means to achieve all these. There are various other needs that education has to meet in developing nations. Providers of cross-border education through elearning on the other hand, have their own agenda. Often such agenda runs contrary to the needs of the recipients of the education they provide. If you provide education in areas that the skills and competencies taught are not needed by the nation at that particular time, then the educands become more of a burden to the national economy and to the polity. There is thus the need to do a needs assessment; this gives an idea of what is required by the society, the individuals, the system, the programme, as well as what hardware and software are required and to what level of efficiency. Usually, one of the most important steps never to be missed while producing materials for e-learning in Africa is to conduct a learning needs assessment before ever starting the delivery of instructions. There is also the need to know what society needs in the areas of technological provision, utilization and application. Further, a societal needs assessment would reveal the ethno-cultural intricacies that may impede learning and it is important to know in order to weed them out during the contents identification phase, the material development stage, the determination of graphics to use in illustration as well as in determining the learning strategies. A needs assessment done before building up the contents and a pretest before beginning the programme delivery proper engages the learners better. In assessing quality therefore, educational provisions are measured against the needs of the individuals, the societal sub-group and the nation at large.

The sum-total is that the needs of the individual, the society and the nation where e-learning is provided should be the priority of the on-line education providers.

## ii) Congruence with national educational goals and philosophy

Generally, every nation has her own goals and objectives which the education systems must help to achieve. Such goals and objectives are spelt out in the national policy on education and sometimes they are specific for each level of the educational system. In providing the benchmark for a level of the system, such goals and national philosophy must be considered. In assessing the quality of educational provisions at that level, the attainment are measured against the stated objectives and national goals and philosophy. For example, if the goal of the nation is to get her universities to produce engineers with stated skills or lawyers with stated competencies or historians with certain level of knowledge, in designing programmes for these categories of students, such stated skills, competencies and knowledge must be adequately covered. This is why, among other things, the National Universites Commission, NUC, stressed that "programme philosophy and objectives should clearly state the type of manpower the programme is designed to produce and the general directional statements of the knowledge and skills the graduates of the programme should be able to perform in relation to the philosophy, goal and objectives of the institution ... and the country." (NUC, 1999, italics mine). An educational provision which lacks these then could not be said to be qualitative hence right from the beginning, quality assurance procedures expect that such issues must be integrated in the planning, the execution and the assessment of education given. It is mandatory therefore to ensure that the programmes and courses provided agree with the national goal and national philosophy of education.

Some have argued that the aim of trans-border education is the production of an international body of employees who can function in the global village into which the world is developing. But deep in the mind of such providers is profit making and profit maximization. The recipient nations should assess the quality of the programme provided; is it the same as in the home country of the providers in terms of coverage, depth, duration, quality of tutors, quality of study materials, quality and usability of the on-line hardware and software etc. More importantly the aims and objectives of the programmes must agree with national goals and philosophy of education. If they deviate then quality is lacking vis-à-vis the expectations of the recipient nation. This could be easily achieved if before implementation, e-Learning providers take time to study national goals, objectives and philosophy of the recipient country, subject their programmes to pre-implementation analysis by the quality control agency within the country and ensure that its academic brief is acceptable to the quality control and assurance body set up by government. The truth however is that most cross-border providers are afraid of this procedure, and they are for obvious reasons.

## iii) Parity of offering:

For cross-border programmes, it is essential that the programmes provided be at par with the same programme in the country of origin. Students should be able to expect that their e-

learning study materials, mode of delivery, assessment procedure etc are subject to the same rigour of quality assurance as the awarding institution would use for any of its programmes of study.

## iv) Participatory and interactive activities

It is difficult **not** to build a participatory approach into e-learning materials. If this is absent then quality is absent. The participatory approach in e-learning is the key to encouraging adults to participate in their own learning, especially there is something in it committing them to the future. On the human side, (i.e. the second part of e-learning) quality assurance focuses on ensuring that the process of using e-learning is fit for purpose in :

- a) enhancing learning
- b) breaking isolation by being sufficiently interactive thus enhancing uninterrupted interaction with study materials, with colleagues, with the on-line tutor and with other resources
- c) promoting transactions by being flexible enough to sustain intra- and inter-group contacts
- d) engendering the willingness to complete programme by being self motivating
- e) being user friendly thus preventing procrastinations and supporting effective utilization of time, resources and materials
- f) being sufficiently supportive of both synchronous and asynchronous learning
- g) actually removing the distance from distance education

## v) Statement of objectives and strategies

An important aspect of quality assurance is for the programme provider to state clearly for 'consumers', as students of distance education are often described, the objectives, the operational strategies and the assessment procedure to know before hand. According to the QAAHE (2004), these should include, but not limited to:

- documents that set out the respective responsibilities of the awarding institution and the programme presenter for the delivery of e-learning or element of study;
- descriptions of the component units or modules of the programme oelement of study, to show the intended learning outcomes and teaching, learning and assessment methods of the unit or module;
- a clear schedule for the delivery of their study materials and for assessment of their work.

To further ensure and assure quality, QAAHE(2004) had suggested that the awarding institution, whether or not working through a programme presenter, should ensure that students can be confident that:

- a) the e-learning programme offered for study has had the reliability of its delivery system tested, and that contingency plans would come into operation in the event of the failure of the designed modes of delivery;
- b) the delivery system or element of study delivered through e-learning methods is fit for its purpose, and has an appropriate availability and life expectancy;
- c) the delivery of any study materials direct to students remotely through, for example, e-learning methods or correspondence, is secure and reliable, and that there is a means of confirming its safe receipt;
- study materials, whether delivered through study centres for the programme presenter or through web-based or other distribution channels, meet specified expectations of the awarding institution in respect of the quality of teaching and learning support material for a programme or element of study leading to one of its awards;
- e) the educational aims and intended learning outcomes of a programme delivered through e-learning arrangements are reviewed periodically for their continuing validity and relevance
- f) providers of e-learning programmes also need to take account of the lowest levels of technology available to students and students' special educational needs in the country of consumption
- g) in an e-learning environment, it is the responsibility of the programme presenter to ensure that the system is free from contamination by viruses at the point of delivery
- h) consideration should be given to how alternative forms of delivery would come into action in the event of failure of the principal delivery system, or where students are unable to meet scheduled events students should be able to expect that the system would fail safe. A schedule in advance of the course will, at least, enable students to identify the non-arrival of anticipated materials or events, and access to contact details will enable students to respond quickly to any failure of the principal delivery system.

## vi) Orientation towards e-learning

In Africa, the prior experience of all prospective e-learners had been through directed teaching and face-to-face didactic encounters. It is thus the concern of quality assurance to provide opportunities for them to become aware of the different challenges and opportunities of autonomous learning, and of their responsibilities as autonomous learners. They need clear guidance on the characteristics of on-line learning, and on the general expectation of time commitment that they should be making.

Particularly in an e-learning environment, students may need time to understand and become familiar with technologies that are new to them. They may need some introductory support, possibly involving access to on-line learning environments prior to the start of the course so that equipment and technical access can be tested and new skills practised. Consideration might be given to the need to assign an identified contact prior to the commencement of study to enable the programme presenter to ensure that the student's induction and preparation have been adequate. *(see Quality Assurance Agency for Higher Education , QAAHE, (2004). Code of practice for the assurance of academic quality and standards in higher education p 23)* http://www.qaa.ac.uk/academicinfrastructure/codeOfPractice/default.asp

Equally important is helping students to overcome compuphobia. A number of on-line learners are those "old" students returning to the classroom; or those who for one reason or the other dropped out of education and are now dropping in back into learning; or those who are desirous of career change and thus want to update themselves by acquiring new skills, new knowledge and a retooling. While they were in school, there were no computers. Going back to school, they met a box called 'computer', and studying through e-learning means they have to use the computer one way or the other. The fear of operating the computer may serve as a block to learning hence the strategies put in place to reduce or remove this fear and thus provide orientation towards e-learning could form a constituent part of quality assurance.

## Conclusion

An innovation is penetrating the African education scene through e-learning. A wider access to higher education is made available, people can conveniently work and learn, the burden of higher education is gradually shifting away from Government to learners or at least, it has been shared and more people are obtaining higher qualifications. As it does, there is need for the nations involved to be conscious of quality and quality assurance. The quality of a nation's education, particularly higher education, is intricately interwoven with her economic development. Further, the education a nation gives her citizens must be congruent with the nation's philosophy, goals and aspirations, and in these days of global development, a nation's educational system must support the achievement of the Millennium Development Goals (MDG) alongside the national goals. As other nations import their educational system to African countries through e-learning, there is need for preventing implantation of diploma mills in Africa as this is likely to worsen the development problems of Africa. Quality higher education is what is needed to accelerate national economic and socio-political growth and development in Africa. And indeed in the developing nations of the world.

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#### **Technology Acceptance Model and Teachers' Adoption of Laptops**

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#### Abstract

This qualitative study investigates the teachers' perceptions of their adoption of laptops as an innovation within the Technology Acceptance Model (TAM) framework and E-learning. The perceptions of teachers' were investigated through face-to-face semi-structured interviews. 24 teachers (8 laptop users, 16 non-laptop users) participated in the study from three different high schools (8 teachers from each school) in Denizli, Turkiye. Data were analyzed qualitatively including content analysis in order to discuss teachers' behavioral intention (BI) to use, perceived usefulness (PU) and perceived ease of use (PEOU). The results indicate that teachers have intention to use their laptops in educational activities in the classroom. The teachers who do not have a laptop indicate that they have intention to use technology but they do not purchase a laptop because of the organizational factors.

#### 1. Introduction

Technology use and information technology adoption in education is a crucial research field in educational research and practice. During the last decade the use of information technology (IT) increasingly changed many concepts in our lives and transformed our learning. Diffusion and integration of IT emerged the new phenomenon known as e-learning. E-learning requires a set of applications and processes together with the use of technological instruments. Computers play the critical role for those e-learning applications. Considering the situation and use of laptops in e-learning applications together with the value of e-learning technologies and especially computers' in enhancing the skills of teachers, this study investigates the diffusion and integration of laptops among teachers on the basis of TAM.

TAM is a theoretical model for explaining the technology use [1] and is a significant extension and adaptation of Ajzen and Fishbein's Theory of Reasoned Action (TRA) [2]. TAM is proposed as a useful model for predicting and explaining the users' intention and adoption of information technology.



Acceptance

According to TAM, users' PU and PEOU determine the users' intention to use and the intention determines the adoption of technology. PU is defined as the degree of performance for a person who uses a particular system. The person believes that his/her performance is enhanced by using the system. PEOU is the extent to which an individual believes that using the system will be free of effort [3].

#### 2. Theoretical Background and TAM

TAM is applied in various fields and widely used by the researchers in order to make a better understanding of adoption and use of technology. In a critical review of TAM, it is concluded that TAM is a useful model but has to be integrated with the variables related to the adoption of innovation models [4]. Venkatesh and Davis developed a theoretical extension of TAM called TAM2 that explains PU and intentions in the term of social dimensions [5]. Their findings suggest that usefulness perceptions, perceived ease of use and intentions significantly influence user acceptance.

A quantitative meta-analysis study of Schepers and Wetzels [6] examines previous research on TAM in order to find the influences of external variables (e.g. subjective norm) on PU and BI to IT use. Another meta-analysis study suggests that PU and PEOU are the two most significant factors in explaining the system use. PEOU is the dominant factor in explaining PU and system use and PU is effective on use [7]. Venkatesh and Davis indicate that as the user is experienced on using the system, then ease of use loses its significance and other factors begin to play a more important role than ease of use [8].

Noh studied the teacher experience of laptop integration and how teachers adopt laptop computers into their classroom in their own ways in a middle school in Michigan [9]. Being a part of a large project of Freedom to Learn (FTL), Noh's study explored how teachers adopt technology in school to provide an innovative way to use technology.

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## 3. Statement of the Problem

The purpose of this study is to investigate the teachers' perceptions of their adoption of laptops as an innovation within the TAM. In this study it is discussed that teachers have perceptions about usefulness and ease of use of laptop computers.

## 4. Participants

24 Teachers from three different school types; a High School, an Anatolian High School and an Anatolian Commercial Trade High School were selected randomly and interviewed by the researcher. 8 teachers from each school answered the researcher's questions from semi-structured interview form during face-to-face interviews. School A, is a high school that was founded in 1874. School B is an Anatolian High School that was founded in 2005 and this "Anatolian" attribute expresses that educational language in this type of school is mostly English. Curriculum for high schools and Anatolian high schools consist social and scientific classes. School C is founded in 1961 and is also an Anatolian High School of vocational type. The curriculum in School C generally consists of classes about commerce and trade.

Table 1 demonstrates the characteristics of schools where interviewed teachers (participants) give lessons in. Table 2 gives the demographic features for interviewed teachers.

## 5. Data Gathering and Analysis

Data were gathered through semi-structured interviews. Questions of the interview were prepared on the basis of TAM in order to find answers of teachers' PU, PEOU and BI. Data gathering and analysis of this study are made qualitatively. Answers for each question were written and the researcher took notes of observations. Whole data gathered through note-taking of the answers and researchers' observation notes. Written data transformed into transcription notes and those transcriptions evaluated through content analysis. Data coded and then labeled with topics in order to make themes. At the end of the coding and labeling processes a thematic framework on the basis of TAM is structured.

Results are discussed on frequency tables demonstrating teachers' answers. Firstly; PU, PEOU and BI for teachers who already use laptop computers in their educational activities are discussed and secondly, discussion continued with the usefulness, ease of use and intention for the teachers who do not use laptop computers.

## **Table 1: Demographic Characteristics of High Schools**

		School A	School B	School C
1	School Type	High School	Anatolian High school	Anatolian Commercial Trade High School
2	Computer Lab (N)	Available (2)	Available (1)	Available (7)
3	Internet Access	Available / wireless	Available / wireless	Available / wireless
4	Number of Teachers	140	63	79
5	Number of Students	2337	854	1465
6	Number of interviewed teachers	8	8	8

 Table 2: Demographic Features of Teachers

Demographic Features		Features	Number of teachers (N=8 for each school, total 24)			
			School A	School B	School C	
1	Gender	Female	3	2	4	

		Male	5	6	4
2	Age	31-40	3	5	2
		41-51	4	2	4
		51 +	1	1	2
3	Branch /	Mathematics	1	1	1
	Profession	Turkish Literature	1	1	2
		English	1	1	1
		Chemistry	1	1	1
		Accountancy			2
		Guidance		1	
		Arts			
		Philosophy	1		
		Physics	1		
		History		1	
		Geography		1	
		Music	1	1	1
4	Experience (year)	More than 10 years	8	8	8
5	Experience	< 1 year		1	
	in current school	1-2		7	2
	(year)	3-5			2
		6-10	5		2
		10 +	3		2

#### 6. Findings

Interviewed teachers who have computers gained their PC's or laptops on their own for their personal use. Schools also give the opportunity of computer use at school time by making computer laboratories and technology rooms available together with wireless internet access for teachers. Table 3 demonstrates the frequency of laptop users and nonusers with their experience of use for the schools A, B and C.

**Table 3: Teachers' Computer Use** 

Demographic Features	School	School	School

			Α	В	С
1	Computer owning status	Only PC	3	6	6
	(Number of teachers/N)	Only laptop	1		
		PC and laptop	3	2	2
		Non-owner	1		
		Total (N)	8	8	8
2	Experience of computer use	1-5 years		2	4
		6-10 years	5	6	2
		11-20 years	2		1
		Do not use a computer	1		1
3	Experience of laptop use	1-2 year	2	2	1
		3-5 years			1
		Over 5 years	2		

Most of the teachers in this study have an experience of computer use for over 6 years. 8 teachers of 24 have their own laptops. 4 teachers from School A, 2 teachers from School B and 2 teachers from School C have their own laptops.

## 6.1. Perceived Usefulness

Teachers' perceived usefulness is given in Table 4. The question, "What kind of usefulness can a laptop provide for you?" is asked from the semi-structured interview form in order make clear the perceptions of teachers about PU. Table 4 gives the answers of 8 teachers who have their own laptops and the given numbers demonstrate the repetitions for each answer.

"What kind of usefulness can a laptop provide for you/teachers?"		School A	School B	School C	Total (N) (repetition)
1	Facilitates giving lessons	1	1	1	3
2	Facilitates information transfer	1			1
3	Time gaining	1			1

 Table 4: Teachers' Laptop Use and Perceived Usefulness (For laptop users)

4	Increase effectiveness	2			2
5	Reflecting images on board	1			1
6	To go beyond traditional methods	1		1	2
7	Visualization	2		1	3
8	Removes pen and paper	1		1	2
9	Facilitates self- improvement	1		1	2
10	Make plans and ideas applicable			1	2
11	Useful in every respect	1	2	1	4

Davis in his PU study proposes a number of commonly used measurement tools and Legris et.al criticize these tools in their study [4]. (1) Using (application) increases my productivity; (2) using (application) increases my job performance; (3) using (application) enhances my effectiveness on the job; (4) overall I find the (application) useful in my job.

Given in Table 4 above, generally teachers claim that laptops are useful for educational purposes in every respect for them. Teachers' 11 different answers given in the table above make their PU perceptions clear. It is clear that they regard their laptops as facilitators which guide and help them for a better performance.

PU of non-laptop users is generally focused on "usage in the classroom", "freedom" and "removal of pen and paper". Non-laptop users gave estimated answers to this question by taking into account experiences of colleagues who use laptops in their classrooms at school and by making comments on observations of their colleagues' activities with laptops.

## 6.2. Perceived Ease of Use

Davis also constructed tools for measuring PEOU. The most frequently used items for PEOU are; (1) learning to operate the (application) is easy for me; (2) I find it easy to get the (application) to do what I want to do; (3) the (application) is rigid and inflexible to interact with and (4) overall I find the application easy to

use. Table 5 and table 6 show PEOU of teachers. Teachers answered the question:

		School A	Schoo l B	Schoo l C	Total
PEOU	Portable	3	2	1	6
	Facilitates internet access	1		1	2

Table 5: Teachers' Perceived Ease of Use (laptop users)

"For what reasons do you find laptops easy to use?"

Both users and non-users converged in one answer; "laptops are portable and this property makes them easy to carry everywhere". Teachers also hesitate that there are similarities between laptops and PCs so that they can easily operate with their laptops. Only one teacher among non-users reports that it is complex and difficult to use a laptop. This answer takes us to Rogers "Diffusion of Innovations". In his theory Rogers states complexity as the degree to which an innovation is perceived as relatively difficult to understand and use [10].

Table 6: Teachers' Perceived Ease of Use (non-laptop users)

		School A	School B	School C	Total
PEOU	Portable	3	5	6	14
	Difficult (complexity)	1			1
	Similar to PC		1		1

## 6.3. Intention to Use

Two questions; "Do you intend to use your laptop in the future?" and "Do you intend to have a laptop in the future?" were asked to the teachers. Laptop users answered the first question and non-users the second. All of the answers for these two questions were "yes". This hundred percent result shows us that all of the teachers participated this study have BI to use laptops. During detailed interviews some of the teachers among non-users also noted that they want to have their own laptop and use it in the classroom but they are on the point of giving up this choice because of the organizational factors. They report that they need technological equipments (projection etc.) ready to use in their classrooms but lack of technology makes them think again about this choice. Noh also found a similar result in his study in 2005 [9].

Table 7 shows the reasons of teachers for not having a laptop.

Non-laptop users' first coming reason for not having a laptop is "having a PC". Also "lack of need", "cost" and "lack of technical hardware" become other reasons for not having a laptop.

#### 7. Conclusion

Based on TAM, this paper presented an attempt to examine teachers' perceptions and adoption of laptops in e-learning process.

Results show us that laptop users and non-users have common perceptions on PU and PEOU. Teachers indicate that laptops are portable and this feature makes their use of laptops easily. Also the operating similarities between PCs and laptops make teachers to learn how to use laptops easily. BI of teachers of laptop use is also positive. For their future plans, non-laptop users report that they intend to purchase a laptop and laptop users state their continuing plans of using laptops in the future. Users also state that laptops increase their own pace and effectiveness by its usefulness.

Reasons for not having a laptop		Schoo l A	School B	School C	Total (repetition)	
1	Cost (expe	ensiveness)	2		2	4
2	Having a l	PC	1	3	3	7
3	Lack of need			4	2	6
4	Lack of technical hardware	Not have a projection / data show	1	1		2
		No technical equipment	1			1
5	Do not know how to use a computer		1			1
6	Lack of in	terest			2	2

Table 7: Perceptions of non-laptop users (Reasons for not having a laptop)

During the adoption process of an innovation both PU and PEOU are important for teachers. But this study shows us that PEOU is prior for teachers in laptop use by its technical and practical characteristics. Teachers look for the technologies which are easy to operate and which allow them whatever they want to do. Organizational factors and supportive technical equipments are also important for teachers.

With the introduction of any new educational innovation some problems occur if there is a lack of implementation in the integration of the innovation. The integration of e-learning applications into teacher development is also an innovation that represents a series of evolution of current practices. Skilled teachers in the use of e-learning can model its use to enhance the learning of their students.

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#### Learning as a Meaning-Making Process in Blog: Based on the Case Studies of Korean Adult Bloggers

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#### Abstract

This paper explores adult bloggers' learning experiences in terms of a meaning making process. Based on the results of two subsequent research projects, this paper introduces first Cyworld, one of popular blogging services in South Korea, and discusses (a) adult bloggers' perceptions of blogging experiences in terms of learning, and (b) its link to their definition of learning (i.e., learning as acquisition or reflection). The paper concludes that the blogging experience in Cyworld appears to be a meaningful context that facilitates informal learning, and that bloggers who emphasize a meaning-making process rather than an acquisition process for learning perceive that their blogging activities are related to learning through reflection and integration of prior learning.

#### 1. Introduction

Internet technology has been rapidly expanded in South Korea. According to the *Computer Industry Almanac* [1], among the top 15 countries in Internet usage, South Korea rests in seventh place in number of Internet users. In other words, the number of Internet users aged 6 or older is estimated to be 33.01 million, which is 72.8 % of the Korean population (as of 2005). Of these users, 48.2% of Korean Internet users access the Internet to use a homepage and/or blog [11]. It means that one in every four Koreans has enjoyed blogging as one of their most favorite on-line activities. Especially, Cyworld (http://www.cyworld.com), one of the popular online social networking and blogging services, has become a social phenomenon in South Korea. Since the site was launched in 2001, its number of users have reached almost one third of the total Korean population, equivalent to 15 million [12]. In addition, over 90 percent of Internet users in their 20's have registered on Cyworld [18]. They spend a considerable number of hours

communicating with others, sharing their experiences, information, and knowledge, and thus creating and strengthening their social

networks. The popularity of Cyworld in South Korea accordingly has allowed expanding its services to China, Japan, and US beyond national boundaries.

## 1.1.What is the Cyworld?

Cyworld is "an advanced blogging site which interconnects personal homepages, encouraging users to form a network with friends or colleagues" [14]. Cyworld as a whole presents a social network for interaction. "Cyworld" means literally "relationship world" in Korean, so one of the characteristics of Cyworld is *Ilchons*, which is referred to as "neighbors" in the U.S. version and are buddy relationships formed by on- and off-connections. Another typical characteristic of Cyworld is "wave ridding," which is described as follows: "when you're reading posts on bulletin boards or looking at photo files, you can click on the name of someone who has added a remark or photo you find interesting and you'll be transported to that person's digital room" [12]. This function allows Cyworld users to create, maintain, and strengthen social relationships. Hence, many users of Cyworld spend several hours a day creating their own blog, browsing others' blogs, and communicating with other users.

Beyond its major function facilitating online communications, the paper has been developed originally with the inquiry: what kinds of benefits do the users expect and actually gain in these social networks and blogging? From the viewpoint of educational researchers, a learning process was derived from these social activities, especially as a form of adult informal learning. According to the findings of the preceding studies [3; 13], adult bloggers used the Cuworld seemed to learn what they needed to learn with or without intentions and their own perception to learning was very important to have meaning making out of blogging activities. Hence, these studies confirm that a potential significance of Cyworld activities correspond to the learning process that occurs in the context of social activities in everyday situations, in particular as a form of informal learning.

This paper discusses what meaning-making implies to support online users' informal learning experiences to be more constructive.

#### 2. Conceptual Framework

#### 2.1. Concepts of Informal Learning

Informal learning is a significant form of learning in the adult stage. It is different from formal learning which is "typically institutionally sponsored, classroom-based, and highly structured" [8]. Informal learning has been defined as an important and predominant form of learning in adult lives. However, it is easy to underestimate how informal learning is practiced in our lives because it is rarely intended explicitly and learners are mostly unaware of it. Informal learning discussed here is based on some of the principal views of informal learning including (a) informal learning is free from curriculum or institutional components; (b) informal learning occurs either intentionally or incidentally (c) learners are a central agency in informal learning; and (d) informal

learning is a social phenomenon that takes place in various social contexts [6; 7; 8; 15; 17].

#### 2.2. Informal Learning Processes

There is no consensus regarding the definition of the adult learning process. However, adult learning is considered a complex process that not only includes the systematic acquisition and accumulation of information, but also embraces "making sense of our lives, transforming not just what we learn but the way we learn, and it is absorbing, imagining, intuiting, and learning informally with others" [9].

In this paper, two epistemological points of view on the adult learning process are discussed. The first one is the "learning as acquisition" lens "understands knowledge as a substantive thing – a skill or competency, concept, new language, habit, expertise, or wisdom – that an individual obtains through learning experiences" [2]. On the other hand, learning is a reflection process for other learners. The "Learning as reflection" lens interprets learning as a meaning-making process. Fenwick and Tennant [2] define this perspective on adult learning as helping learners to be active constructors of knowledge, "creating new meanings and realities rather than ingesting pre-existing knowledge". This kind of learning often brings transformative outcomes that can lead us to challenge our assumptions and values and radically change our existing prior knowledge and approaches [10; 15].

#### 2.3 Learning as Shared Meaning Making

Stahl [16] strengthens the collaborative character of learning and refers to learning as shared meaning making corresponding to the "learning as reflection." Meaning making is not understood as a psychological process which takes place in individuals' minds but as an "essentially social activity that is conducted jointly - collaboratively -- by a community, rather than by individuals who happen to be co-located". Stahl grounds the collaborative character of meaning making in the philosophical tradition of Heidegger, Hegel, and in Vygotsky's concept of mediated cognition which shows how meaning is socially produced and situationally interpreted; the meaning-making practices do not merely take place within a 'context of joint activity' but the context of joint activity is those practices. Namely, the meaning is not merely transferred from mind to mind by the activities, but the meaning is constructed by and exists as those activities. Stahl integrates the idea of a dynamic relationship: He assumes a dynamic relationship between shared meanings and individual interpretations.

This perspective supports the possibility of meaning making activities in blogging spaces such as Cyworld. People interpret these meanings from there own viewpoints.

#### 3. Methodology

Using "mixed model research" [4], which is that the survey was conducted by using online questionnaires, which included not only closed items (i.e., quantitative), but also

open-items (i.e., qualitative) [4]. The target participants recruited for this study were adult Cyworld users over 20 years of age. Throughout this procedure, age distribution and gender balance was intentionally considered to obtain the most diverse voices using Cyworld.

## 3.1. Data Collection and Analysis

Data were gathered through an online survey written in Korean. A total of 123 users accepted the invitation and voluntarily accessed the online survey, and 100 respondents completed the survey questionnaire. The survey questions were generally grouped into three categories: demographic background, personal experiences with Cyworld, and personal perception of learning in general and specifically in relation to Cyworld. Data collected was then translated into English by the researchers for data analysis. Out of the 100 participants, the majority of participants were female (67 %), 30-39 years old (52%), and office workers (51%). Half of the participants had used Cyworld's blogs for more than 2 years (50%), another half had used that feature for 1-4 hours per week (51%), and 45% of participants had less than 5 lichons (or neighbors). Of the participants, 74% used additional online communities (i.e., other blogs or a specific interest group called either as an online club or an online café).

## 4. Major Findings

It was the principally descriptive data analysis that revealed two major findings that answered the research questions: a) Experiences of informal learning in blogging; and b) The relationships between participants' definition of learning (i.e., learning as acquisition or reflection) and their perception of blogging experiences. The data analysis showed that once the participants joined blogging activities with a certain motivation, many of those, if not all, had certain learning experiences. But, their perception of blogging experience appeared to be affected by their definition of learning and that the level of seriousness of reflection also depended on their own view on learning.

## 4.1. Experiences of Learning in Blogging

How did the participants themselves conceive of these activities? Table 1 summarizes the relationship between blogging activities and learning and the reasons for that relationship.

Table 1. Ex	periences of	Learning and	l the Reasons	for Participant	Responses	[13]
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Question	Response	Number	Reasons for the Response
Do participants see	Yes	62	Self-Reflection
blogging activities			Sustaining Social Bonding
related to rearning?			Acquiring Specific Knowledge
			Cultivating a Constructive Life

No	38	Only for Maintaining Relationships
		Not for Seeking Tangible Information
		Merely for fun
		Showing myself to others

When the participants were asked to link the meaning they gained to learning, 62 respondents indicated that learning did happen through these activities. The other 38 respondents believed that any learning through online use could only happen through sharing a tangible piece of information and specific content-oriented knowledge. Specifically, 62% of participants believed that even if they did not intend to pursue any learning-related experiences, blogging activities did lead them to such positive experiences as reflecting on themselves; sustaining social bonding; acquiring specific knowledge, information, and skills; and in turn, cultivating a constructive life.

Specifically, Participants #92 and #65, each said:

Using a guest book or a place for writing is good for us to share our lives that we hardly could do before. I think that these in-direct experiences and understanding accumulated by communication are learning (#92).

Observing other people's mini-hompis, I learn how to live, how others live, how to deal with others, what others think on a particular subject, and why they think differently from me (# 65).

# 4.2. Participants' Definition of Learning and Perception of Blogging Activities

Then, what does create the difference between the participants' responses about learning? One's definition of learning, as discussed in the earlier section, can in fact vary, depending on his or her individual and personal perspectives. This aspect was true for the participants of this study.

As presented in Table 2, the study findings suggest that four different groups can be categorized based on the link between the participants' perception of learning and their perspective when defining blogging activities.

Table 2. Definition of Learning and Perspectives of Those Blogging Activities I [	13]	
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Do Participants See Blogging Activities as Related to Learning?	Numbers	How do Participants Define Learning?	Number
YES	61	Learning as Acquisition	36 (59%)

<sup>&</sup>lt;sup>13</sup> Three participants did not answer the question asking for a definition of learning.

	$(1)^{13}$	Learning as Reflection	25 (41%)
NO	36	Learning as Acquisition	29 (81%)
	(2)	Learning as Reflection	7 (19%)

The first group (36 participants) believed that learning occurred in their blogging activities and learning meant the acquisition of specific knowledge, skills or information while the second group (25 participants) that included blogging activities as a part of meaning-making experiences defined learning as being broader than the first group, including experiencing a reflective process and/or meaning-making experience. The third group (29 participants) did not think that any learning-related activities occurred in their Cyworld activities and defined learning simply as the acquisition of specific knowledge, skills, or information but the last group (7 participants) did not view blogging activities as meaning-making experiences, but did accept the broader definition of learning as consisting of a reflective process.

On the other hand, Table 3 reshapes the responses of participants in terms of their definition of learning.

Definitions of learning	Numbers	Do Participants See Blogging Activities as Related to Learning?	Number (%)
Learning as	32 (33 %)	Yes	25 (78%)
Reflection		No	7 (22 %)
Learning as	65 (67 %)	Yes	36 (55 %)
Acquisition		No	29 (45 %)

**Table 3**. Definition of Learning and Perspectives of Those Blogging Activities II

As described in Table 3, only 33% of the participants defined learning in a broader sense as "reflection" (meaning-making) while the majority of the participants (67%) defined learning as "acquisition" (particular knowledge acquisition and its application) Furthermore, the most of participants who named learning as a meaning- making process (78%) perceived learning occurred through their blogging experience while only 55% of the participants whose responses were that learning should simply mean an acquisition process (67%) believed that learning took place in blogging activities. The results show that blogging experiences in Cyworld make it possible for the bloggers to use it with purposes of learning especially when they possess a broader definition of learning: learning as meaning-making process. Finally, focus interviews following up with a written survey questionnaire revealed more strongly their view on learning supports a reflective process; more they find blogging activities as meaningful and constructive experiences. In turn, these bloggers were more active to develop blogging into meaning-making activities and integrated them into their own reflective course.

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## 5. Discussion and Conclusion

As seen in findings, even if bloggers involve in the same blogging activities, depending on how they characterize learning, they seem to have different experiences. Identifying learning as a reflective process helps users more classify a certain activity meaningful which results in having users' more active in developing the course for life-reflection. Meaning making is certainly produced in collaborative, interactive contexts, and situationally interpreted through blogging activities. Hence, the blog is an ideal space to generate meaning-making opportunities. As Kolb [5] mentioned, not all adults learn from their life experiences. Learning does happen when learners actively make sense of an experience and link it to previous learning through reflection and integration of prior learning. Accordingly, sustaining conscious efforts for reflection is the very important first step in having a certain, even fun-oriented activity value-fulfilled. These studies suggest that the prerequisite for this is to have a more unrestrained view and definition on learning. For example: When learning is assumed to be acquisition, the teacher will understand himself as a provider of knowledge and the learner merely as a consumer, otherwise the learner would be centered to build up a further developmental course well.

The different positions and concepts of learning reflect fundamental issues of epistemology and the bloggers' different cultural and societal backgrounds. Beyond the differences outlined here, we assume that concepts of learning, prior knowledge and person's personal experience are crucial to maximize one's activity meaningful and productive.

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## **PARALLEL SESSION #5**

## TECHNOLOGY-ENABLED EDUCATION IN JORDAN

#### Evaluation of the Efficacy of a Courseware for a University Course in Computer Science

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#### Abstract

During the past decade, considerable attempts have been made at the Jordanian universities to integrate information technology in their teaching and learning systems. However, the Jordanians' research on the effects of teaching and learning with technology on students' achievements is very limited to guide researchers, educators, and legislators in Jordan in establishing environments that will promote learning for students. Particularly, there were only two known studies conducted by Akour (2006, 2007) attempting to investigate the effectiveness of Computer-Assisted Instruction (CAI) with college students enrolled in an introductory computer science course. A newer version of a courseware in Arabic language called Information Technology for Beginners (ITB) was developed to investigate the difference between two groups, traditional instruction plus CAI versus traditional instruction alone, who were given a pretest and a posttest to measure achievement of an introductory computer science course objectives. A Quasi-experimental, nonequivalent control group design was utilized. An analysis of covariance on the posttest scores with pretest scores as the covariate showed that the traditional instruction plus CAI group performed significantly better than the traditional instruction alone group with a large effect size. It was concluded that traditional instruction plus CAI format should be considered as a substitute to the traditional instruction alone format.

#### **1. Introduction**

During the past decade, rapid advances in information technology strongly increased the interest of Jordan's Ministries of Education and Higher Education in the use of technology for instructional purposes. The two ministries realized that traditional methods of instruction are not preparing students with a competitive educational foundation to endure the pressures of such a technologically reliant society. According to the USAID (2004):

In July 2003, the GOJ launched the Education Reform for the Knowledge Economy (ERfKE) initiative. This five-year, \$380 million program, developed with USAID assistance, is one of the most ambitious education reform programs in the Middle East and North Africa region to date. The goal of Jordan's education reform program is to re-orient education policy, restructure education programs and practices, improve physical learning environments, and promote learning readiness through improved and more accessible early childhood education.

However, the Jordanians' research on the effects of teaching and learning with technology on students' achievements is very limited to guide researchers, educators, and legislators in Jordan in establishing environments that will promote learning for students. Particularly, there were only two known study conducted by Akour (2006, 2007) attempting to investigate the effectiveness of CAI with college students enrolled in an introductory computer science course. This introductory course in computer science provided a general introduction to the information technology concepts, numbering systems, hardware, software, networks, Internet, and multimedia. It was taught in a traditional format where much of the learning comes from reading the textbooks, attending instructor-led classes, and computer lab assignments. However, in recent years, computers and communications technology have drastically transformed the delivery medium of instruction. For example, the development of CAI is one of the most rapidly advancing and interesting medium of instruction in recent years. Therefore, it is worthwhile to explore the effects of CAI on Jordanian college students' achievements.

#### 2. Review of Literatures

Throughout the past two decades, a huge number of researchers in various fields (e.g., personnel psychology, English, nursing, math, physical education, science, information technology) from around the world have become increasingly interested in the effectiveness of technology on students outcomes (e.g., Brown, 2001; Chen, 2005; Chang, 2002; Jantz, Anderson, & Gould, 2002; Matheson, 1990; McKethan, Everhart, & Stubblefield, 2000; Yildirim, Ozden, & Aksu, 2001; Akour, 2007). As a result, many meta-analyses studies were conducted to review and synthesis the outcomes of these studies. For example, 42 studies that involved college students were examined for the effect of CAI on students achievement in science education when compared to traditional instruction and found a small effect of .27 (Bayraktar, 2001-2002).

Overall, most of the CAI research studies reported small positive effect of CAI on the achievement of students at different educational levels and most them were done in the United States of America. The purpose of this study was to address the following research question using a quasi-experimental design: Is there a significant difference in achievement scores between college students who receive traditional instruction plus CAI and those who receive only traditional instruction in an introductory computer science course? Based on this research question, the null hypothesis was declared that there was no significant difference among the adjusted means on the dependent variable.

#### 3. Method

#### 3.1 Research Design

This study utilized a quasi-experimental, nonequivalent control group design that is a suitable alternative to an experimental design when randomization is not possible (Cook & Campbell, 1979; Gall, Borg, & Gall, 1996; Huck, Cormier, & Bounds, 1974). The nonequivalent control group design can be utilized as a nonequivalent comparison group design in which two treatments are applied (Huck et al., 1974). Since the subjects in this type of design were not randomly assigned, intact classes of students were randomly assigned to either the experimental group or the control group where both intact groups took pretest and posttest. The nonequivalent control group design is illustrated in the following diagram:

01	XTI	02	Where:
01	XTIC	O2	O1 = pretest O2 = posttest, respectively XTI = traditional instruction XTIC = traditional instruction plus CAI = lack of pretreatment sampling equivalence

#### **3.2 Educational Courseware Development**

To develop the educational courseware entitled "Information Technology for Beginners" (ITB) Version.2, the researcher designated a team of three computer programmers, one instructional designer, four subject matter experts, and one Arabic language specialist. The ITB language of instructions was in Arabic. The design of the educational courseware was based on Smith & Ragan's (2005) Instructional Design Process Model (Analysis, Strategy, and Evaluation), Alessi & Trollip (2001) Model for Design and Development (Planning, Design, and Development), and Te'eni, Carey, and Zhang (2007) Human-Computer Interaction Systems. ITB was mainly developed using Macromedia Authorware 7.0 and was implemented on an IBM personal computer platform. It contained seven sections, each of which had many lessons, interactive exercises, guizzes, summary, and glossary. The topics of the seven sections were (1) Information Technology Concepts, (2) Numbering Systems, (3) Hardware, (4) Software, (5) Networks, (6) Internet, and (7) Multimedia. The content of these sections were based on the available textbooks used to teach the course in a traditional method. To promote active learners participations and address their different learning styles, the ITB's multimedia elements included interactive activities and quizzes, audio, video, graphics, text, and animation. The activities and quizzes are programmed with the correct answers and feedback.

The design of the navigational icon options gave users full control where to go within courseware (i.e., go to main menu; go to current section menu; go back a page; go forward a page; exist). A database was built into the courseware to record students' transactions (i.e., exams and quizzes scores, data and time of using the courseware, completed levels) and perform quantitative performance assessment. Additionally, ITB featured 50 questions achievement test generated randomly and provided immediate feedbacks to the learners regarding their achievement test scores. During its development it was subjected to a formative evaluation by an expert review panel and a student review

panel. Summative evaluation was also conducted by two pilot studies using a quasiexperimental design.

#### 3.3 Participants

The convenient sample consisted of college students at the Al al-Bayt University, Mafraq, Jordan. Participants in this study were enrolled in the Computer Science-1 course that is a university required course for all undergraduate students. For the purpose of this study, two intact sections were randomly selected and assigned randomly to either a control group (traditional instruction; N=25) or an experimental group (traditional instruction; N=25) or an experimental group (traditional instruction; N=25). A total of 52 students participated in this study.

#### 3.4 Instrument

To assess students' achievements in the experimental and control groups, the Computer Science-1 Achievement Test (CS1AT) was developed. The developed CS1AT was based on the university Computer Science-1 placement test and the course objectives. The CS1AT consisted of 50 multiple-choice items and each item had four alternative answers. Each correct answer was worth 1 point, and each incorrect answer was 0 point. Content validity for the CS1AT was established through a formal review by a panel of 8 experts. The Kuder-Richardson Formula 20 Reliability Coefficient (KR-20) was used to measure the inter-item consistency (Alpha = 0.88). The Pearson Test-retest reliability coefficient was 0.83.

#### **3.5 Procedures**

This study was conducted during the 2006-07 school year. All participants in both groups completed a pretest before the treatment at the same time and settings. After the pretest, the control group started learning the materials through traditional classroom instruction which included lecture and lab assignments with fifty percent of the time being lecture and fifty percent for lab assignments. The traditional media of chalkboard was used to assist in the presentation of the instructional materials. In contrast, the ITB replaced approximately 20 minutes of the traditional instruction for the experimental group in each class meeting, totaling 16 hours for the semester, of which students completed computerized lessons and exercises. After learning concepts in lecture, the instructor showed the experimental group how to learn more about the concepts using ITB. For instance, students learn the parts of computer hardware from the instructor and then they are instructed to learn in more details about those parts interactively using ITB. Additionally, copies of the ITB courseware were distributed to the experimental group to use at home at their preference.

Each group received an equivalent amount of instructional time. The duration of the study was for a full semester of 16 weeks with three hours of classroom instruction per week. A posttest was given at the end of the semester to both groups. Completion of the course requirements was mandatory for both groups.

#### **3.6 Statistical Analysis**

In the present study, the covariate was the scores on the pretests; the independent variable was the instructional format, (i.e., traditional instruction plus CAI or traditional instruction alone); the dependent variable was the scores on the posttest. The statistics that were applied to analyze the data consisted of descriptive statistics and a one-way analysis of covariance (ANCOVA), using general linear model (GLM). SPSS 15.0 (Statistical Package for Social Sciences) was used to analyze the data. Descriptive statistics were applied to summarize achievement scores (i.e., pretest and posttest) of the course by method of instruction and to verify that the samples are normally distributed. To deal with the main threat to the internal validity of a nonequivalent control group design, ANCOVA was applied to decide if group means differed significantly from each other due to the treatment effect not the pre-existing group differences, with the pretest as covariate. Prior to using ANCOVA, assumptions of homogeneous regression coefficients and linearity of Y on X were examined and found to be appropriately met. To evaluate the treatment effects, the effect size was calculated for the instrument. F values were assessed for significance at alpha = 0.05.

#### 4. Results

Table 1 shows the descriptive statistics of students' achievements scores on the pretest and posttest. No momentous difference noticed on mean pretest scores between the experimental group (M= 18.296) and the control group (M=20.00). To adjust for differences in pretest scores ANCOVA was applied using general linear model (GLM). Following the adjustment for the pretest as covariate, the adjusted mean posttest scores were 40.326 for the control group and 47.624 for the experimental group, suggesting that students in the experimental group scored higher on the adjusted posttest than the control group.

	N	Pretest		Posttest			
Group		Mean	SD	Mean	SD	Adjusted Mean	Std. Error
Control	25	20.000	6.171	40.800	4.397	40.326	.418
Experimental	27	18.296	4.103	47.185	2.271	47.624	.402

Table 1. Mean pretest and mean and adjusted mean posttest scores

Note. N=number of students in section

According to Huck et al., (1974): "The null hypothesis associated with this analysis is that there no difference among the adjusted means on the dependent variable. A significant F will be found if these adjusted means are far enough apart from one another." Table 2 shows a significant difference between the two groups for the treatment effect, F(1,49) = 156.328, p = 0.000. Thus, the null hypothesis of no significant difference among the adjusted means on the dependent variable is rejected. Overall, the results suggest that the traditional instruction plus CAI format is significantly more effective than the traditional instruction format alone. The effect size index was

calculated from partial eta square ( $^2 = 0.761$ ), which according to Cohen (1988) is a large size effect.

pretest scores as the covariates								
Source	Type III	Df	Mean	F	Sig	Partial		
	Sum of Squares	DI	Square	Г	Sig.	Eta Squared		
Pretest	387.295	1	387.295	90.035	0.000	64.8%		
Group	672.463	1	672.463	156.328	0.000	76.1%		
Error	210.779	49	4.302					
Total	1127.308	51						
* 0.0	\ <i>\</i>							

Table 2. Results of ANCOVA on students' posttest scores with pretest scores as the covariates

\*p < 0.05

#### 5. Discussion

The results of this study suggest that the traditional instruction plus CAI format is significantly more effective than the traditional instruction alone format on improving students' achievements which is consistent with Akour (2006,2007) and Burns & Bozeman (as cited in Kathleen, 1991) meta-analysis findings. However, since the effect size index of this study is large, the results do not support previous meta analysis research that found CAI, in general, produces small positive outcomes on students performance at different educational levels (Christmann & Badgett, 2000; Bayraktar, 2001-2002; Kulik & Kulik's, 1991; Waxman, Connell, & Gray, 2002; Yaakub & Finch, 2001; Blok, Oostdam, Otter, and Overmaat's study (as cited in Waxman et al., 2002)) but support the propositions of instructional theorists in the applications of various instructional strategies, such as the selection of the appropriate delivery medium of instruction, to promote learning (e.g., Bruner, 1966; Merrill, 1971; Briggs, 1977; Gagne, 1979). Since traditional instruction plus CAI format provides students with the opportunity to some control over the sequence of the instructional materials, engages their various senses, learn interactively at their own pace, and learn from the instructor, it is likely this format of instruction leads to more meaningful learning and higher level of achievement than traditional instruction alone format. As a result, the traditional instruction plus CAI format should be considered as a substitute to the traditional instruction alone format.

However, this study has four major limitations that should be noted. First, a convenience sampling was used in which the participants were not randomly assigned to experimental or control groups. Second, the lack of a complete control over the instructors' instructions and the students' learning could have affected the results. Third, the observed large effect size for this study is inconsistence with the previous research results that found, in general, small effect size for group differences in students' overall achievement. Forth, this study involved only a single-institution. Lastly, this is the third known empirical study conducted using CAI with traditional instruction in Jordan.

Despite the limitations, the findings of this study add to the body of research on the benefits of using CAI with traditional instruction. A replication of this study might include more variables and data from other colleges in Jordan. Future studies are needed to explore the effects of CAI on different grade levels and subject areas in Jordan.

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## Sustainability of ICT Integration in Developing Countries: An Example from Jordan

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## Abstract

Educational systems worldwide are vigorously pursuing integrating ICT as a means of staying abreast of the rapid technological changes and the requirements of the knowledge-based economy. The Jordanian education system is no exception. Like many other educational systems, it too has implemented several ICT initiatives. In this paper I draw upon a research conducted in Jordan between 2005 and 2007, which explored the Jordanian educational system's experiences with ICT integration. The study comprised two questionnaires and cases studies. The findings of the study identified several issues at each of the involved levels of the educational system. In this paper I will focus on the success or failure of ICT integration and its impact on the overall adoption.

#### Introduction

Developed and developing countries alike are vigorously pursuing the adoption of information and communication technology (ICT) in order to participate and capitalize on the potential benefits of the knowledge-based economy. The new era has been characterized and shaped by the emergence of ICT and the increasing reliance on networks [1, 2]. A close link has been drawn between the diffusion of ICT, productivity, and competitiveness for countries, regions, industries and firms [3]. With countries having large proportions of their citizens as students at some stage or another, investing in education is often conceived investment in the future. According to Fullan [4], a strong public school system is, the key to social, political and economic renewal in society. Therefore, the integration of ICT across educational systems is deemed to have the potential to ignite the transformation of the society as a whole for the new era. The Jordanian educational system is no exception.

With countries worldwide trying to stay abreast with the technological revolution, ICT integration across educational systems is believed to have the promise for development. However, countries, communities, and individuals differ markedly in their ability to afford and sustain such innovation. For Jordan, such transformation can be an immense challenge due to the country's scarce resources and its young population, as 38% of the population are under the age of 15. Therefore, like many other developing countries, Jordan has secured resources for such large-scale transformation through the assistance of developed countries and aid organizations. However, while upfront spending and effort are essential for ICT integration across educational systems, the sustainability of spending and effort is as crucial for the success of integration.

Education systems in the Middle East and North Africa (MENA) region spend significant percentage of their Gross National Product (GNP) on education. For example, Arab countries spend over 5% of their GNP on education, the highest percentage among all developing countries [5]. The latest figures from the Ministry of Education indicate that in 2006 the spending on education was 4.1% of the country's Gross Domestic Product (GDP) and 12% of the total government budget [6]. At the same time, studies and reports have cautioned that despite the impressive signs of improving education in term of enrolment and access to public education, quality is still a concern. Reports have warned that educational systems in the MENA region are not preparing students to participate competitively in the global market or the workplace after completing their secondary education [5, 7, 8]. A national assessment in Jordan found that students did not meet the educational systems' learning objectives in Arabic, mathematics and science [7]. Changes driven by the pervasiveness of ICT and the transformation of societies towards the information era have implications for the skills required for people to be able to participate in and benefit from the knowledge-based economy. Since early 1990s the Jordanian education system has implemented several educational interventions aiming to integrate ICT across the educational system. However, by the turning of the 21<sup>st</sup> century, the education system has accelerated its adoption of ICT. Motivated and influenced by the general climate in the country and worldwide, the education system launched a largescale national project called *Education Reform for the Knowledge Economy* (ERfKE) accompanied by the Jordan Education Initiative (JEI) in 2003 aiming to update the system for the knowledge-based economy. There has been extensive effort to deploy ICT infrastructure across the educational system. The curriculum has been radically updated in order to become ICT compatible and new e-content are available online on the Eduwave. In addition, the Ministry has adopted several programmes for in-service teacher training, which are directed at three types of proficiency: ICT skills, pedagogical skills, curriculum training. Four main ICT training courses were initially adopted for ICT professional development programmes for teachers: International Computer Driving License (ICDL), Intel Teach to the Future, World Links and iEARN.

Resources for financing ERfKE were secured through partnership between the government of Jordan and international aid agencies as well as the private sector. The contribution of international partners has been substantial, with the World Bank alone providing 32% of the total spending on the project, and the government of Jordan sharing constituting 35%. However, this contribution illustrates the larger picture of educational spending in general. In 2005, the budget of the Ministry of Education was JD332,311,000 (1 JD=1.42\$US) and the contribution of international aid was as high as JD171,660,000 [8] with a percentage of 51% of the total spending on education.

## The Study

The main focus of the study was to investigate *how the nature of the Jordanian education system influences schools' adoption of ICT?"* I utilized a mixed-method approach. I conducted two questionnaires, directed to teachers and principals, in the three regions of Jordan; North, Central, and South. A total of 12 secondary schools were carefully

selected from the three regions through stratification. Rural and urban, as well as boys' and girls' schools were included. Then I followed up with in-depth investigation included two schools as case studies as well as interviews at the several levels of the educational system; schools, regional directorates of education and the Ministry of Education.

# Findings

The massive spending and effort on the integration of ICT became evident. All levels of the educational system were engaged in ICT integration. As indicated earlier, there was big upfront investment and there were various ICT training courses available for teachers. Furthermore teachers were largely interested in these courses. ICDL course had a high profile with 113 (98.2%) teachers reported having undertaken the course and 16 (13%) and 46 (40.8%) for World Links and Intel courses respectively. Teachers were largely receptive to these courses with 110 (95.6%) of them believing in the potential benefits of ICT in their profession after participating in these courses. There was also an overall satisfaction among teachers and principals regarding the ICT training courses and there was an overall support for ICT integration among the vast majority of participants. E-math curricula were also available online for all grades and other curricula and materials were extensively being prepared for other subjects. In addition, all schools had received computer labs in order to facilitate their access to the e-content.

The literature on educational change in general and ICT integration in particular stresses the necessity of the actual implementation of educational initiatives in order to achieve fundamental results [9-13]. Fullan and Stiegelbauer [11] stated that the failure of educational change to achieve its objectives may be related just as much to the fact that it was never implemented in practice. Rogers [12] also stressed that once an organisation has made a decision to adopt an innovation, implementation does not always follow directly and he distinguished between adoption (the decision to use an innovation) and implementation (putting an innovation into use).

In parallel to the massive spending and effort aiming to revolutionize the Jordanian educational system, there was a limited capacity within the system to effectively implement such large-scale reform. It became evident during the course of the study that it was difficult for the educational system to sustain development in all tracks of the reform over time. For instance, in 2003 the "I Love Physics" digital material was developed for grade ten. However, despite the resources and effort spent on developing this material it was substantially underused by teachers. This, according to Salem,

[...] is one of the main things that challenge our [the educational system] efforts for reform in general; we start full of energy and we improve, then what we develop is not implemented and teachers do not use it. (Salem, December 6, 2005)

Furthermore, while the vast majority of teachers had undertaken some form of ICT training, there was apparent absence of follow-up and ongoing support for teachers during their utilization of ICT. Mentors, who are the prime provider of support for

teachers, were overwhelmed by their own responsibilities and the unreasonable numbers of schools and teachers they supervise. In addition, mentors were often removed from their mentoring role in order to reinforce other fields across the education system (e.g. training and authoring), which left teachers without supervision, particularly when they need it most- in classrooms during their implementation of ICT. Ali, the principal of Al Noor School/boys, indicated that mentors *are supposed to provide follow-up, but they are busy with training and digitsation* [...] *they do not have time for follow-up*. (Ali, December 15, 2005) Mentors are expected to visit, support, and evaluate schools. However, this appears to be impossible in light of the large number of schools assigned to each mentor and considering that the school year has 193 working days in two semesters [14]. For instance, Rajab, a mentor from Directorate2, said that *each mentor is responsible from 120-130 schools* (Rajab, December 8, 2005). Therefore, Hassan, a mentor from Directorate1 said: it *would be great if I can visit a teacher once or twice a year* (Hassan, January 19, 2006).

School context and infrastructure also appeared to have direct impact on the adoption of ICT. In terms of quantity and quality, ICT in schools appeared to be troublesome for both teachers and students. In particular, networking problems did not only hinder teachers' and students' access to the available e-content online, but also wasted large proportion of lessons while teachers were trying to overcome such problems. In two different occasions, teachers spent between 10 to 15 minutes, out of 45-minute lessons, on networking problems. Furthermore, it became clear that computer lab coordinators have substantial impact on ICT integration in schools through facilitating or hindering school members' access to ICT. This is particularly evident as the vast majority of schools provide access to ICT only in computer labs. When computer labs coordinator was present during lessons, it was clear that teachers were able to concentrate more on their subject rather than technical issues.

The regional directorates of education hold a key role in the dissemination and sustainability of ICT integration. They are the direct link between the Ministry of Education on one hand, and schools and teachers on the other. However, it appeared that the directorates have limited capacity to support and sustain ICT integration in schools. As noted earlier, despite the crucial role of mentors during the implementation of ICT, their role was confined to administrative visits to schools. The Discovery Schools used to receive between 3 to 5 visits per week during the first year of implementing the e-math. However, these visits dropped dramatically to once or twice a year during the second and third year.

Moreover, maintenance and ongoing technical support for teachers and schools were also slowing ICT integration. It was reported that the process required to maintain ICT could take excessive time, which hinders the ultimate utilization and benefit from these tools. This delay often caused frustration and disappointment among teachers. The lengthy time for maintenance and replacement of the ICT resources was associated with the bureaucracy within the system as well as the limited capacity within the regional directorates to provide ongoing and timely support for ICT in schools. Ziad, from Directorate1 in Amman, indicated that his department could not cope with pressure and demand from 160 schools with only 3 or 4 technicians. He reported that it might take *a* week or more to find transportation to reach schools due to bureaucracy and shortage [of resources] (Ziad, November 2, 2006).

# Discussion

The study highlighted the need for a holistic approach for ICT integration; one that includes all venues of the educational landscape (e.g. training, infrastructure, curriculum, and follow-up) in order to attain fundamental outcomes. The integration should focus on all areas of the educational system as focusing on developing certain venues at the cost of others might not lead to fundamental achievements. For example, developing new materials and curricula should not be at the cost of follow-up for teachers by removing mentors from their mentoring role. In addition, while ICT training is vital for teachers' utilisation of ICT, it remains ineffective if teachers return from their training and are not supported in putting into practice what they had learnt.

Moreover, the bureaucratic nature of the educational system makes it vital for all levels of the educational system to work together effectively in order to achieve effective implementation of ICT. Each level of the system has its vital role and responsibilities during the implementation which can influence ICT integration. It became evident that that practices in classrooms are influenced by the performance of all other levels of the educational system including schools, directorates of education and the Ministry of Education.

The Jordanian educational system's decision to integrate ICT was necessary and effective in creating the political and public climate for ICT integration. In addition, the decision was successful in generating remarkable support from international and local partners which secured resources for the launch of ERfKE and the JEI. However, while providing schools with a reasonable number of computers is necessary, these computers can become worthless if they are not used due to non-functionality or the lack of proper technical support and maintenance. Similarly, providing schools with Internet and intranet connections is a prerequisite for school members to access the e-content. However, this connection might become a burden if the connection is not fast, stable, and reliable to access the e-content. In addition, ongoing ICT professional development is needed for teachers to stay abreast of the changes around them and to refine their skills and application of ICT. However, follow-up and ongoing support are integral to the success of their implementation of their newly developed skills during ICT training courses in real teaching/learning environments.

A successful ICT integration is one that is sustainable. One of the main defining features of ICT integration in education is the significant recurrent cost due to replacement and update as well as teacher professional development. It is plausible, and might be inevitable, for an educational system with scarce resources, like Jordan, to seek external assistance and support in order to launch a large-scale educational intervention. However, the whole intervention can be in doubt when extensive efforts and resources are spent during the launch of the intervention while additional resources and effort are not secured to ensure sustainability of all stages and parts of the intervention. Teachers' and schools' adoption of ICT can be underpinned by ensuring sustainable and adequate access to e-content, follow-up, professional development, ICT infrastructure, technical support and maintenance.

It became clear that ICT adoption in schools was directly influenced by the performance of the regional directorates and their role in providing schools with ICT, conducting ICT professional development, follow-up, technical support and maintenance. However, the directorates are bonded to the executive body of the educational system and they implement the Ministry's large plans and top-down initiatives. Conceivably, the dissemination of interventions across the educational system, through directorates and schools, can reshape and modify the original version of the initiative as it was adopted by the Ministry. This is a central aspect of centralised educational systems where all parts of the system are tightly attached to its centre. However, lengthening the process between planning and implementation can result in fundamental modification to the original version of the educational intervention. This was particularly evident in cascading ICT training courses where a core team from the Ministry of Education train a core team from each regional directorate and this team trains mentors and trainers in their regions then to be passed to teachers in the field. It was reported that this mechanism was ineffective due to fundamental modifications which might occur during the process of cascading ICT courses. Basil reported, from his own experience, that this model of disseminating ICT training courses did indeed significantly change the essence and contents of a training course that he developed in the past (Basil, December 13, 2005).

The mentors' role may become more efficient and receptive to teachers' and schools' needs when they are given more autonomy. Due to their closeness to the actual implementation of ICT in classrooms, mentors can determine individual teachers' levels of ICT competence and adoption; therefore, they hold the best position to make timely intervention which targets individual teachers' needs regarding ICT implementation. Therefore, mentors can design or assign ICT training courses for teachers according to their individual needs instead of relying on one-size-fits-all approach adopted by the top-down strategy. However, when mentors are extremely overloaded and lack the knowledge, their role might be trivialised and confined to superficial visits without being able to provide proper support and follow-up for teachers during their implementation of ICT.

Mentors can also play an effective role in linking teachers at two levels: subject teachers in the same school and subject teachers from different schools. Usually, when a new innovative idea is adopted or invented by an isolated number of teachers in a particular subject in one school, it becomes necessary to cross-fertilize such ideas across groups in the same school as well as across other groups from other schools. Mentors might also create clusters of schools in which experiences, ideas, training and technical support are exchanged among schools' members in each cluster which might harmonise the integration of ICT among teachers and across schools. They might also create communities of practices for teachers within which they share their experiences with their colleagues teaching the same subject and reflect upon their own practices. The directorates of education can play this *networking* role in order to facilitate the flow of educational practices from one school to another in a given district which might create *pools* of adoption instead of isolated practices by individual teachers, especially early adopters in each school.

In this regard, the directorates can organize and maintain virtual communities for teachers in which they can interact and cooperate online. Considering that connectivity has reached the vast majority of schools, adequate access in schools and less load assigned to teachers during the school hours can facilitate their interaction and cooperation. Discussion forums and email lists can facilitate and encourage teachers' cooperation and interaction, which can reflect upon their own professional lives. Such interaction and cooperation can help teachers to address and discuss their daily problems during their utilization of ICT.

Considering the heavy reliance on external aid, capacity building is also vital for the sustainability of ICT integration. The effectiveness of any reform project involving external fund should dedicate sizeable effort for capacity building in order to be able to carry on if the aid ceases or disrupted.

## Conclusion

In conclusion, while an adequate access to ICT is a prerequisite for ICT integration, the contextual factures within the education system can also decide the success or failure of the integration. The educational system's capacity to sustain the intervention along all its tracks and stages is vital for accomplishing fundamental achievements. It became evident that the success of an intervention aiming to integrate ICT across an educational system is a complex interaction of the innovation with the educational system in the local context.

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# Preparing Jordanian Teachers to Face the Challenges in Applying Information and Communication Technology in Education

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## Abstract

For the past five years, the legislators of the Ministry of Education in Jordan continue to reform the curricula and acquire new technology for preparing the new generation to compete in an emerging information-based global economy and be effective and productive citizens. Despite the increased access to computers, Internet, and related technologies for both students and teachers, our educational system is still experiencing difficulty in effectively integrating these technologies through the reformed curricula. The lack of a training teacher program on using technology in curricula is one of the greatest barriers to changing teachers' pedagogical beliefs and practices. This paper introduces an experience carried out during the last year at the University of Jordan to train school teachers on using and applying technology through the curricula. A one year intensive practical training program, entitled "Information and Communication Technology in Education" (ICTE), has been modeled after the accredited graduate program in Information Technology offered by the College of Education at Ohio University. During this experience a total of 350 participants have been trained on cutting-edge software packages to be used through the school curricula in Jordan. By next year the program is going to be revised and expanded to cover neighboring countries in the region.

## 1. Introduction

During the past decade, the Ministry of Education in Jordan initiated a national strategy to increase access to information through new technologies. The new strategy aimed at preparing students and teachers to compete in an emerging information-based global economy effectively and productively. The new era of using the new information and communication technologies (ICT) (such as; computers, software, Internet and networks) promoted an urgent need to reform the classroom curricula to be integrated through the new technology.

Faced with the challenge of improving the teaching/learning process, many public and private schools in Jordan turned to the extensive use of computer technology and the Internet. The trend has caught many teachers not adequately prepared to use technology in their teaching. Even those teachers, who received some training in technology through

and knowledge of technology. Today, we might have spent a lot on computer technology, but we have forgotten our teachers untrained on how to use the technology. Although some of our schools are equipped with the best hardware technologies (such as; computers, whiteboards, data shows, touch screens, etc.) and educational software packages covering different subjects along with access to the Internet; we won't see much difference in the teaching/learning process unless our teachers know how to use and integrate the computer technology in the curricula they teach. The benefits to students increasingly will depend on the technological skills, which their teachers are able to learn and use to change their pedagogical beliefs and practices.

In 2006, and as part of its mission to serve the community, the University of Jordan along with the University of Ohio and the Arab Group represented by Al-Faisal International Academy in Saudi Arabia signed a partnership agreement to develop a high diploma program in Information and Communication Technology in Education (ICTE) [1, 2].

The ICTE program is modeled after the College of Education's accredited Instructional Technology graduate program. The program has been developed as a respond to the urgent need for training teachers on information and communication technologies in schools in Jordan and next to be exported to the entire neighboring countries after a year.

As of today, the ICTE program has over 350 participants from both public and private schools. They are being trained on cutting-edge software packages to be used through the school curricula in Jordan. Around 200 participants are expected to graduate on September 2007. The continued goal of this intensive practical training program will be to incorporate these technological skills into the teachers' daily life through well-prepared courses.

# 2. ICTE Background

As the interest of integrating the new technology into classroom curricula grows and more schools get connected to the Internet, training school teachers to use these technologies in an efficient way becomes an essential goal for decision makers in Jordan at the highest level. The idea of developing the Information and Communication Technology in Education Diploma (ICTE) came as a response to the urgent need for training teachers on information technology in schools in Jordan and the close region. An agreement on mutual cooperation involving the Arab Group represented by Al- Faisal International Academy in Saudi Arabia, the University of Jordan and the University of Ohio has been agreed upon in order to establish this program [2].

## 2.1 ICTE Objectives

The following objectives were in mind when the ICTE training program was initially introduced. Among these objectives are the following:

- 1. To develop teachers who are committed to the pedagogy and understanding the roles of technology in preparing the new generation of Jordanian students to compete effectively in an information society.
- 2. To upgrade teachers' knowledge/skills in using new technology in the teaching/ learning process.
- 3. To develop bi-lingual (Arabic/English) pilot training courses for effective use by teachers whose mother tongue is Arabic.
- 4. To disseminate the developed courses in the form of printouts, electronic material delivered through the Blackboard<sup>TM</sup>, CD-ROMs, whiteboards, PowerPoint presentations, and in the nearest future through video tapes.
- 5. To develop the program at the local and regional levels.
- 6. To reach out teachers all over Jordan and within their environments and schools to introduce the program and its benefits.

# 2.2 ICTE Program Development

To implement the ICTE program, the following activities were undertaken:

- 1. The first activity was planned through two consultative workshops held in August and December 2006 at the University of Jordan for developing a master plan to implement the program objectives. The workshops participants were teaching experts from the University of Ohio and the University of Jordan. The workshops identified the topics of the courses to be taught and how to teach them. The program has 10 courses (a total of 30 credit hours) and lasts for one academic year. These courses were modeled after the accredited graduate program in Information Technology offered by the College of Education at Ohio University. Almost 60% of the program is focusing on practical training.
- 2. Because the major language of our participants is Arabic, the next activity saw the development of bi-lingual (Arabic/English) courses prepared by expert teaching staff at the University of Jordan. After the courses were finalized, there contents were published on Blackboard<sup>®</sup> in addition to supplementary examples, practical exercises, essays, further readings, etc.
- 3. The courses of the program, including the final project were developed to affect at two main categories:
- 3.1 *The conceptual courses* (12 credit hours): These courses introduce the participants to the basic concepts of understanding the role of technology in pedagogy. They include the following courses (as shown in Table 1):

	Course Title		Course Title
1	Principles of School Curriculum	3	Instructional Design
2	Learning and Teaching Strategies	4	Assessment Techniques

# Table 1. The conceptual courses

3.2 *The application courses* (15 credit hours): These courses are the core of the training program. They aim at introducing the participants to the software packages usually used in integrating information and communication technologies in the classroom curricula. They include the following courses and software packages (as in Table 2):

	Course Title	Software Package
1	Technology Applications in	Windows <sup>®</sup> , Word <sup>®</sup> , Excel <sup>®</sup> , Access <sup>®</sup> ,
	Education	PowerPoint <sup>®</sup> , Publisher <sup>®</sup> .
2	Internet Applications in	Adobe Dreamweaver <sup>®</sup> .
	Education	
3	Instructional Multimedia	Macromedia Flash <sup>®</sup> & Authorware <sup>®</sup> .
4	Graphics Design for Visual	Adobe Photoshop <sup>®</sup> .
	Media	
5	Programming Concepts for	VB.Net <sup>®</sup> .
	Teachers	

 Table 2. The application courses

- 3.3 *The final project* (3 credit hours): The project was carefully planed to utilize what the participants have learned during the whole year. It aims at helping them to integrate the new technology through the classroom curricula they teach. The project has three stages:
- 3.3.1 *The preparation stage:* The participants are introduced to the goals and expectations of the project. Ideas, thoughts, discussions are the main characteristics of this stage. Each participant is encouraged and motivated to write a proposal on how information and communication technologies can be applied to improve his teaching skills in the curriculum he is teaching.
- 3.3.2 **The design stage:** By now, the participants have been introduced to the basic educational concepts and received training on how ICT can help to improve the teaching/learning process. At the end of this stage, the participants' ideas are explored and revised on one-to-one bases. The objects to be used in the project are identified. A prototype is designed and made ready to be implemented.
- 3.3.3 *The implementation stage:* This is the mile-stone stage, where the participants have to implement the ideas into real products using all what they have learned during the program. The project is discussed and assessed at the end of the program.

# 2.3 ICTE Training Strategy

All the way through training, and to overcome the fears of inadequacy, participants have been encouraged to be committed to the following strategy:

- 1. Pinpoint their deficiencies when they don't know how to do things and not to be afraid to ask for help.
- 2. Share their knowledge of computers and Internet with their colleagues.
- 3. Ask their mentors and colleagues for help.
- 4. Integrate what they have learned in the curriculum and get feed back from their students.
- 5. Find out what their students know about technology and ask them for help.
- 6. Set weekly goals regarding familiarity with technology.
- 7. Use e-mail and contact people having similar experiences.
- 8. Discuss issues, ideas, and suggestions with other people in the same field.

# 3. Geographic Distribution of the ICTE Participants

The new ICTE high Diploma program was established during the last year. It attracts teachers coming from major cities in Jordan including the capital city "Amman", "AzZarqa", "Salt", and "Ma'daba". Soon the program will be extended to have participants from all over the country and exported to neighboring countries (see Figure 1). Most participants coming from public schools are sponsored by the Ministry of Education, whereas participants from private schools are not financially covered. In addition, we have some participants who are not teachers, but they have shown interest in the program. Those applicants are working in fields related to education such as librarians, book-sellers, publishers, etc. The tuition of the one-year program is around 2,000 JDs (around \$2,500).

Figure 2 depicts the distribution of our schools according to statistics obtained form the ministry of education during 2005/2006 [3]. The public sector occupies around 57% of the total schools, while the private sector fills 39%. A reach out plan has been made to extend the program to attract teachers from those major sectors. Agreements with the Ministry of Education to train more teachers from all over the country have been put to work. Figure 3 shows the distribution of teachers that the ICTE program is targeting in the nearest future. A major concentration is now focusing on teachers from public and private sectors as they fill around 93% of the teaching capacity in Jordan. Figure 4 shows the distribution of Jordanian students who will benefit from the program if their teachers get the required training and skills.



Figure 1. Geographic distribution of the ICTE participants (phase I)



Figure 2. Distribution of schools

(Data source: Jordanian Ministry of Education 2005/2006 [3])



Figure 3. Distribution of teachers





(Data source: Jordanian Ministry of Education 2005/2006 [3])

## 4. Distribution of the Current ICTE Participants

Within a short period of time and since it was first announced at the web site of the University of Jordan, the ICTE program started with 210 participants. By the spring semester of 2007, the total enrolled were around 350 students/teachers who are working hard to finish the program. Although, the number is less than 1% of the targeted Jordanian teachers that we plan to reach in the future, the current participants are way beyond what we expected for the pilot testing phase. By September 2007 around two

hundred participants are expected to finish the training requirements and graduated with a high diploma (a degree after the bachelor and before the master) in ICTE. The new graduates will facilitate the integration of technology through curricula and train their colleagues.

Our participants need considerable training time outside the school hours so they can concentrate on coursework and training objectives without having to deal with the normal school day demands. Therefore, the ICTE program is provided outside or away from the normal school hours. All classes are offered on Thursdays evenings and Saturdays, so the teachers have the freedom to learn and practice.

Figure 5 depicts the distribution of the participants according to their ages. It shows that around 60% of the participants are over 30 years old. Although training time varies according to individual's previous knowledge of computers, age, mood, as well as other factors, we set the time required for training as whatever satisfies a teacher's need to learn and grasp the concepts to effectively use the computer as both a personal and educational tool.



Figure 5. Age distribution of the ICTE students

The distribution of the participants according to their previous knowledge in computers is shown in Figure 6. Around 80% of the participants have good or below knowledge of using computers, which emphasizes the importance of such a training program.



Figure 6. Previous knowledge of using computers

Concerning their use and knowledge of the Internet, Figure 7 shows the previous knowledge of the participants in using the Internet. Only 40% of the participants know how to seek information directly from Internet sites or through search engines like

Google. The majority of the participants were passive users; where they only know how to navigate through web pages.



Figure 7. Previous knowledge of using the Internet

In Figure 8 we show the amount of hours spent by the ICTE participants on the practical training of two major courses, namely, Graphics Design for Visual Media and Internet Applications in Education offered last year at the University of Jordan. The software packages used in teaching these courses are Adobe Dreamweaver and Adobe Photoshop, respectively. The data was obtained by closely observing the progress of 200 participants during the academic year 2006/2007.



# Figure 8. Distribution of time spent by participants to design documents using Adobe Dreamweaver<sup>®</sup> & Photoshop<sup>®</sup>

Although some of the students were slow in grasping the concepts and showing progress at the beginning of the program, but at the end of the second semester 2007 they have shown improvements as they have implemented what they learned in the final project.

## 5. Technical Resources

This experience has been done using the resources available at the Computer Labs in King Abdullah II School for Information Technology (KASIT) at the University of Jordan. Practical courses were offered in ten computer labs each equipped with forty top-technology computers with Internet connection and multimedia capabilities. Each participant has been assigned a user-account to access the Internet, as well as a Blackboard<sup>TM</sup> account used for the supplementary material and the in-class activities. In addition, the software resources (shown in Table 3) were mainly used by the participants.

E-mail	Microsoft Outlook
Microsoft Office	FrontPage <sup>®</sup> , Word <sup>®</sup> , Excel <sup>®</sup> , Access <sup>®</sup> , PowerPoint <sup>®</sup> ,
	Publisher®
Internet Browser	Internet Explorer
Authoring Packages	Adobe Dreamweaver, Adobe Photoshop, Macromedia Flash,
	Authorware, and Moviemaker

Table 3. Software resources used in the ICTE training program

# 6. Conclusions

In this paper we have described the challenges facing the teachers and the students in an evolving information-based global society. To cope with the new technology, it is not enough to equip our schools with the top-technology computers, software, and network connections. The new era requires changes in the way we teach and learn and hence, it requires changing our teachers' pedagogical beliefs and practices. Therefore, our teachers should not left behind and they should be trained on how to use and integrate the new technology in the curricula they teach. We described a training program, named ICTE, established at the University of Jordan for training teachers on the use of technology in education. The program now is one year old and is training 350 participants on cuttingedge material to develop and improve their skills in using technology in education. The main problem we faced during this experience has been how teachers should adapt and integrate the materials they learned to be used through the classroom curriculum. Now, we are very optimistic that this new ICTE program will result in new visions and positive attitudes toward using new technology in education in Jordan. By August, 2007 around two hundred teachers are expected to finish the training requirements and graduated with a high diploma (a degree after the bachelor and before the master) in ICTE. The new graduates will facilitate the integration of technology through curricula and train their colleagues. By next year the program is going to be revised and expanded to cover the entire Middle East region.

## 7. Acknowledgments

We would like to acknowledge the hard working of Dr. Ahmad Sharieh and our colleagues at KASIT for their efforts and enthusiasm for making the ICTE a success story. Also we would like to acknowledge the hard working of the ICTE administrative.

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# **Beyond Traditional Lecturing: Interactive Computer-Based Classroom**

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## Abstract

In this paper, we describe a bi-lingual (Arabic/English) Interactive Computer-Based Classroom system that has been developed to enable students within the campus of the University of Jordan to interact electronically with the lecturer's computer, where lecture notes are available for projection. The new system aims at exploiting the potential of computer technology for improving the way we teach and learn. It enables the lecturer to improve the organization of the course material, present lectures and give a means of simplifying extensive content. Also, it allows the instructor to monitor students' activities through receiving immediate feedback regarding how well they have learned the material in an interactive way. For students, the new system encourages them to participate and complete the coursework with more variety in learning experience, such as answering questions directly, taking quizzes, downloading audio and video files, reviewing past lectures, uploading due assignments and many other interesting tasks. Our system comes at low cost. It has the advantages of being flexible, easy to use, and has the ability to run at any place within the campus where a networking connection is available. We intend to use it in most of the computer labs.

#### 1. Introduction

Many educational institutions in Jordan, as well as in the regional countries, are still using traditional paradigms for teaching and learning. The conventional chalkboard sis still used heavily as the main tool for teaching. To cope up with cultural changes and emerging technologies, significant pressures on higher education have been placed to become more productive. Consequently, integrating digital technology across the curricula has become a necessity [2, 7].

According to cognitive psychology and how information is stored in memory, instructional designers must find ways to make learning relevant and meaningful enough for the learner to make the important transfer of information from short-term to long-term memory [7]. Cognitive psychologists agreed that learning is more productive when the acquired knowledge occurs in an interactive environment. Experimentally, it was found that students attending interactive lectures learn more than students attending a traditional one [5, 6, 10]. This is because students in an interactive environment do not spend the time in writing and copying the material from the board as the case in traditional

classrooms; instead, they spend the time in thinking, understanding and asking questions [4].

Efficient learning techniques became mandatory to keep up with the demand of productive learning. Significant improvements in computational power, networking bandwidth, storage capacity and graphical user interfaces, have dramatically changed the way we teach and learn. New teaching methods, such as long-distance and virtual learning, where students are separated in space and/or time, become increasingly common in many universities and educational institutes [2, 3, 4, 8].

Another direction to enhance the productivity of education is *electronic classrooms*. They became widely common these days and they have been installed in many universities and colleges all over the world [5]. Electronic classroom or simply "E-classrooms" is equipped with technologies that capture classroom activities, allow for audio and video recordings of lectures, slides presentation, and capture the notes written by the lecturer. Class material are made available all the time. They can be accessed and reviewed by students for missing parts, studying difficult concepts or to prepare for exams [4].

The rest of this paper is organized as follows: in the next section, we discuss the aim and motivation behind our project. Then we go over the detailed description of our Interactive Classroom and its features. Finally, we wrap up with a conclusion and directions for future work.

#### 2. The Aim of the Project

Teaching at King Abdullah II School for Information Technology (KASIT) at the University of Jordan is classical. Lecturing is based on electronic presentation using PowerPoint<sup>TM</sup> slides. Classrooms are equipped with ceiling-mounted projectors and whiteboards for writing notes. A typical lecture is around 50 minutes and has around 50 students. The classroom is the only place where students can learn and take notes. Lecture notes, in most cases, are not made available outside the classroom. Recently, KASIT starts offering few courses through Blackboard<sup>TM</sup>, but yet not as efficient and utilized as required. The reason behind this is the high running cost of the system, while it serves only a thin slice of the huge community of the University of Jordan.

The problem with typical electronic presentations, as the case with PowerPoint<sup>TM</sup> slides, is that they tend to result in using ready-made presentations instead of facilitating the free elaboration of ideas and development of models as it is used to be done on the traditional chalkboard [1,9]. Another weakness of electronic projection of slides is the absence of a means to alter or augment the displayed material during the presentation.

Our proposed *Interactive Computer-Based Classroom* comes with an aim to improve on the unsatisfactory techniques currently available for teaching, support a range of teaching and learning activities, namely presentation and discussion. Our work is focused on presentation by a lecturer and archiving material for students. Our scenario for solving the problem is yet very simple. We aim at utilizing over thirty computer labs distributed around the campus and already equipped with latest computers, servers, and connected over a high-bandwidth network to be used in teaching synchronous multisection courses interactively. This project is not about any kind of real-time long-distance lecturing and it overcomes separations in space by exchanging audio, video, and textual materials at different computer labs. It worth to mention that the project was initiated and developed as a six-month undergraduate project, and it was driven by practical needs and targeted at providing a friendly, easy to set, low-cost Windows/PC-based interactive classroom environment.

#### 3. Motivation

With the increasing number of students seeking high education in Jordan, large lecture sections have become very common, especially at the University of Jordan, with some sections of introductory courses having over 80 students.

The work described here was motivated by the ongoing extension to support a longstanding problem of teaching an obligatory, multi-section course of Computer Skills required by all students at the University. Unfortunately the huge amount of students per section was not very conducive to establish meaningful interaction between students and the instructor. For this reason, the performance of the students was always low and students have to repeat the course more than once. Ideally the instructor of such an important course should be able to move freely about the room to interact as needed with students during the presentation. In addition, it would be beneficial if students could have the possibility of interacting directly with the material being presented.

To address this problem and to provide flexibility while lecturing, we have developed our Interactive Classroom System. In our proposed model the instructor is not replaced, but another dimension is added that greatly improves the efficiency of learning. Despite the lack of face-to-face interaction with an instructor (in the case of teaching multisection courses), our system encourages interaction electronically through audio, video, chatting and responding to questions asked, solving quizzes, uploading assignments, and many other activities.

#### 4. The Interactive Computer-Based Classroom

In this section, we describe our Interactive Computer-Based Classroom system, shown in Figure 1. The model has three major actors, namely, the administrator, the instructor and the student, all connected through a TCP/IP network. The following scenario describes the flow of the system: students in a classroom (say class-A for example) interact from their networked computers with the main computer that the instructor is using to present the class material. Once connected, they are engaged in the lecture. This enables students to perform actions such as: viewing the class presentation, asking questions, participating actively in answering Yes/No questions, downloading previous lectures, taking a quiz, and many other tasks.

In addition, it enables the instructor to take attendance and monitor students' activities while presenting his/her material. At all times, the instructor can determine whether a student is paying attention to the presentation. Also, he can start a quiz, give permission for text or voice chatting, and send notes to students. The program running on the system server allows the instructor to easily manage and modify the course material.



Figure 1. The interactive computer-based classroom system

# 4.1 The Roll of the Administrator

The administrator's roll starts when he receives a request form to add a new instructor who likes to participate in the Interactive Classroom System. The form includes the instructor's personal information and the course he is teaching. When the instructor is added to the system, students registered in this course are added into the system and the instructor-student relationship is established. At this time, both the instructor and his/her students are granted access to the system.

# 4.2 Connecting with the Instructor Server

When granted permission to use the interactive classroom, the instructor can login and start using the system. Figure 2, shows the instructor's main screen. Actually, the instructor can do two major things through this screen; either he can manage the coursework content, or he can start a presentation. Figure 3, shows the description of the major tasks performed by the instructor during the presentation.

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Figure 2. The Instructor Screen Figure 3. Description Of The Instructor's Tasks Back to the main screen, the instructor is enabled to perform the following tasks: he can edit lecture content, manage the master agenda of the coursework, make announcements for the entire class, manage and start a quiz, and finally, he can start a presentation.

# 4.2.1 Starting A Presentation

Presenting the class notes starts when the instructor clicks the "Start Lecture" button. The delivered material could be simply a PowerPoint<sup>™</sup> presentation, material from the World Wide Web, supplementary audio/video files, or execution of any number of different programs on the main computer. Figure 4, shows the instructor's presentation screen for delivering his/her notes and monitoring students' activities. Figure 5, describes the management tasks that the instructor can perform while lecturing. The management tasks include: interacting with students through writing to explaining a concept, interacting through voice using a microphone, initiating the process of collecting assignments, writing notes to students, explaining ideas through running a video file, and finally asking quick Yes/No questions to attract students' attention. Figure 6, describes the students' activities that the instructor can monitor while delivering his/her lecture. These activities include: monitoring students attending class, monitoring inactive clients (i.e. students not having the focus on the presentation screen), monitoring students raising hands, granting permissions to students to start asking questions, monitoring if a student accessed his/her previous notes, watching if a student submitted his/her homework, and finally monitoring non-interacting (i.e. idle) students.



instructor during lecturing



## 4.3 Connecting With The Student Machine

On the client side (i.e. student), the system automatically displays a list of online active instructors running on servers. When a student chooses to join an instructor; the course information is displayed and the "Login" button is activated as shown in Figure 7. When a student clicks this button, he is presented with a login window requesting the student's ID and the password. Immediately after the "Connect" button is clicked, the student is validated against the class list of the selected instructor. After authentication, student is granted permission to interact with his/her Instructor's machine. Accordingly, the student can perform a set of tasks as described in Figure 8. The tasks include: downloading missed lecture notes, reading messages sent by instructor, and viewing an active presentation.



Figure 7. Student's login screen

Icon	Description	Icon	Description
	Online instructor (active session)	*	Download lecture notes
and the second s	Join session (attend lecture)		Download announcements

Figure 8. Description of Student's Major Tasks

## 4.3.1 Joining an Active Presentation

To view the active presentation, running on the instructor machine, the client (student) has to click the "*Join Session*" button. Immediately, the student is presented with the screen shown in Figure 9. The student has no control over the displayed material. He is just setting there watching the presentation and other activities presented by the instructor. While watching the presentation, the student is capable of doing a set of tasks to interact with his/her instructor. The tasks include: checking attendance record (i.e. number of days he was absent), reading notes sent by the instructor, raising hand to ask a question, uploading an assignment when requested to do so, and finally, responding to quick Yes/No questions.



Figure 9. Student's main presentation screen

#### 5. Conclusion and Future Directions

We have described a relatively inexpensive, Windows/PC-based system that can be controlled at a distance by a classroom instructor and students in the class. The Interactive Computer-Based Classroom is motivated by teaching multi-section courses in an interactive way and it aims at enabling lecturers to deliver presentations, monitoring students' activities, and receiving immediate feedback regarding how well the students have learned the material. Students interact through responding electronically to questions asked, solving online quizzes, uploading assignments, and downloading previous lectures as many times as needed. The Interactive Computer-Based Classroom is just the first step in using electronic materials in the classroom. The current work is in the favor of expanding its interaction with student devices and providing mechanisms for the instructor to direct student activities in a way that everyone can contribute.

#### 6. Acknowledgments

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# Shifting the Gears: Towards Automatic Assessment of Undergraduate Students at the University of Jordan

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## Abstract

This paper describes the work being undertaken at the University of Jordan to tackle the problems we are facing with our examination system. It also discusses our experiments to develop more efficient and effective automated assessment solutions. We present ExamBuilder; a bi-lingual (Arabic/English), convenient, easy to use Windows-based platform solution for generating and administering automated exams. It has been designed to automatically assess students' progress in many introductory undergraduate courses, where traditional assessment is costly, inefficient, time-consuming, and error-prone process. The gear shifting toward automated exams was essential to improve our quality of teaching and learning and to provide our students and instructors the best possible services. Automatic examination is what we have been doing during the last four years with reliable and encouraging results.

## 1. Introduction

Accurate and efficient assessment of students' knowledge is an integral process that we do every day [5, 6, 10]. Tests, when applied efficiently, are powerful tools used for evaluating and assessing students' intended learning outcomes in almost every educational system [4, 6].

In this paper, we take a look at the problems we are facing with the examination system at the University of Jordan (JU) and the experiments we carried out to tackle those problems. Yet, the major assessment of students' knowledge in the JU system is still based on taking exams. Almost 80% of the student's grade, in most undergraduate courses, is based on taking two exams; a midterm and a final one. Although the intention of an exam is to effectively measure to what extent students have learned the material; still preparing, writing, and grading the exam is the least favorite work for most instructors. When preparing an exam, the instructor needs to make sure that the exam covers all the important parts of the course material, tests students' knowledge, considers

the number of questions for the given amount of time, avoids unclear and ambiguous questions, weights questions adequately and fairly, and most importantly, it does not take forever to grade [10]. Of course, this is time consuming and one can imagine the great amount of time and consideration required to prepare questions and to evaluate students fairly.

The registrar office at JU requires the student's final grade, including the grade of the final exam, to be posted within 72 hours. For a faculty member, and most of the time, this process often turns into unpleasant and stressful work. To handle the situation, most instructors are tempted to write short exams so that it will be easy to grade. Few multiple-choice, true/false, short-answer questions will do the trick. Although this might be a solution, but definitely the exam might not efficiently test a student's knowledge. Some students can correctly answer these types of questions without really understanding the material; sometimes by guessing or simply by cheating. No matter how careful we are during the exam, academic dishonesty cannot be stopped [3].

To work out the previous problems and many other problems in our examination system, we have designed and implemented a bi-lingual (Arabic/English) Windowsbased system named ExamBuilder. The new system aimed at providing instructors with automatic testing and grading facilities as well as exam administration resources. Also, it provides efficient results and feedback when used for grading. Now, we can assess students quickly, efficiently, and we have great control over cheating since exams are generated randomly.

After describing the motivation behind ExamBuilder, the rest of the paper describes the system architecture and features. Next, we show the results of our experimentation with the system and while this work is still in progress, the main goals have been already achieved.

#### 2. Motivation

On March 2004 a "*link*" between the University of Jordan and Chester University in the United Kingdom has been actively implemented [11]. The link was made possible through a grant from the Department of International Development (DFID) in UK. The main theme of the link was to inspect and restructure several activities pertaining to student key skills in several courses, such as: computer skills, Arabic and English communication skills. The target was to improve the structure of the courses and to link their input and output more efficiently and effectively. In addition, and to provide the highest quality in curriculum offerings and the best possible services to its students and faculties, JU invited a quality assurance committee from the United Kingdom to assess the quality of some programs and services offered to our students. In order to meet the intended learning outcomes of the curricula, the committee recommended that students should be assessed differently. At the end of each course, students should be able to demonstrate recognition and recall of knowledge, skills and abilities, analysis, synthesis and evaluation, as well as critical thinking.

Unfortunately the recommendations were not easily fostered and we had been faced with many obstacles. One problem was because the introductory level courses in computer skills, communication skills, programming skills, as well as some other courses are compulsory courses and must be taken by all undergraduate students. Most of these classes usually have over 80 students per section and some other courses offered in parallel with over a fifty-section per course.

The simplest solution was to design and implement economical, effective, completely automatic evaluation procedures and techniques able to monitor students' progress in learning. The system described here is in fact able to help instructors with the online creation of random on-line exams from test banks and their automatic management, including: testing, grading, and immediate feedback to students. We started with few courses in 2003 and now we had automated over 60 exams serving more than 40,000 students.

#### 3. ExamBuilder

Automated assessment in education has appeared in the literature and was carefully evaluated [1, 2, 8, 9]. ExamBuilder (shown in Figure 1) is a bi-lingual (Arabic/English) Windows-based system aimed at providing faculty members with automatic testing and grading facilities. It was built to satisfy the urgent needs to improve our traditional assessment process and geared toward creating and administering exams in an efficient way. The following sections describe the features of the system.



Figure 1. The architecture of ExamBuilder

#### 3.1 Complete Exam Management System

ExamBuilder features a user-friendly interface designed for instructors to quickly upload and manage exams driven from a test bank. Instructors can choose what questions are needed to be on the test and their level of difficulty, set the time limit on the test, and the weight each question should take. ExamBuilder allows for different types of testing including: general test, reading comprehension test, passage listening test, or a mixed test format. Each type is empowered by a subsystem, which allows for selecting a set of multiple-choice questions chosen from predetermined subjects according to the material to be tested. Questions and answers are contained in the test bank, where instructors regularly keep updating and adding new questions to the database. Besides the categorization by subjects, the questions are also subdivided into categories to meet the intended learning outcomes for the material to be tested. In addition, questions are assigned a difficulty measure ranges from 0 to 10, with 10 being the highest. Figure 2 shows the main interface of the system.



Figure 2. ExamBuilder main interface

## 3.3 Multiple-Choice Testing

ExamBuilder supports multiple-choice testing format. The validity of tests based on multiple-choice questions have been studied and discussed well in the literature. They still remain the most commonly used assessment formats [6, 7]. According to [7], an exam based on multiple choice testing is a very flexible assessment format that can be used to assess a wide range of knowledge, skills, abilities, values, and thinking skills.

## **3.4 Test Generation**

Students are connected through a reliable network to the main server where the test runs and monitored by a test Agent. When a student logs to the system and authorized to take a test, the Exam Generator module generates a random test driven from the test bank based on the required constraints set by the instructor. The constraints might include:

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- 1. The total number of questions to be on the test,
- 2. The categories from where questions are extracted to satisfy the intended learning outcomes, and
- 3. The difficulty level and weight of the extracted questions
- 4. Next, the agent starts and delivers the test to the student's machine.

# 3.5 Integration with the Test Agent

All the time during the test, a test agent keeps an eye on accidental interruption due to technical reasons (mainly connectivity with the server). The design includes features to skip and mark questions for later review, auto save answers, display the remaining time, and upon failure, it restores and resumes the process exactly from the point where it stalls.

Upon test completion, either because the student answers all questions or the maximum time has been exceeded, the test is graded and results are saved on the server. Immediately the student sees on his machine the number of questions he answered correctly and the total score of the test.

# 4. Experiments and Discussion

Table 1 shows the distribution of the automated final exams during the past four years. We started with five multi-sections introductory courses in Computer Skills (level I & II), Arabic Communication Skills, and English Communication Skills (both levels).

The pilot sample included 4000 students at that time. The initial results we obtained were very promising. The experiment was carried out in 10 computer labs hosting 600 networked, Window-based PC's. It required only eight sessions (one hour each) to finish the task, which used to be completed in at least 4 to 5 days. Results were posted to students the next day.

Academic Year	Final Exams	No. of Sessions	No. of Students
2003/2004	5	8	4000
2004/2205	30	92	20130
2005/2006	53	120	31240
2006/2007	65	151	40550

Table 1. Automation of final exams during the last four years

As of today, we are done with automating 65 exams serving 40,550 students and require only one week to complete the process. Table 2 shows a sample of those exams and the number of students being served.

Course Name	No. of Students	Course Name	No. of Students
Documentation &	Students	English Comm.	Students
Communication	500	Skills	1200

		English Language (	
Principles of Marketing	540	I)	1700
Calculus I	550	Computer Skills (I)	1800
Physics I	566	Islamic Culture	2025
Arabic Communication Skills		Gen. Safety	
(I)	600	Principles	2133
Principles of Business			
Administration	647	Military Sciences	2200
Principles of Finance			
Management	708	Computer Skills (II)	2400
General Physics (II)	770	Islamic Education	2609
		Arabic Comm.	
Environment	836	Skills II	2800
		Eng. Comm. Skills	
Principles of Accounting I	840	II	2800
Principles of Accounting II	865	National Education	3343

Figure 3 shows the distribution of the final automated exams during the last four academic years, while Figure 4 shows the distribution of students taking the final automated exams during the same period.



Figure 3. Distribution of the final automated exams during the last four years

We believe that the automation process was fruitful. Many instructors who are teaching multiple sections show interest in participating in the process. The benefits are so much to mention. First, we could save instructors a great deal of time spent on preparing tests. Through test banks updated frequently by specialists in the field, instructors now can build a test that covers the material quickly, efficiently, and with only few mouse clicks.



**Figure 4. Distribution of students taking automated exams during the last four years** A second benefit is that the random generation of tests eliminates academic dishonesty. Some students used to do whatever it takes to pass a test. They might copy answers from neighbors, use cheating sheets or commit any irresponsible behavior in order to pass. Now, the odds for two students setting next to each others to see the same question are very low. Another benefit is that many errors that we used to do while grading under stress, now disappeared. Errors such as: being consistent while marking two exams with similar mistakes, mistakenly marking off correct answers, and making errors in calculating total points, all now under control. Finally, and most importantly, we could save thousands of trees and tons of papers wasted for printing the test material.

## 5. Conclusion and Future Development

Assessment of student learning outcomes is an important work. It needs to be revised frequently to the satisfaction of both students and instructors. In this paper, we described the work being undertaken at the University of Jordan to tackle the problem of evaluating our students quickly, fairly and professionally. Our traditional testing and evaluating techniques were inadequate, especially when it came to introductory courses, were classes are over crowded and multi-sections were possible. With test automation we could save great deal of time and efforts spent on preparing and grading tests. The task that we used to do in two weeks can be done efficiently in few days.

The whole techniques and platform of ExamBuilder are under continuous development. We keep adding automated features because we know that our instructors and students time is valuable. Also, work has been initialized to add more security measures to protect the test banks and to monitor activities against the servers.

#### 6. Acknowledgments

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## E-Learning And ICT-Led Development In Jordan: The Case Of Hashemite University

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## Abstract

The recent explosion in ICT applications on the world-wide web has provided considerable impetus to e-learning initiatives. E-learning will clearly play a growing role in higher education and professional training in the years ahead. Also, e-learning will change the way universities gain competitive advantage through improved students performance and quality higher education. This study attempted to explores the HU's approach of embedding e-learning in order to support their teaching-learning process. HU took this initiative in its vision since 2003. The existing technology infrastructure and the level of educational technology expertise show the university readiness and awareness to move forward in the use of educational technology. The University established an e-learning center. The center concerns of developing e-learning infrastructure, training, course/curriculum development, and support practices.

**Keywords:** E-Learning, Jordan, Hashemite University, Case development, design of e-Learning environments.

## **1. Introduction:**

E-learning is the use of the internet and new multimedia technologies to improve the quality of learning by providing access to resources and services, as well as remote exchanges and collaboration. It concerns with everyone; students, employees, employers and also teachers and trainers who are themselves seeking to improve upon their own capabilities.

E-learning mainly takes the form of online courses, where the dominant learning technology employed today is a type of system that organizes and delivers online courses; e.g. learning management system (LMS). Wireless network, course management systems, multimedia, and other technologies add new dimensions of richness to e-learning. There is an increasing demand for synchronous and asynchronous e-learning. Hashemite University (HU) is the leader of adopting e-learning and information
technology in education. LMS was integrated into Hashemite University information system since 2003. The Hashemite University e-Learning Initiative has four plans of action:

- The deployment of the necessary infrastructure and equipment for sparking the growth of e-learning;
- Specific training at all levels and particularly for teachers and trainers;
- The creation of the necessary conditions for the development of quality educational contents and services;
- Hastening the networking and co-operation at the national level.

To use e-learning effectively, HU enhances the technical proficiency of its staff, and develop a reliable and robust technical infrastructure. Towards this step, the University established an e-learning center to develop e-learning infrastructure, training, course/curriculum development, and support practices. E-learning center provides students with a safe, supportive and caring learning environment- enabling them to reach their full potential through the development of a desire for lifelong learning.

The center reflects the University vision where it envisages an environment where the use of information and communications technology is regarded as an integral part of our everyday practices and administration management. It acknowledges the potential of e-learning to impact on learning outcomes for all students and the work habits of all staff.

# 2. Objectives

For a variety of reasons, e-learning programs are a high priority for many Universities. For some, the emergence of these programs is an institutional response to evolving faculty interest in applying technology to the learning process. For others, it is a part of the overall strategic vision to enhance the learning experience, to reach a dispersed population and to increase enrollment.

In Hashemite University, the focus is on the quality of the educational content and the teaching methods. Although most of the resources made available for these priorities are at a national level. It encourages transnational cooperation, helps to disseminate best practices and sets the basement for the creation of a regional market in the e-learning field. Beside what we have mentioned, the objectives of the e-learning center in Hashemite University are:

- To improve the quality of e-learning activities engaged in within the university world.
- E-learning encourages students and academic staff to assume greater responsibility for their own learning, in forums that develop their: Skill to become active and independent leaders as well as abilities to communicate, collaborate, plan, analyze and solve problems. Further, it develop their skills to use new technologies particularly information technology.
- Set up a network for the sharing of resources network providing the resources to generate innovative strategies for improving teaching.

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- foundations and identify topics for future cooperation and joint efforts to promote elearning on the academic level as well as in schoolsDevelop systematic methodologies for design and assessing of course curricula and
- study programs adaptable to e-learning environments.
  Improve the quality of e-learning activities engaged in within the university world (pedagogical, organizational, economic, technological, institutional, and socio-cultural).
- Create an inclusive observatory platform that will present all the specific areas information collected into an overall picture of e-Learning development in Jordan and Arab region.
- Creating standards of excellence as an assessment tool (program and institutional level), improvement tool (internal quality care system) and tools for accreditation for excellence.
- Identify and disseminate good practices in e-learning to provide new ideas on dissemination and evaluation by recommending strategies to policy makers and offering guidelines to training institutions.

# 3. Hashemite University e-learning Model

The University technology infrastructure is upgraded to support the adoption of elearning and achieve the above e-learning objectives. The following figure defines all the key components that are implemented in HU information system for effective e-learning environment.



Figure 1: Hashemite University E-Learning Model

**LMS** takes the learning content and organizes it in a way where courses divided into modules and lessons, supported with quizzes and tests and discussions and much more.

**Synchronous,** which means "at the same time", students involve eith the faculty via the web in real time. Students accessing the courses at the same time as a faculty. HU will provide the student with a synchronous live classes where students can interact with their instructors, watch, listen, and ask questions.

Asynchronous, which means "not at the same time", allows students to complete the course on his own time and schedule, as many times as they want, without live interaction with their instructors. HU provides a class capturing tool that records the class with all its activities and makes it available for their students on the LMS.

For in-house content development, the university provides its staff with a productive authoring tool, easy to use and rich in features. Through this tool, instructors will be able to develop his own contents and publish it in different formats for students.

HU has a high technology infrastructure supported with the rest mentioned components of elearning, such as: online exam system, student information system, library system, portal system. The University also supports its infrastructure with brand software for students' and instructors' use.

The e-learning center conducts a set of training packages for the faculty staff on the available software, which provides the staff with knowledge on building courses online for different educational fields. The e-learning center provides a wireless environment for the purpose of mobility in the center and research on mobile e-learning.

### 4. Discussion

As we mentioned earlier, LMS was integrated into Hashemite university information system since 2003. The following figure shows the awareness of both the students and the academic staff in adopting technology in learning-teaching activities. This reflects the HU readiness for initiation a successful e-learning program.

It is clear that e-learning will play a growing role in HU in the years ahead. E-learning will be valuable especially to people whose personal constraints prevent them from enrolling in traditional courses.

E-learning applications used in HU allow instructors to create, deliver, and manage ecourses. The used technology is easy to understand and easy to use by students and instructors. We concluded that both students and academic staff are so aware in adopting technology in learning-teaching activities

Last, but not the least, the main advantage of e-learning is that it significantly increases access to advanced learning sources. Traditional classroom instruction is inevitably tied to the same time, same place environment for class delivery. E-learning courses evidently support learning environment whereby students can access materials at differing rent times

and places. In addition, electronic delivery media allows a student to replay delivered materials as often as they need.



Figure

# 2: Hashemite University Blackboard Usage Rate

### 5. Future Expectations

- Placing a strategic plan to train the faculty staff in the university on the e-learning software to apply IT in the education process.
- Holding specialized e-learning conferences, workshops and seminars.
- Contracting and cooperation with international and regional communities in the field of e-learning.
- Placing a strategic plan for course delivery methods, from face-to-face courses in hybrid e-learning to totally online courses for distance learning. Scheduling courses to meet degree requirements for distance and off-campus learners.
- Upgrade the center infrastructure to support the educational technologies goals outlined in the education technologies strategic plan.
- Create a distance learning program and associated courses which serves nationally and regionally.

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### Development of eContent for Delivery of an Undergraduate Electromagnetic Course Using Mobile Devices

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### Abstract

The content of an electromagnetic engineering course was developed for delivery by eLearning means, based on the standard ADDIE instruction design methodology. A prototype eContent module was designed and deployed on CD-ROM, desktop and mobile learning environments. The result of an online questionnaire evaluation shows that a mobile education system will be a good complement to existing desktop system as it brings convenience to most students and professors. The screen size and resolution and battery life of the mobile devices, speed and cost of accessing and downloading new content on an anytime, anywhere basis are the most decisive factor which will certainly influence the popularity of future mobile education system.

### 1. Introduction

Education worldwide is undergoing an upsurge of instructional and technical innovation. Driven by a powerful combination of need and opportunity, universities are re-examining tools and methodologies for creating educational materials and delivering instructional services [1]. Educators face a tremendous array of challenges including student enrollments, greater cultural and economic diversity, expanding curricular demands, and rising societal expectations, all complicated by perennial budget constraints. Universities must find cost-effective ways to diverse student populations, and extend services to dispersed users. Educators need real-time data to track student performance, direct individual learning programs and optimize instructional outcomes. Now these innovations are being adapted for eLearning solutions that render high quality, personalized education an accessible and affordable reality [2]. ELearning is thus seen as a strong contender to become the technology of choice for students and faculty at leading universities as it is being well received for its potential use outside the classroom. Particularly, mobile devices have several potential applications in learning and education, and can offer new dimensions to the students' learning processes in a mobile learning environment [3-6]. As such, mobile learning focuses on the delivery of electronic learning materials on mobile computing devices to allow access from anywhere and at anytime. The design for mobile devices has to be flexible to allow eLearning materials to be delivered in heterogeneous computing platforms [3-6].

In electrical engineering education, for example, the electromagnetic course is a fundamental subject which involves the basic laws of electrostatics, magnetism and waves. The course requires of students a good background in physics, calculus and engineering mathematics as well as an ability to visualize electromagnetic wave propagation. The diversity of the topics which are covered in the course and the wide scope of the mathematical tools used place an extra burden on both students and lectures. Particularly, the vector nature of electromagnetic fields presents a mathematical stumbling block to many students which impede their understanding of the physical concepts [7-9]. Because the visualization of three-dimensional vector fields is challenging to many students, introductory electromagnetics courses often become an exercise in which students merely memorize a set of formulae, making minimal connections between the physical phenomena and the mathematics. "Very few textbooks and course syllabi have deviated from this traditional approach and electromagnetics is taught today much as it has been taught for the last several decades" [9].

The EM course may be delivered in a variety of ways including text, equations, simulation and animations of problem formulation and solving. It may also contain a number of interactive questions, mainly in multiple choice formats, that will allow students to interact positively with the various subjects. In addition, the students may be provided with references, lectures notes, exercise and home works for extra readings. In this paper the delivery of the introductory EM course at Princess Sumaya University for Technology by eLearning means is described and tested. A course module, designed in cooperation with International TurnKey Systems, is tested by students in three different versions made available through CD-ROM, desktop and mobile devices. A survey is conducted in order to probe the perception of both professors and students regarding mobile learning and its popularity for technology-enhanced learning purposes.

# 2. Instructional Design Methodology

The course module was designed based on the standard ADDIE instruction design methodology where for each lesson the five phases of analysis, design, development, implementation and evaluation are followed. During the analysis phase, several work sessions had been conducted between the subject matter expert and the instructional designer to cover needs analysis, target audience, technology issues and current infrastructure for deployment, learning objectives and instructional goals, content analysis and project time plan.

In the design phase, a complete storyboard was developed. The lesson was demonstrated through six screens where the student can switch seamlessly from one screen to another through a graphical colorful interface. The screens developed depend on the nature of the lecture, for example, in a Coulomb's Law lesson; four sub-screens were created to include a biography of Coulomb, an interactive activity that describes the theory, and the exact text of the law and its step-by-step derivation of the problem, as shown in Fig. (1). This was created as flash paper to allow easy navigation and hard copy printing. Each key



figure was preceded by an informative content which was facilitated through a pause process provided to the learner.

Fig. (1) The four sub-screens developed for Coulomb's Law lesson.

For this lecture, the SME had advised that it was important for the students to know the application of the electrostatic in real life. Consequently, a group of industries were recognized as medium for applying electrostatics including electronics, computer peripherals, medicine, industrial equipments, agriculture, to name a few. For each field a group of photos were gathered and ran though some digital processing to make them suitable for the prototype need in all its versions: desktop, web and the mobile. An iconic representation for each application field was displayed and once the student clicks over it, a slideshow of related pictures is displayed.

The first application of Coulomb's law was illustrated through an example of finding the electric field at a general point due to a of uniformly distributed line charge. A simulation screen was made available for students to show how to obtain the electric force and field intensity on a point charge following a set of equations which were related in a step-by-step walk through method to find the final formula with the vector drawing and calculus. The explanation for each step was recorded and displayed as accompanied narration to

the activity. The student had full control of this activity through the "control tracker" that has a play/pause, start, end, backward and forward buttons.

The second example was given again to find the electric field due to line charge but with the line on a different point on the z-axis while the third example dealt with a ring of charge, as shown in Fig. (2).



Fig. (2) Desk-Top version of (a) line charge and (b) ring charge problems.

Although Gauss's law is not a key figure related to the lesson of the module yet, its application in some relevant cases is presented, including biography and a step-by-step examples.

# 3. Web and Mobile Versions

Upon completing the above development, a cycle of Flash Action-script code optimization was conducted to come out with two versions; web and mobile. This came as part of implementation and deployment phases. The development phase was quite interesting as it had to consider the final product for the three delivery channels in a CD-ROM, web and mobile devices. The main technology used was Adobe Flash. For the desktop version, a video introduction for instructor was added to give a brief about the project and the module the students will use. A live video shooting was taken in one of the actual classes. The video was then displayed in the introduction using all target devices including desktop, laptop, mobile phone, i-mate and iPod in order to emphasize the mobility of the proposed eLearning module.

A number of technical actions steps were taken to produce the mobile version using Flash Lite [m]. First, the graphics were optimized in files, the flash lite version supported by the mobile device was identifying and then the flash files were published with flash lite player. Finally, the files were programmed to match the flash lite player. The main problem that was encountered was to change the flash stage dimensions to comply with the specifications of the various mobile devices screens. The number of pixels suitable for each device has to be predetermined, for example 176\*208 pixels were used for



Fig. (3) The four sub-screens developed for Coulomb's Law lesson.

The open source Moodle learning management system (LMS) was selected as the hosting platform for the prototype. A SCORM version was therefore created from the desktop version and an inexpensive commercial tool called WBTExpress was then chosen to create the SCORM package, and finally the process passed through graphics optimization for bandwidth considerations. The final lesson version for a mobile phone was uploaded into the device as shown in Fig. (4).



Fig. (4) Mobile Learning version of line charge problem formulation.

# 4. Online Survey

The students' and professors' perception of mobile learning was investigated through an online questionnaire conducted in the first quarter of 2007. The questionnaire consisted of 24 questions aimed to cover a wide range of subjects and then posted into the Princess Sumaya University for Technology website [x]. An email list containing over 2700 emails for professors in the 22 universities, public and private, and a students' list of 415 emails were also prepared and used to circulate a call for participation in the online questionnaire. Only 137 professors and students responded of whom 41.61% were student and 51.83% were lecturers and researchers. Almost all (96.35%) possessed a mobile phone while only 15.33% possessed a handheld computer or a PDA.

Subsequently, the degree of importance of the factors that influence the choice of a mobile device for use in a mobile learning environment, the mobile learning platform and the expected services it offers was the focus of the questionnaire in order to arrive at the best solution that best suites learners and facilitators when a mobile learning system is developed. It was found that screen size and resolution and battery life were the most important factors that influence the choice of a mobile device used in a mobile learning environment as indicated in the results of the questionnaire shown in table (1). The processing power and wireless capabilities of the mobile devices such as GSM, WIFI and Bluetooth were also important to users while input methods such as a keyboard and the weight of the unit were less important to users.

Degree of Importance	Screen Size	Weight	Wireless Capabilities	Input Methods	Processing Power	Battery Life
1 (not	2.19	2.92	3.65	2.19	1.46	1.46
important)						
2	4.38	5.84	2.92	2.19	1.46	0.73
3	10.22	21.90	6.57	24.82	16.06	10.95

4	18.25	23.36	26.28	27.01	27.74	21.17
5 (very	59.12	37.96	53.28	35.77	45.26	58.39
important)						

Table (1) The percentage degree of importance of the factors that inf	luence the
choice of a mobile device for use in a mobile learning environm	lent.

Results also reveal that the speed and cost of downloading new content were the most important features of the mobile learning platform while its user friendliness and graphics capabilities such as videos, audios and illustrations in the course content were less important. Most respondents did not find the entertainment component in course content and the variety it offers important with only about quarter of the responses being positive in this respect, as shown in table (2).

Degree of Importance	User friendliness	Speed of content	Cost of Downloadin g	Graphics and illustration	Edutai nment in	Variety of courses
		Downlo		S	conten	
		ad			t	
1 (not	2.92	0.73	0.00	0.73	2.19	0.73
important)						
2	5.11	2.92	2.19	3.65	10.95	5.11
3	11.68	8.03	10.95	16.06	16.79	18.25
4	29.93	23.36	19.71	29.93	33.58	36.50
5 (very	41.61	56.20	58.39	40.15	26.28	30.66
important)						

Table (2) The percentage degree of importance of the mobile learning platform.

Almost half of the sample considered accessing notes and course content on an anytime, anywhere basis and receiving live information and notification of events such as exams, cancellation of classes, change of lecture rooms as the most important of the function and services expected from the use of mobile learning technology. However, the interaction and asking questions in the classroom via the mobile device to the teacher by typing in questions, which are then send to the lecturer's PC for him/her to answer, communication with and feedback from the lecturers and tutors, the ability to communicate with other peers and friends as well as being able to add or drop courses seamlessly during course registration time were found to be less important, while participation in mini quizzes inside the classroom was not important as shown in the results of table (3)

Degree of Importance	Accessi ng notes	Receiving notification of events	Interactio n in the classroom	Partici pate in quizze s	Commun icate with lecturers	Commu nicate with peers	Add or drop courses
1 (not important)	2.92	0.00	3.65	1.46	2.19	0.73	1.46

							-
2	2.19	4.38	7.30	8.76	3.65	8.03	7.30
3	13.87	11.68	21.90	21.17	20.44	19.71	21.17
4	23.36	29.20	30.66	38.69	28.47	31.39	21.17
5 (very	48.18	45.26	27.01	19.71	35.04	29.20	37.23
important)							

Table (3) The percentage degree of importance of the services offered	through	the
use of mobile learning.		

### **5.** Conclusions

The usefulness of mobile devices use in teaching electromagnetic course was described and evaluated. The results of an online survey indicate that mobile learning make the delivery of the course simpler and aid in a complete transfer of ideas to students. The mobile devices also allowed for greater ease of lecture delivery, specifically in allowing the lecturer to import into the lecture graphic simulations and animations using on the fly internet images and computer simulations as well as power point presentations. These lectures can be saved and posted onto an eLearning platform or the professor website for students' future reference.

The results of student perception and acceptance of mobile devices implementation for lecture delivery indicate that mobile devices for students should be pursued for teaching the electromagnetic course, and should be extended to other simpler courses with large students' attendance and with application for which the mobile devices are well-suited. The results are consistent and provide reliable pointers towards the usefulness of mobile devices for faculty at the university level. The ultimate goal of the study is to investigate the possibility to provide individual faculty members at Princess Sumaya University for Technology with technology-enhanced learning tools to assist them in their educational mission.

### 6. Acknowledgements

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# **PARALLEL SESSION #6**

# **E-LEARNING IN MEDICINE**

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# M-Learning from a Cell Phone: Improving Students' EMP Learning Experience through Interactive SMS Platform

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### ABSTRACT :

**Introduction & Background:** Virtual learning communities are radically redefining the traditional language learning classroom, where computer-assisted language learning (CALL) is being replaced by mobile-assisted language learning (MALL), with increased use being made of wireless networked mobile computers to facilitate internet based language learning. Meanwhile, cell phones are becoming ubiquitous, with students presuming their right to personal use during class, frustrating teachers who regard this as disruptive. M-Learning is defined as the teaching and learning processes through the use of mobile and handheld devices such as cell phones, Personal Digital Assistants (PDAs), laptops, and tablet PCs. M-Learning is the ability to receive learning anytime, anywhere, and on any device.

**Objective:** This paper aims to describe the development of a mobile-based interactive learning environment (MOBILE) in classrooms as well as to understand the impacts that mobile applications such as short -message-services (SMS) can have on students' EMP (English for Medical Purposes) learning experience.

**Method & Material:** A brief description of the system as well as the trial that took place is presented. Based on the literature described on mobile technologies and ICT in the classroom and pedagogy, two new classroom dynamics were designed, applied and evaluated i.e. SMS Feedback and SMS-quiz. Subsequently a discussion of the survey results, obtained from 40 students of medicine studying the EMP course, is presented.

**Findings & Conclusion:** The findings indicate that students and instructors can benefit from the additional channel of communication in the classroom. The lecturer perceived a gain of quality and quantity of feedback from the students. The research implies that students are of the opinion that the system was useful - making classes more interesting and interactive (over 90%). The post-project feedback on a Likert scale gives strong evidence that "SMS Feedback" was found to be an especially useful, efficient and preferred method of communication (94%). Overall, the main inhibitors for adoption of SMS in the classroom, among other challenges, were time constraints (20%) and the cost of text messages (52%), rather than a perception of the system's value.

Keywords: M-Learning; EMP; Cell Phone; SMS; MALL

### Introduction.

M-Learning is defined as the teaching and learning processes through the use of mobile and handheld devices such as cell phones, Personal Digital Assistants (PDAs), laptops, and tablet PCs (Qingyang 2003). According to Chabra and Figueiredo (2002), "M-Learning is the ability to receive learning anytime, anywhere, and on any device." Hence, the mobility factor is the ultimate means of providing M-Learning services to the students or teachers. M-Learning usually adopts a web-based system due to its compatibility and flexibility of reaching out more users with different requirements and capabilities. While electronic learning (E-Learning) extends study beyond physical classroom, M-Learning promises continued extension towards the "anywhere, anytime" learning process. Learning through SMS residing in "m-learning" can be considered part of the world of "e-learning", which refers to the use of technology for learning in a broad sense and encompasses educational processes carried out in compliance with different theoretical models, pursued using different educational methods and is, normally, based on activities that "take places via any electronic medium" (Anohina 2005).

# SMS and language Learning:

Virtual learning communities are radically redefining the traditional language classroom, where computer-mediated language learning is becoming significant, with increased use being made of wireless networked mobile devices to facilitate internet based language learning. Meanwhile, cell phones are becoming ubiquitous, with students presuming their right to personal use during class, frustrating teachers who regard this as disruptive. This review considers their intentional use in class, to provide ubiquitous mobile-mediated language learning. Research reviewed provides a general orientation and conceptual and practical framework, and identifies their relevance to an interactive SMS learning, potential for distributed practice, and suitability for encouraging classroom interactivity. An important application to cell phone usage in the L2 classroom is capturing SMS (Short Message Service) into a database that is displayed on a message board. Teachers can use computers to receive SMS from students, with particular advantages for educational purposes.

Text messaging is an example of a student centered, personal approach to communication – where connection and communication is viewed from a student's point of view. Text messaging is particularly suited to the 18 to 24 year age group, who are often the most vulnerable. Young people have taken to communicating by text messaging or SMS that allows users to send and receive short messages from handheld, digital mobile phones or from a computer to a mobile phone, giving almost instant access.

These young people are adapting and inventing language to accommodate the 160character limit with the result that the messages are mostly abbreviations, acronyms or even combinations of letters and numbers, such as L8, for "late".

As a consequence, the language is informal and the messages are mostly peer to peer (Horstmanshof & Power, 2004). Thorton and Houser (2002; 2003; 2005) developed several innovative projects using mobile phones to teach English at a Japanese university. One focused on providing English vocabulary instruction by SMS. Three times a day,

they emailed short mini-lessons to students, sent in discrete chunks so as to be easily readable on the tiny screens. Lessons defined five words per week, recycled previous vocabulary, and used the words in various contexts, including episodic stories. Students were tested biweekly and compared to groups that received identical lessons via the Web and on paper. The authors then explored usability and learning issues. The results indicated that the SMS students learned over twice the number of vocabulary words as the Web students, and that SMS students improved their scores by nearly twice as much as students who had received their lessons on paper. Students' attitudes were also measured. The vast majority preferred the SMS instruction, wished to continue such lessons, and believed it to be a valuable teaching method. The authors theorized that their lessons had been effective due to their having been delivered as push media, which promote frequent rehearsal and spaced study, and utilized recycled vocabulary.

Levy and Kennedy (2005) created a similar program for Italian learners in Australia, sending English vocabulary words and idioms, definitions, and example sentences via SMS in a spaced and scheduled pattern of delivery, and requesting feedback in the form of quizzes and follow up questions.

While the applications of cell phones have typically been pedagogic in nature, they have also been used for practical or administrative matters, such as simplified and flexible student-teacher communications (e.g., course updates and reminders) and referrals to related websites and other up-to-date instructional resources (Dias, 2002, Summer/Fall; Levy & Kennedy, 2005).

Language classroom interactivity has a number of significant benefits: it promotes an active learning environment, provides greater feedback for lecturers, increases student motivation, and enables a learning community (Mazur 1998, Hake1998, McConnell et al 2006, Bishop et al 2003, Angelo 1993). During the past six years the rapid proliferation of mobile devices, particularly cellular phones, in the student demographic has changed the levels of student access to information and communications technology (ICT) in the classroom - presenting an extraordinary opportunity to develop interactive classroom systems and to enhance students' learning experience (Schwabe 2005, Scornavacca 2006). The present challenge for researcher is to go beyond anecdotal perceptions and obtain English empirical evidence about the impact of these technologies in the English for medical purposes (EMP) classroom. This paper aims to describe the development of a classroom interaction system as well as to understand the impact that mobile applications such as SMS can have on students' learning experience.

Using interactive classroom pedagogies it is possible to promote a more active learning environment, increase the motivation of students, inform the work of teachers and generally enable a genuine learning community in the classroom (McConnell 2006). Classroom Feedback Systems (CFS) provide one possible technological affordance that can efficiently enable interaction in large classes. Known by a vast array of names and produced commercially by a range of vendors, CFS technologies have been used since the sixties (E. Judson and D. Sawada 2002; W. R. Penuel et al,2005) allowing students to respond to questions and have the results processed and displayed for use by the lecturer and the class as a whole. Modern systems provide the ability to answer a range of question t ypes from simple yes/no through to detailed responses, free-form questions and roleplaying(L. Bollen, 2004). Other media such as images are now also being used in

particular contexts (P. Seppälä and H. Alamäki ,2003) .The hardware used now ranges from small infra-red units like those used with televisions, through more reliable radio units, to the use of web systems accessed by wireless personal digital assistants (PDAs) or laptops.

A variety of positive outcomes from the use of CFS technologies have been reported including improved understanding of important concepts (W. R. Penuel et al 2005) increased student engagement and participation(M Freeman and P. Blayney 2005), improved quality of discussion in the classroom and a better teacher awareness of student difficulties (W. R. Penuel et al 2005). The preferred mobile communication device is undoubtedly the mobile phone. As with most of the world, mobile phone ownership and the use of short message service (SMS) communication has rocketed up over the recent years. Mobile phones are regarded as essential devices by the student demographic and have the advantages of being familiar, permanently configured to work correctly, and battery lives generally measured in days rather than hours.

In one of the few examples of classroom use of mobile phones, Markett (2006) describes the use of SMS to collect text in the form of a semi-structured discussion during class that can then be continued in a more traditional web-based discussion afterwards. Sadly however, the problems caused by disruptive mobile phone use have more often led to the banning of mobile phones in classrooms and the use of jamming equipment. This can lead to unusual solutions such as that of Bollen (2004) who reported the development of an SMS-like system on PDAs in order to avoid restrictions on using mobile phones in class.

# **Interactive SMS Platform Project:**

The development of the project is based on the assumption that nowadays most students have a SMS enabled mobile phone and that they bring it to the classroom. Therefore most of the necessary ICT infrastructure for a classroom interactive system is already in place. In order to take advantage of this opportunity it was necessary to enable the instructor to receive messages from students while lecturing.

The system comprises of a mobile phone connected to the instructor's laptop and the installation of a SMS management tool (SMS Studio). An alternative to this set-up would be using an SMS-gateway instead of the phone. The SMS software enables the instructor to easily read incoming SMS messages on the computer screen as well as automatically analyze the results of polls. In addition, it also allows the instructor to send messages to any mobile phone. Therefore two new classroom interactive activities were designed:

SMS Quiz: at the end of each class, the instructor presented slides containing few multiple-choice questions related to the topic. Students were able to use their mobile phones SMS to answers and were able to see on the projector screen real-time graphics showing the results to trigger class discussions (Mazur 1998). SMS Feedback: it allows students to send questions on the sentence structure, terminology and translation or comments to the instructor's laptop via SMS without interrupting the class. The instructor was able to read the messages on the laptop screen and decide whether or when would be appropriate to comment on the message received.

### **Discussion:**

English for Medical Purposes (EMP) also called English for Special Purposes (ESP) is a mandatory course for all students of medicine, which is introduced to them by the English department. One hour and half lectures were delivered two times a week to a group of 40 students. At the beginning of the semester, students were introduced to the project and actively encouraged to use their mobile phones in class. During the trial, using the system was voluntary and students paid for their own messages.

At the end of the semester, the students were asked to answer a survey containing 22 questions measuring mobile phone usage, user acceptance of the system, and perceived impact on students' learning experience. The questionnaire was developed in conjunction with Education Development Center (EDC) of the university and it received face and content validation. Majority of the students (89.1%) owned a phone that they often carried in classes. During the trial, 51% of the students used the SMS Feedback to send a question or comment in classes:

### SMS PROJECT IN EMP CLASS

SMS Feedback

Ask you questions regarding the lecture through SMS to

09133611740

SMS QUIZ

Which choice can best.....

A)..... B)..... C)..... D).... Send your answer to

### 09133611740

However, over 90% of them perceived that the ability to send the instructor SMS's during class was in one way or other useful. Students indicated their reasons for not using the SMS feedback. Most (41.5%) responded that they had nothing to say, 33.6% gave cost as the main inhibiting factor.

Most of the students used the SMS Quiz (81%) since the instructor noticed that this activity provided several benefits for the classroom environment (e .g. instantaneous feedback on concept tests or using results to stimulate class discussion). It was also noticed that students seemed to be very interested in the result of polls that reflected their collective opinion on a given issue. In the case of the SMS Quiz, student participation was mainly inhibited by cost (31%) and lack of interest (5%). The survey questions have examined largely descriptive aspects of students' mobile phone usage as well as drivers and inhibitors for using the project. The remaining questions examine the impact of this application on respondents' learning experience. Table 1 summarizes the results.

STUDENTS' IDEAS	MEAN	RANK
Using SMS increased the levels of linguistic interaction in EMP class.	4.04	1
Using the project during class made the English classes more interesting.	4.03	2
Using SMS in the English classroom is a good idea.	3.99	3
I found this instructional method effective.	3.71	4
In general, I liked using SMS as part of this course.	3.69	5
The use of SMS during EMP class enhanced my study.	3.54	6
The project during class increased my interest in the subject.	3.49	7

Table 1: Ten Ranked Students' Ideas on the Project

For these questions, respondents were asked to answer questions using a Likert scale from 1 (strongly disagree) to 5 (strongly agree). Reliability analysis was carried out to investigate the internal consistency of the scale used in this part of the questionnaire

(Crombach's alpha =0.92). In particular the increased engagement and interactivity, improved classroom discussions and the ability of lecturer to react to the student's feedback effectively (Draper and M. I. Brown,2004). The expectation was that English as-second-language (ESL) students would find the system more useful than native English speaking students. This assumption was based on the idea that most of the ESL students would be more comfortable interacting via the SMS channel as it would give them more opportunities to express themselves clearly (I. Elgort, S. Marshall, and G. Mitchell 2003).

Students were also asked to indicate their preferred of method of communication if they would like to ask the lecturer a question (traditional vs. SMS). For this question, respondents were asked to answer on a Likert scale from 1 (Raise my Hand) to 5 (Send an SMS). SMS appeared to be the strongly preferred method of communication for asking questions. Figure 3 summarizes the results.

# **Conclusions:**

The rapid proliferation of mobile phones among the student population is generating a novel platform for the development of classroom interaction systems. This research described the development of a classroom interaction system and explored the impact that mobile applications such as SMS have had on students' learning experience. The findings indicate that students and instructors can benefit from the additional channel of communication in the classroom. The lecturer perceived a gain of quality and quantity of feedback from the students. Students indicated that the system was useful - making classes more interesting and interactive. The "SMS Feedback" was found to be an

especially useful, efficient and preferred method of communication, in comparison to the traditional "raising hands" method of asking questions. While students perceived only a moderately positive impact of the system in terms of increasing their interest in the subject and enhancing their study, they indicated that they would nevertheless like to see more use of this technology in the classroom. Overall, the main inhibitor for adoption of SMS in the classroom was the cost of text messages, rather than a perception of the systems value.

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# A Strategy for Global Nursing Faculty Development: Utilizing Technology and Partnerships

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### Abstract

The Felician College (Division of Nursing and Health Management, Lodi, New Jersey) and the University of Jordan (Faculty of Nursing, Amman, Jordan) have collaborated in the development of curriculum, faculty, and students since 1986. The two academic institutions wanted to continue these activities utilizing educational technology. The goals of this Fulbright funded project were: to continue to strengthen the linkages between the two institutions, and advance the utilization of technology in nursing education. Interactive distance learning techniques fostered the advancement of a model global faculty development program between the USA and Jordan, with possible expansion to the Middle East Region. Described are the complementary strengths and limitations of each institution, the roles of technology and collaborative partners who provided funding, and technical assistance. Outcomes of the project include development of an international community of faculty and student learners, development and implementation of an online graduate nursing course in Jordan, and Jordanian students coping with unexpected technical circumstances. Discussed are graduate students' reactions to online learning, the challenges of developing an electronic international nursing faculty development program, the necessity of student, faculty, and administrative orientation to the benefits, and quality of technology enhanced educational programs, and progress of distance learning in Jordan.

### 1. Introduction

In 1986, the University of Jordan, Faculty of Nursing, developed the first Master of Science in nursing program in the country. The purposes of the program were to prepare professional nurses for leadership roles in education, and to teach in clinical specialty areas. The program graduates are from Jordan and other areas of the region. These graduates have assumed leadership roles in governmental agencies, educational and health care delivery institutions, nationally and internationally.

The vision of the Faculty of Nursing, at the University of Jordan, is to be the leading institution for undergraduate and graduate nursing education, research, and community services in Jordan and the region. Toward this end, a PhD program in nursing started in 2005.

### 2. Problem

New specialty hospitals have opened in Jordan. The increasing complexity of health care, and the rapidly growing body of knowledge in nursing, requires an expanded base of knowledge and clinical skills (1). In view of these facts, the faculty members of the graduate program believe they needed to upgrade their knowledge and clinical skills to be able to teach in a program that prepares nurses to assume advanced clinical nursing practice roles. There is no faculty continuing education program in Jordan. Therefore, the faculty strongly believed that there was a need to develop a Clinical Nursing Development Program, in Jordan, that was cost-effective, and culturally relevant. Thus, enabling them to prepare graduates with knowledge and clinical skills to meet the health care needs of the country, and the region. Additionally, the graduates of the Master of Science in nursing program will also have a venue to maintain, and periodically upgrade, their clinical skills and theoretical knowledge.

# 3. Significance of program

Usually this type of continuing education program takes place abroad, is very costly, and educates only a small number of participants, while depleting the institution's scarce economic and professional resources. Moreover, many times course material does not take into account local needs, and constraints. In addition, because most nurses are female cultural restrictions, and family responsibilities, make it difficult for them to travel abroad for further education.

**Impact of program.** Nurses are educated in the region where they live and practice their profession, through a cost-effective, and cultural relevant program. Moreover, it enables all participants to maintain their professional and traditional female responsibilities. In addition, both academic institutions retain their faculty and immediately benefit from their expanded knowledge base. The online delivery of the program provides a framework for access to new technological resources that are relevant to the current, and continuing, learning needs of the participants, and has the potential for expansion into other private and public sectors and regions; all contributing to the sustainability of the program. The program will strengthen linkages between the institutions in a sustainable way by providing a framework for both groups to resources that consider local needs, economic conditions and constraints, and the local cultural context. Moreover, the program delivery does not depend on favorable geopolitical conditions. In addition, it fosters internationalization of each institution and maximizes benefits for health care delivery in both countries. Felician College students will also be included in some selected courses. This strategy will foster collegial relationships, increase participants' cultural awareness, while exposing them to a world-view beyond New Jersey. In addition, they will have the opportunity to study with international participants as peers. The Felician College students can use this new knowledge when caring for the large Arab population in New Jersey health care institutions.

# 4. Proposed linkages

Felician College has had a collaborative relationship with the University of Jordan, Faculty of Nursing, in the development of curriculum, faculty, and students since 1986.

Both institutions wanted to continue to strengthen their linkages through the initiation of "An Online Collaborative Clinical Nursing Development Project." Felician College is a small Catholic College in the Franciscan tradition located in the New York metropolitan area with approximately 1,500 students at the time the program was initiated. The strength of Felician College was their experience with distance learning. The College had a certified online instructor, and two fully online graduate programs. However, the college does not have any videoconference facilities. The University of Jordan is a large university located in the Middle-East with approximately 22,000 students at the time the program was initiated. The strength of the University of Jordan was their *Atheer* learning center affiliated with the World Bank Global Learning Network. The University did not have a certified online instructor, or any fully online programs.

# 5. Project description

The Fulbright Alumni Initiatives Award Pilot Program funded this two-year program titled, "Online Collaborative Clinical Nursing Development Project" between Felician College, Lodi, New Jersey and University of Jordan, Amman, Jordan. The objective of this pilot program, "is to develop innovative projects that will foster institutionally supported linkages and sustainable, mutually beneficial relationships between the Fulbright scholar's home and host institution."

### **Goals:**

- Introduce distance-learning methods to the nursing faculty members in Jordan.
- Increase the number of Jordanian faculty with advanced clinical practice skills.
- Jordanian faculty will utilize newer methods of patient management when delivering complex health care.
- The Jordanian Master of Science in nursing program graduates will be prepared to plan and deliver care to patients with complex health care needs.

# 6. Program outcomes

The program goals were achieved through the development of an intensive three-week program, *How to Teach Online*, designed and implemented by a certified online instructor, conducted in the USA. The clinical portion of the training was mentored by a, nationally certified advanced practice, US graduate nursing faculty member. Four Jordanian faculty participants, who were teaching theory courses, developed online clinical courses. This exercise helped them upgrade their clinical skills, and learn new electronic resources, that they were able to share with their colleagues and students.

# **Unexpected outcomes**

An online nursing research course was developed, and taught in Jordan. The course was offered during a semester when a "rare" severe snowstorm occurred resulting in destruction of communication lines, and electrical power outages, throughout the country. Although students could not access the course from their homes, it was possible on campus. In spite of the inconvenience, students were pleased that they could go to campus at times convenient to their lifestyle, and professional responsibilities, rather than

fixed class schedules. Another, was a video conference between Felician College and the University of Jordanian chief administrators and faculty. This was made possible by Verizon telecommunication, the World Bank, and the Fulbright program. Verizon telecommunications provided the facilities of the Callaghan Learning Center in New Jersey, and conductivity to the World Bank in Washington, DC: without cost. World Bank provided satellite access to the *Atheer* learning center in Jordan: at low cost. The purpose of the videoconference was to discuss the training program that had taken place in the USA, and its impact in Jordan. This provided a forum for face-to-face dialogue of distance learning strengths and challenges. For example, program accreditation, monetary compensation for online faculty, expectations of faculty participation in on campus activities, and ongoing training and support.

During the implementation of the project the administration of the university, and the Faculty of Nursing, changed. I did not know what their philosophical beliefs were about the benefits of distance learning. This required orienting them, to the benefits and challenges of distance learning to gain their support, in the middle of implementing a funded project. In addition, I was unexpectedly invited by the United Nations Non-Governmental Section, Department of Public Information to share the project at a Communications Workshop entitled, "Affordable Communications Technologies."

# 7. Discussion

Students were pleased with the online nursing research course. In spite of the unpredicted technical problems, students appreciated being able to do course work at their convenience. This is an important consideration for busy professionals. Another consideration is no disruption of classes due to civil unrest, and students can complete their studies in a timely manner. In addition, students do not have textbook costs due to the availability of web-based information. However, students were reluctant to take examinations in the online course format. They were afraid they would make a mistake in choosing the correct answer, and incorrect electronic submission of the document. The second time the course was taught this was not a problem. This issue stressed the importance of an orientation of students to this new method of learning. Resolution of the problem is the development of an online tutorial, and requiring students complete it before the course begins.

An unexpected issue is the high cost of technologically enhanced education in Jordan, to students and the university. Due to the type of communication technology used in Jordan, at that time, even students living in Amman might pay very expensive long distance charges. Fees for online service are charged by the minute. Licensing fees for the university to use learning platforms are a major cost when student tuition and fees are low. Availability of technological equipment for students outside Amman was a problem due to the cost of computers. This problem is being address through the development of *Knowledge Stations*, an initiative founded by The King Abdullah II Fund for Development, in 2001, and administered by The National Information Technology Center. The initiative is designed to ensure that every Jordanian has access to Information and Communications Technology (ICT) in their local community. The program has targeted communities in rural and remote areas, with underserved and underprivileged populations. The goal of *Knowledge Stations* is to build universal access to information and communications technology, for all Jordanians. Communities are

supplied with computers, internet connection, and training sessions to encourage the use of the national information system, and the internet, for socio-economic development. Currently, there are 132 *Knowledge Stations*. It is envisioned that Jordan will become the Information Technology center for the region, preparing *knowledge workers* for the future. Due to periodic changes in, university and nursing program, administration there is an ongoing need for continuing education in the understanding of electronic program delivery benefits and challenges, and faculty workloads, and compensation issues. Accrediting bodies must also understand the nature of this method of education (6). With adequate faculty preparation, and peer review, this method of education can far surpass a face-to-face classroom experience. Students become more resourceful and responsible for their own learning, skills that will benefit them during their professional careers.

Some of the challenges in the electronic delivery of this program are common in other parts of the world using this method of program delivery.

### 8. Conclusion

This program achieved its goals and raised issues of program delivery not thought of before in Jordan. Felician College continues its collaboration with the University of Jordan in the development of their PhD program in nursing. Faculty continues to communicate. Recently, under another Fulbright program, a nursing faculty member from the university visited Felician College, and health care institutions in New Jersey, and lectured on health care delivery to Muslim patients.

The area that needs strengthening is student-to-student participation. An international health care delivery course planned for graduate students in Jordan and the USA, has been postponed, to be taught in the near future. It is clear from the literature that the number and size of classrooms available at one location no longer limit education programs. Nor are they limited by expertise of faculty in one country (8).

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### 10. Resources

Fulbright Program -

Council for International Exchange of Scholars

3007 Tilden Street N.W.

Washington, DC 20008-3009 http://www.iie.org/cies

The Global Development Learning Network http://www.gdln.org

The Global Development Learning Network Center "Atheer"

University of Jordan; Amman, Jordan

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# Individualized Formative Assessment Online Modules: Case Study and Potential for Enhanced Distance Education System

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### <u>Abstract</u>

For an e-learning experience to be effective, it must be so even in the limit that the distance between learner and teacher goes to zero. In this paper, we show how carefully designed computerized modules enhance learning in biomedical physiology at the Harvard-MIT Division of Health Sciences and Technology. We extract aspects that make this type of system conducive to distance learning, and propose a system that harnesses computer technologies to not just provide an online learning experience, but an overall enhanced education.

### Introduction

Intersecting technologies including affordable computers, internet and fiber optics, have enabled more people around the world to have access to basic human rights. The impact of these technologies in an array of fields such as finance [1] and health [2] has been tremendous. Motivated by movement in these fields, we have realized that there is great opportunity for better access and delivery of education around the world. However, simply providing these commodities does not make optimum use of the novel tools that are available today. We can improve on current levels of health, commerce and education even in industrialized areas with the portability, individualization, computational speed and engagement powers of technology. Here we consider how we can most effectively harness technology to make the best education, beyond the traditional didactic experience, available to a wider group of people.

### **Background of Project**

We have revised teaching of one topic in a Harvard Medical School HST Renal Physiology class with a collection of online resources that students use in combination with traditional lecture. Over four years of implementation and upgrading, we have consistently found that students prefer this type of learning experience, and have even found their performance increases. Many aspects of this project can be applied to other e-learning experiences, including both those taking place in a residential system as the one described here, or more continuous distance education settings. We have recently commenced our first exercise in dissemination, and in doing so, have extracted many aspects of the project which enhance the learning experience. Through this process, we recognize there is potential for use beyond this department and school. This second implementation is a module that will be used in the Harvard Medical School HST Cardiovascular Pathophysiology class, and as a one-lecture module it will act as a model for automating and creating an online venue for teaching. Following are descriptions of both implementations.

#### **Motivation and Implementation I**

The project was initiated as part of a consortium on biomedical engineering education. Biomedical engineering is a natural field in which to experiment because it is a relatively new field, and there is plenty of room for best practices in educational techniques, content and delivery to be established. Commencing in 2000, the National Science Foundation funded an eight-year consortium on biomedical engineering education, VaNTH [3], for Vanderbilt, Northwestern, University of Texas and the Harvard-MIT HST program. VaNTH is engaged in efforts to transform bioengineering education by developing, implementing, and assessing educational processes, materials, and learning technologies including developing courseware and curriculum. The VaNTH initiative combines learning science with biomedical engineering content and technological delivery.

Based on principles from VaNTH, we developed a module that presents capillary filtration, which is a fundamental concept in all of physiology and medical education, in the context of the kidney and incorporated it into the curriculum of the Harvard-MIT Division of Health Sciences and Technology renal pathophysiology course (HST 110) [5]. Module design is based on the learning and teaching philosophies outlined in How People Learn [4]. The module replaces the traditional problem set and textbook reading with two interactive on-line exercises that present content and provide real time formative assessment to students. The first exercise is assigned prior to the lecture and presents basic concepts in renal physiology. Student performance and feedback collected during this exercise shapes the lecture content and thus tailors it to the learners. Feedback from students and faculty has consistently been positive, and has led to improvements in the module implementation every year since the first implementation in 2003.

Principles of How People Learn have led us to design the module by focusing on the following principles for online learning experiences: a learner-centered, knowledgecentered, and assessment-centered delivery. Centering on learning means appealing to a variety of learning styles as well as identifying preconceptions that students might have and providing feedback to addresses particular misconceptions. Knowledge-centered instruction doesn't rely on memorization of facts, rather helps students consolidate and think about in different ways information they already know. Assessment-centering reinforces the fact that students already have access to the information required to learn the material from their textbooks, and concentrates efforts on evaluating knowledge of material to leverage further forms of instruction constructively. Taking these recommendations into consideration, the module we have implemented is heavily question-based, in order to assess students' level of understanding of material they should already know, and also provides multiple levels of feedback to address where their understanding is lacking. First, throughout the module students are prompted to answer questions on which they receive immediate formative feedback. The feedback is customized to address common patterns of incorrect responses. A second form of feedback occurs during the lecture. Secondly, the lecturer uses data from student responses collected during the first online exercise to inform the focus of the lecture. Students complete the second exercise following the lecture as a summary of topics learned.



Figure 1: Screen shots of instruction (a) and formative assessment questions (b) from the on-line learning exercise in HST 110.

### **Feedback and Results**

The sheer nature of the HST program brings together a set of students with diverse backgrounds and goals of study. To understand how well the module addressed this challenge, we studied students' preferences on type of learning experience based on their current degree objective. Student feedback and demographics were collected at the end of each exercise using the same on-line interface. Students were asked, amongst other questions, if they prefer this type of learning experience over traditional methods. Subjective feedback has been positive with 73 percent [5] of the graduate students (Masters, Ph.D., M.D. and M.D./Ph.D) who have been taught with the new module in HST expressing preference for online exercises over a more traditional textbook reading and problem set assignment [Figure 2a]. Negative feedback has been minimal and related mostly to technical difficulties, which were addressed during subsequent implementations of the module. To take our analysis of student feedback further, we analyzed the effect of student scholastic background on their stated preference of either computer exercise or textbook reading and a paper based problem set. One might imagine that a student with an undergraduate degree in biomedical engineering would be more adept or interested in a clinical case dealing with core biomedical concepts that were familiar to them. However, it is also possible that students with an undergraduate major in biology might not have as much experience with these core concepts and might appreciate the remediation provided by the module and the use of biology to teach a complex and quantitative concept. Learning styles of students may vary depending on the type of instruction they are accustomed to which could vary based on the types of material they have previously studied.

Another metric of evaluating the module is student performance. Year after year, a group of domain experts evaluated student performance on the exam in HST 110, grouping questions into three learning objectives based on key aspects of the content. Compared to the baseline year, when the module system was not used, student performance has increased overall [5]. In sum, this type of module has shown that a





b)

*Figure 2: Effect of undergraduate major (a) and graduate program (b) on Learning Tool Preference.* 

# Implementation II

Success of the module in HST 110 indicated that dissemination would be beneficial, and it was natural that expansion would first be within HST. All HST courses are also residential, cater to a diverse audience and contain complex topics which combine foundational concepts. We chose to implement in HST 090: Cardiovascular pathophysiology, which is a required first-year course for all MD and PhD students in the HST program, and had great support and interest from the class professor, Dr. Elazer Edelman. The cardiac cycle is a term referring to all or any of the events related to the flow of blood that occur from the beginning of one heartbeat to the beginning of the next. Thus understanding of the cycle draws on concepts in fluid dynamics, physics and anatomy and is elementary for any learning about the heart. It also is important for understanding diseased states because disorders often cause problems that end up impairing the basic cardiac cycle. Additionally, students report difficulty with this topic in the current course presentation [8]. The new module will take approximately the same time to complete as the original module (1 hour), and will include formative assessment, integrated feedback and a mechanism for informing the lecturer of student understanding. The module will be heavily assessment based since the material is also available via textbook and will be covered (as follow-up) in traditional lecture form after the module is completed.

The first module in HST 110 was implemented in CAPE/ELMS which is an online platform and database created as part of the VaNTH initiative. In creating the new module, we considered aspects of various possible implementation platforms. CAPE is specifically designed for creating educational materials, however it is less flexible than other options and to date not universal. Software such as Adobe Flash, Visual Basic and PowerPoint VBA are easy to use and able to handle complex interfaces, however they are proprietary and have substantial learning curves.

HTML and JavaScript break down quickly for complex designs. For these reasons we have chosen an opted for the very powerful platform, Django [6]. A key aspect of Django is that it's open source, as we would like to see this format usable and reproducible by anyone located anywhere. This platform fulfills all of our needs (incorporates a database, can convey all of our information in a problem and question/answer based format, easy management of test subscribers, and the code is readily viewable, editable and is portable).





Figure 3: Screen shots of instruction (a) and formative assessment (response) (b) from the online learning exercise being developed for HST 090. The slides are created in Inkscape [6] which is a Vector Graphics Editor, similar to Adobe Illustrator, which strives to be SVG Compliant, open source, responsive and extensible. Database and online functionality will be added with Django [5].

### **Expanding to Distance Education**

Distance learning has its own nuances, however we have already demonstrated that the nature of the online module enables students to learn material on their own, in their own environment, and their performance to be effectively transmitted to the instructor for comprehensive benefit.

We envision that this method can be used in combination with a distance learning lecture format, informing the lecturer before every lecture how all students, including those who may not be in the vicinity of the lecturer are performing. In a distance learning situation, this format would be implemented throughout a course, instead of for only one topic, and would also have follow-up lectures following each online exercise. This follow-up lecture may be delivered via the internet, a format which currently has been demonstrated at MIT [9]. An integral aspect of our format is this non-computerized lecturer component. This is important for personal interaction and allows for variety in communication. In fact, this is an ideal method to ensure that the students in a distance situation are keeping up with the lecturer who may be in a different city or country from the students. The interaction and involvement in such a module may also lessen the psychological distance for students at remote learning sites [10]. No one method may stand alone, and leveraging all of them in this format has numerous benefits including those we describe here. This method also allows for feedback without singling out students, yet addresses all student concerns. Figure 4 illustrates how the method can simultaneously be applied to residential and distant students, with one coordinating instructor who can lead discussion/lecture sessions after each module execution. The feedback also makes this method viable for diverse audiences, enabling administration of a class with people from a variety of backgrounds or geographies and cultures.

# **Conclusion**

Experience from revisions of the modules over years, to increase student performance and interest, has led to the following characteristics which should be considered for all elearning experiences:



Figure 4: Flow diagram showing how a modular system may be implemented to complement a traditional system with lecture and residential students.

- Material should be presented in a relevant, engaging context for students.
- Utilize computation speed and power to provide continuous assessment for realtime feedback and to gather student performance results.
- Format the module to be learning-centered, accommodating for different learning styles, cultures and backgrounds.
- Actively consider the module's content in the context of the rest of the course or parallel courses to ensure that the modules are self-contained and usable in different courses and circumstances.
- Acknowledge and leverage other resources available for instruction. A highly assessment-centric module serves to inform the instructor how well students have grasped subject matter from resources and can then use lecture time to fill in gaps

The world has become flatter in recent years [11], but the challenge will be to enable people around the world to take advantage of the level playing field. The technique we describe here is adaptive and engaging, useful for students of diverse learning styles and backgrounds. It also can be executed easily online with open source platforms. We have shown it to be effective in single instances in residential courses, but the properties we outline here make it especially conducive to repeated use in distance learning, and in fact can prove to enhance learning above and beyond traditional methods.

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# The Use of Computer in Reviewing X-Ray Films in Veterinary Practice: Between Education and Application

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#### Abstract

This work is proposed to develop computer software that can be used as an educational as well as a diagnostic tool in the field of veterinary radiology. It comprises a database of 27 normal x-ray images of adult horses of 19 different body parts with many positioning options. For each x-ray image, the standard exposure factors are displayed as a guiding piece of information. For educational purposes, some of the most common diagnosed affections of radiographic importance of different sites of the adult horse were included. The user of this tool can review and compare standard normal x-ray films with suspected abnormal ones. The program features some image processing tools to enhance the image quality and make it possible to detect more lesions in a way that had never been possible without the use of computers. This work is a step towards developing more specialized software for digital reviewing and enhancing of x-ray films. The full software is provided in the form of a CD and an internet based format for e-learning and remote consultation purposes.

#### 1. Introduction:

The history of x-rays discovery and the use of computers in education is quite interesting. X-rays were discovered on 1895, by Wilhelm Conrad Roentgen and were put to use for medical purposes in no time<sup>28</sup>. However, computers have been used in education for over 20 years. Ever since, a great number of research articles worldwide were published on the implementation of information technology in general<sup>1, 8, 10-12, 15</sup> and its effectiveness on student learning. Computer-based training (CBT) and computer aided instruction (CAI) were the first systems deployed as an attempt to teach using computers<sup>7</sup>. A case-based e-learning survey in the field of veterinary radiology showed positive student attitudes toward the e-learning tool and illustrated the differences between objective ratings and subjective assessments by students in testing a new educational intervention<sup>27, 30</sup>.

There have been many remarkable advances in conventional radiographic imaging over the past decade. Perhaps the most remarkable is the rapid conversion from film-based to digital radiographic system<sup>18</sup>. Computed radiography (CR) and digital radiography (DR) systems (x-ray systems that are producing soft-copy images) are rapidly replacing conventional film-screen systems. An exciting aspect of the conversion to digital radiography is the ability to boost the diagnostic capabilities through direct computer-aided detection of various lesions<sup>2, 3, 18</sup>. Very sophisticated image processing tools are integrated in such systems for that reason<sup>23</sup>. Some of these tools can go as far as detecting phantom details, defining regions of interest and acquiring measurements. The

integrated image processing tools may include dark noise, uniformity, exposure calibration, linearity, low-contrast and spatial resolution, spatial accuracy, laser beam function and erasure thoroughness features<sup>23</sup>. Moreover with digital radiography there is a decrease in the x-ray dose requirements for x-ray filming yet with acceptable image quality<sup>2, 18</sup>.

The aim of this research was to draw the attention to the immense uses of computed radiography and to develop a simple, specialized, straightforward, easy access, educational as well as diagnostic tool for importing, digitally reviewing, and enhancing x-ray films on computer monitor.

#### 2. Material and methods:

The computer work was divided into two parts. In part one, both normal and abnormal x-ray films were scanned and enhanced digitally for integration with the computer software. Normal x-ray films were grouped under 4 main categories: head; neck and back; thoracic limb; and pelvic limb). The abnormal x-ray films were similarly classified to be added to the software database with their diagnosis for educational purposes. Part two, was building a specialized computer software that can import external x-ray images, digitally captured or scanned, into the computer software as well as reviewing and enhancing them digitally. This was achieved using *Macromedia Director*<sup>®</sup> program version 10, running under *MS-Windows*<sup>®</sup> with a minimum screen resolution of 832x624. Then the same program was adapted to run from the internet as a shockwave application to expand its benefit. The software was completely developed by the author of this paper in Egypt.

# 3. Results

The main software interface is divided into two parts. One part is for displaying the normal x-ray image and the other is to display the suspected one. The interface exhibits image-processing tools at the bottom by which imported images can be digitally enhanced. These tools are *zooming*, *flipping*, *rotating*, *moving* and also *brightening/darkening*. An *open* button is used to import external images of x-ray films. A *reset* button was added to reset all modifications applied. The *help* button explains how to interact with the interface buttons (Fig. 1).

Radiographic parameters of each normal x-ray film are displayed as a guide. These parameters are: Focus Detector Distance (FDD), the Kilo-Voltage (KV) and the milliAmpere/second (mAs). Films taken with High definition screens and/or with Bucky are also indicated.



Figure (1): The interface. Notice the image enhancement buttons at the bottom of the interface. The Normal x-ray image is on the right hand-side and the imported x-ray film is on the left hand side. The Radiographic parameters appear below the images of normal film.

# 4. Discussion

The use of computer and its applications especially in the medical field became inevitable<sup>21</sup>. Computed radiography has been used in human medical imaging since the 1980s with recent acceptance in the veterinary profession<sup>17</sup>.

The practice of digital radiography is a rapidly evolving technology that requires timely revision of any guidelines and standards<sup>14, 29</sup>. Over the past two decades, the development of computed radiography has transformed the face of radiological imaging<sup>4</sup>. Using advanced image capture and computer technology, radiographic images are viewed on a computer monitor<sup>17</sup>. Digitization of clinical data as one of the new technologies and their potential application to the diagnosis of diseases is becoming increasingly important in veterinary medicine<sup>16, 19, 20</sup>. The opportunity for increased productivity and diagnostic capabilities makes the computerization of veterinary medicine especially exciting. Future trends seem to indicate that more veterinarians should have better technology available in

their practices<sup>16</sup>. The potential of CR in veterinary medicine is driving the development of specialized software for veterinary medicine<sup>24</sup>.

Computed radiography is a useful tool for the veterinarians and has many advantages<sup>6, 22, 24</sup>. Radiographic images can be adjusted using dedicated computer software to maximize diagnostic image quality. Digital images can be accessed at computer workstations throughout the hospital, instantly retrieved from computer archives, and transmitted via the internet for consultation or case referral. Digital image acquisition is faster when compared to conventional screen-film radiography, improving workflow and patient throughput. Digital radiography with computerized image-processing tool greatly reduces the need for 'retake' radiographs, also eliminates the costs associated with radiographic film acquisition and processing. Digital radiographic data can also be incorporated into hospitals filing system, making record keeping an entirely paperless process<sup>17, 25</sup>. The only major disadvantage is the cost, and time. In the future, as is the case with any computer-based technology, this modality will become affordable and available<sup>24</sup>.

Normal x-ray films included within this program were all adjusted to be viewed according to the most recent convention, having the cranial side towards the left handside, and the caudal towards the right hand-side. X-ray images taken from old sources<sup>26</sup> were fitted to follow this principle. The computer program has a tool to flip the imported images to follow the same principle. The listing of the different radiographic parameters helps the young veterinarians to learn and achieve excellent radiographic results with the minimum effort. It will increase their learning capability through studying already diagnosed cases that were included in the software database. As interpreting the clinical significance of radiographic findings is always difficult and sometime confusing<sup>9</sup>, some research work was published focusing on listing normal radiographic, anatomic structures simulating disease entities in horses<sup>13</sup>. Similarly, other researchers worked on radiographic interpretation of normal skeletal variations and pseudo-lesions in the equine foot<sup>5</sup>. Some textbooks have dedicated special chapters on "normal variations and incidental findings" in an attempt to differentiate between variations which have no clinical significance and those that may be clinically significant<sup>9</sup>. The use of sophisticated images enhancing tools with the idea of computer-aided-lesion-detection; will enhance the radiologist's accuracy and efficiency<sup>18</sup>.

The side-by-side viewing methodology adopted in this software, together with the use of image enhancing tools makes the accompanying computer software a straightforward educational as well as diagnostic one. Constant observation of standard normal x-rays from the software database will adapt the student's eyes to the normal radiographic view of different body parts. When faced with abnormal x-ray film, it will be much easier to detect the abnormality. Moreover, it will be less difficult to focus on any part of the viewed radiographic film that consequently will reduce the number of the abnormalities that can be easily overlooked without the aid of computer. For future work and for educational purposes, images of x-rays with affections can be captured side-by-side to a normal x-ray film and used in the form of quizzes, multiple choices, right/wrong questions for young learns to identify the problems seen in the x-ray film and detect the abnormalities through the process of interactive learning. A database of adult horse x-ray was used in this computer work for veterinary students, but it can be adapted for other

species or for other medical professions to expand its usage. The main advantages of using such model can be categorized under three main headings: 1- Educational, 2-Diagnostic and 3-Financial. Educationally, this model is good for self-training and selfeducation. When published on the Internet, it will allow remote teaching (teacherstudent) as well as professional consultations between professionals and practitioners. From the diagnostic point of view, it will improve image quality and therefore the diagnostic capabilities. Financially, it will reduce the costs associated with film retaking and developing procedures.

In conclusion, with the great advances in computer sciences and applications, we as medical professionals should keep our eyes on the future potentials of these technologies for education, diagnosis and treatment. This computer program is only a small step towards a huge world of possibilities and is designed to unmask some of the computer power in the field of medicine, especially veterinary radiology.

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# Use of Information and Communication Technology among Dental Students at the University of Jordan

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#### Abstract

The aim of this study was to investigate the current knowledge, skills, and opinions of undergraduate dental students at the University of Jordan, with respect to Information Communication Technology (ICT). Dental students from the second, third, fourth, and fifth year were asked to complete a questionnaire presented in a lecture at the end of the second semester in the 2002-2003 academic year. The response rate was 81%. Besides free and unlimited access to computers at the school of dentistry, 74% of the students had access to computers at home. However, 44% did not use computer regularly. Male students were more regular and longer users of the computers than females (p < 0.001). A significant number of students (70%) judged themselves competent in Information Technology (IT) skills. More males felt competent in basic IT skills than females (p < 0.05). More than two thirds acquired their computer skills through sources other than at the university. The main educational use of computers was accessing the Internet, word processing, multimedia, presentations, Medline search, and data management. More clinical students felt competent in word processing skills (p < 0.05) and many more used word processing for their studies (p < 0.001) than preclinical students. More males used word processing for their studies than females (p < 0.001). Students used computers for personal activities more frequently than they did for academic reasons. More males used computers for both academic (p < 0.01) and personal activities (p < 0.001) than females. All students had access to the Internet at the university and 54% had access at home. A high percentage of students (94%) indicated they were comfortable using the Internet, 75% said they were confident in the accuracy and 80% said they were confident in the relevance of information obtained from the Internet. Most students (90%) used e-mail. Students (83%) supported the idea of placing lectures on the web and 61.2% indicated that this would not influence lecture attendance. Students used the Internet more for personal reasons than for study of dentistry. More clinical students used the Internet for dentistry than preclinical students (p < 0.001). More males used Internet for dentistry (p < 0.01) as well as for pleasure (p < 0.01) than females. Time and availability were the main obstacles to Internet use.

Dental students at the University of Jordan have access to substantial IT resources and demonstrated attitudes toward the computer and Internet technology and use that were similar to other students in other nations. However, the educational use of ICT among Jordanian students remains low.

#### 1. Introduction

The past few years have seen rapid advances in information and communication technology (ICT), and the pervasion of the worldwide web into everyday life has important implications for education.

Computer-Assisted Learning (CAL) in dental education first emerged in 1971 with its introduction at the University of Kentucky [1]. CAL use along with advances in information and communication technology is rapidly increasing [2]. Nowadays there is general awareness of the potential benefit of CAL all over the world, including the developing countries, and many faculties recognize the need to exploit the capacities of ICT to enhance their educational programs.

The rapid development in computer technology and the wide availability of personal computers together with the Internet, e-mail and various medical literature retrieval applications have changed both the study and the practice environments in dentistry, as in other disciplines [3-5]. Electronic learning allows students to work at their own time and pace [6]. IT in medical and dental teaching is focused on web-based teaching, which comprises communication, interactivity and displaying clinical images. Other uses of the new technology and media and in dentistry include education for both the patient and the dentist, electronic records and data bases, digital imaging, communication between practitioners and colleagues, exposure to new products and developments, marketing dental practices, access to information such as lectures and course material, and 'teledentistry', which allows interactive programs and live consultations thereby enabling people at distant locations to learn without traveling too far [3,6-10].

Upon entering dental schools, students have variable levels of competence in the use of computers. In Jordan, all schools provide mandatory courses in basic computer skills (introduction to computers and Internet, Windows, Microsoft office and the basics of software programming). The University of Jordan is linked to the Internet to help faculty, staff and students to gain access to all sorts of updated information that are relevant to their teaching and research activities at the university. All faculty members and students have easy and free unrestricted access to computers and to the Internet. All students are registered to use the computers at the beginning of their studies, and are allocated e-mail accounts. Almost all the teaching staff have personal computers with Internet access in their own offices; they are encouraged to enroll in courses provided by the university to acquire information and communication technology (ICT) skills. From 2005 all teaching staff were required to obtain the Jordan University Computer Driving License (similar to the International Computer Driving License) as a requirement for their academic promotion. At the school of dentistry, the use of ICT as a tool to support dental teaching and learning was introduced few years ago without a well-defined strategy. One reason may be the great diversity of ICT skills among both teachers and students.

Observations on students' competence with ICT are few and carried out mostly in countries where informatics is well developed [11]. There have been no studies on ICT in education involving dental schools in the Middle East. The aim of this study was to investigate the knowledge, skills, and opinions of undergraduate dental students at the University of Jordan, with respect to ICT.

2. Materials and Methods

The sample in this study consisted of students from the second to fifth year enrolled at the school of dentistry at the University of Jordan. To conduct the study, a questionnaire derived from three previous surveys was used [9,12,13]. The questionnaire (questions and results are displayed in tables 1 - 6), consisted of 28 multiple choice questions and 4 short answer questions. The questionnaire was circulated to the students' council to obtain comments on its applicability. The items in the questionnaire concerned computer access (questions 1-3), computer skills and training (q 4-7), computer activities (q 8-14), Internet access (q 15-22), and activities involving the Internet and dentistry (q 23 - 32) were assessed.

Data collection took place at the end of the second semester in 2003. Students from the second, third (preclinical), fourth, and fifth year (clinical) were asked to complete the questionnaire. The first- year students were excluded from the study because they were not yet involved in dental courses and it was difficult to contact them since they undertake courses taught by the faculty of science. Estimated time to complete the questionnaire was ten minutes. The questionnaire was distributed in appropriate lectures and retrieval was done immediately.

Participation in this study was voluntary and all participants remained anonymous. Information on gender, age, and year of study was included in the questionnaire. The questionnaire and its administration were approved by the Dean of the School of dentistry. The second-year class (95) consisted of 38 males and 57 females; the third year- class (86) consisted of 37 males and 49 females; the fourth-year class (81) consisted of 33 males and 48 females; and the fifth- year class (70) consisted of 19 males and 51 females.

The data were processed and analyzed by means of the Statistical Package for the Social Sciences (SPSS PC Version 10.0). All of the responses were treated as an equal in weight within questions and among questions. The Chi-square test was used to compare the answers from gender and from the preclinical and clinical year students. The level of statistical significance for all tests was set at p < 0.05.

#### 3. Results

An overall response rate of 81% (268 out of 332) was obtained. Individual class response rates for the second to the fifth year were 74 % (n=70), 74% (n=64), 91 % (n=74), and 86% (n=60), respectively. Out of 268 respondents, 38.4% (103) were males and 61.6% (165) females. There was no statistically difference in gender distribution among participants from each year ( $x^2 = 6.38$ , d.f. =3, p= 0.095).

Jordanian dental students are young in comparison to dental students in other nations because they can enter dental school directly after graduating from high school. At the time of the survey, the respondent's age ranged from 19 to 25 years, with a median age of 21 years; 51% of students were aged 21 years and under, 46% between 22-23 years, and only 3% between 24-25. No significant differences were found in knowledge, skills, and opinions of students with respect to ICT between the different ages.

The following sections summarize the students' responses to the questionnaire in relation to the following categories: computer access, computer skills and training, use of the computer for academic reasons, internet access, and use of the internet for the study of dentistry.

## **3.1 Computer access (Table 1)**

Besides having free and unlimited access to computers at the school of dentistry, 73.9% of the students had access to computers at home. The majority of students were satisfied when asked about the access and availability to the computers.

#### **3.2** Computer skills and training (Table 2)

Forty four percent of the students reported that they did not currently use a computer regularly, and 33% had used it regularly for more than 3 years. Male students were more regular and longer users of the computers. A significant difference was found between males and females in the length of time students said they had been using a computer regularly (p<0.001; Table 3).

When asked about their competence in IT skills, more than two thirds of the students reported that they were competent in at least some basic IT skills. More males felt competent in computer skills than females (Table 3) and the difference was significant (p<0.01). Sixty five percent of students who judged themselves as unable/beginners in IT skills were not using a computer regularly, and only 14% had used computers for 3 years or more. Twelve percent of students who judged themselves competent in most basic skills were not currently using a computer regularly, and 70% had used computers for 3 years or more.

More than two thirds of students (69%) gained their IT skills through personal study and experience and only 21% through the university courses. Thirty eight percent of students who judged themselves as unable/beginners had received their IT training at the university, and 53% through personal study and experience. Only 9% of students who judged themselves competent in most basic skills had gained their IT training at the university, whereas 86% through personal study and experience.

The students were split as to the quality of IT training at the university: more clinical year students found training at the university as poor/very poor than preclinical year students (p<0.001, Table 3).

#### 3.3 Students' use of the computer for academic reasons (Table 4)

Students reported that their primary academic (school-related) uses of the computer were access to Internet and word processing. While 81% of the students believed themselves competent in at least some basic word processing skills, more clinical students felt competent in most skills than preclinical students (41% versus 28%, p<0.05). As shown in Table 3, many more clinical year students used word processing, presentation, and Medline for their studies than preclinical year students. Although equal proportions of both gender believed themselves competent in word processing, more males used word processing, as well as multimedia presentations (PowerPoint), and data management for their studies than females.

The majority of students (91%) used computers for academic activities and almost all (96%) used computers for personal activities. Few students (3.7%) reported that they used computers everyday and approximately half (48%) reported that they used it once a month for academic activities. In contrast, 21.6% of the students reported using computers everyday and 15.7% once a month for personal activities. When the preclinical and clinical year students were compared, no significant differences were found neither for academic activities or personal activities. However, when comparing gender, more males used computers more frequently for academic (p<0.01; Figure 1A), and for personal activities (p<0.001; Figures 1B) than females.

As well as having access to printers at the university, about the half of the students had access to printers at home. Eighty-three percent of students described their access to printers as being very good or good.

#### **3.4 Internet access (Table 5)**

As shown in Table 5, 54% of the students had access to the Internet at home. Most students were satisfied with their access to the Internet. When asked about the use

of the Internet, 94% of the students were comfortable, and 89% were satisfied with the speed of the Internet. In terms of their level to confidence with regard to the accuracy of information on the Internet and relevance of information on it; 13% were very confident and 75% fairly confident or average in the accuracy. Also, 11% were very confident, 80% fairly confident or average in the relevance. Almost all the students (90%) used the e-mail, with 69% using it at least once a week.

#### **3.5** Activities involving the Internet and dentistry (Table 6)

The majority of students (83%) were in favor of the idea of placing undergraduate lectures on the school website. Around two thirds of students (61.2%) did not expect that this would influence attendance at lectures, and 11.2% felt that this would stop them going to lectures. More students used Internet more frequently for pleasure than for dentistry. More clinical students used the Internet more frequently for dentistry than preclinical students (p<0.001; Figure 2A). Also, a significant difference was found when comparing gender; more males used Internet for dentistry (p<0.01) as well as for pleasure (p<0.01) than females (Figure 2B).

Perceived barriers to use of the Internet are shown in Table 6. Time and availability of computers were the most important obstacles to using the Internet while confidence in the ability to use the Internet was the least frequently identified barrier.

Students reported that they often used several non-dental websites. As shown in Table 7, Yahoo was the most commonly used search engine (23%), and Medline was identified as the most visited dental site (9%). The Internet was used by 35% of the students for entertainment (music news, fashion, religion, and culture, etc.). Almost all students (95%) would like materials related directly to undergraduate dental curriculum to be available on the Internet.

#### 4. Discussion

Several studies have reported on information technology (IT) and the use of Internet in dental education and their potential use as an educational tool [1-15]. This study surveyed the current knowledge, skills, and opinions of dental students at the University of Jordan, with respect to ICT.

Analyzing IT skills is especially difficult when comparing results over a span of years; what would be seen as a trivial computer task today may have required advanced knowledge few years ago. The overall impression of the present study is that dental students at the University of Jordan seemed to have comparable computer literacy skills and similar availability of computers and Internet of that of dental students in other countries [9,12,13]. Dental students as all University of Jordan students have free and unlimited computer access. More than two thirds of the students reported that they had access to computers at home. This finding is consistent with data found in an earlier study conducted in a European dental school [12] where 72% of the students had access to computers at home.

A high proportion (44%) of Jordanian students in our study did not use a computer regularly. This is higher than the 5% for Bristol, 20% for Manchester, and 22% for Newcastle students cited in a study conducted in the UK [13]. One third (33%) of the students said they had been using a computer for more than 3 years which compared favorably with 20% for Manchester and 14% for Bristol students [13]; although our percentage is less than the 57% reported in the UK study for Newcastle students [13]. Dental schools are managing IT in vastly different ways; the inequality regarding the educational use of computers among the difference in the length of time that students said they had been using a computer regularly. For example, 27.2% of males versus 54.5% of females responded that they were not currently using a computer regularly.

Nearly 50% of males versus 23% of females reported that they had been using a computer for more than 3 years. This is consistent with the findings of previous studies that showed that male students were more likely to use computers than females [14,15]. It appears that male students are much more eager to search for computer courses using their own initiative, favoring the freedom of time and space offered by electronic learning, while females may be more pragmatic and more focused on exams with a tendency to rely on education provided by their instructors [9,16].

Jordanian dental students now enter the university with basic computer knowledge as all primary and secondary schools provide teaching in basic computer skills that includes introduction to computers, Windows, Microsoft Office and Internet. At the time when the students who participated in the present study were in high school, courses in basic computer skills were not provided in all of these schools. Even though the dental school provides computer education as part of the curriculum, competent students have acquired their IT skills through sources other than the university. More than two thirds of students gained their IT skills through personal study and experience and one fifth through the university courses. There were clear differences in students' perception of the IT training at the university they received, and more clinical year students (66%) rated the quality of IT training they received at the university as poor/very poor than preclinical students (39%). It is possible that courses in computer and communication skills offered by the University of Jordan for dental students as part of their first year curriculum do not meet the needs to achieve the required work during the clinical years. This finding was confirmed in a previous study [9] where the authors attributed the difference to the possibility that some of the students were not fully aware of the content of their curriculum, or that other students considered that their demands were not being met by the computer courses offered. Therefore more emphasis could be laid on the management of more advanced operating systems in the dental undergraduate curriculum [17].

The findings of the present study are consistent with the findings of previous studies where student's self assessment of their IT skills tended to be lower than their assessment of word processing skills [13,18]. While 29.5% rated themselves as beginners in IT skills, and 71.5% as competent, there was a drop in the percentage of those who rated themselves as beginner in word processing (19.4%) and increase in the percentage of students who rated themselves as competent (80.6%). These levels of confidence in producing a written assignment probably conceal a general improvement in ability since the power of Microsoft Word has increased over the past five years [13]. Many more clinical year students used word processing, presentation, and Medline for their studies than preclinical year students; this may reflect the amount of work that requires word processing and literature search for writing reports, clinical seminars, and presentations during the clinical years of study. More males used word processing, as well as multimedia, presentation, and data management for their studies. This could be attributed to the likelihood that males are keener on expressing their skills gained through non academic activities in their studies than females.

The results of this questionnaire indicated that nearly all students (91%) at the University of Jordan were using computers for academic activities. This finding is similar to the outcomes of a survey conducted in 16 European dental schools [9].

*All* students at the University of Jordan have unlimited access to printers in the university and almost half of dental students have printers at home. This could explain why only 17.2 % of them rated access to printers as poor compared with 45% for Bristol, 26% for Manchester and 14% and Newcastle students quoted in a recent study from UK [12].

Even though dental students have access to the Internet in the university, not everyone has the Internet available to them all the time. This is especially true for students where over half did have Internet access at home. This is consistent with data found in an earlier study [12] where the authors assumed that a complete move to Internet based curriculum will prejudice those individuals without Internet access at home and would be biased towards those students who have it.

There have been substantial changes in dental education area over the past decade. Many dental schools have moved towards problem-based learning [6,10,12-14,19]. Implementation of computer-supported collaborative [20] has driven IT investments and implementation in some schools [6,12-13,21-22], hence the authors of this study believe that the value of available Internet resources and of electronic communication in supporting dental learning can no longer be denied. In the present study, the majority of the students reported that the information on the Internet was "fairly" or "moderately" relevant to dentistry and accurate. This is in agreement with the results found in a recent study [12]. This may reflect an ongoing improvement in the quality of websites providing dental informatics. Perhaps, improved Internet availability and connection speed and the mandatory undergraduate teaching of computer facilities and dental informatics will increase the confidence in the relevance and accuracy of information relevant to dentistry on the Internet by students.

Almost all students who responded to this questionnaire used e-mail. At the time this paper was written, the school of dentistry at the University of Jordan did not use email as a mandatory route of communication (versus using paper communication) among dental students or among faculty. Several universities around the world have successfully started using e-mail as a mandatory communication, and the Internet as a mandatory information and communication channel [16]. However, in 2007, the University of Jordan has opened direct route of communication, via the email, between faculty and students. In addition, many of the official letters and correspondence between staff are done through the email, although its use is not mandatory.

One of the great advantages of online teaching is allowing students to focus more on managing their own learning and to work at their own time and pace; it also allows the use of sound, videos and animation to communicate information [6]. The use of online handouts and lecture notes can be used to support lectures and free up time to allow for face to face contact with the lecturer such as small group teaching [23]. However, the lack of communication with peers and instructors, absence of evaluation, as well as the fact that courses appeared to be outdated were the most negative aspects encountered in web-based learning [24,25]. One of the first steps that could successfully tackle this problem is to encourage teaching staff to put lectures and teaching material on the web [6,12]. The students in this survey and others [12] showed enthusiasm to the idea of putting lectures and teaching material on the web, and asserted that this would not stop them from attending lectures. The vast majority of students in the present study enjoyed the experience with the Internet. However, there is no doubt that the Internet can be a distracting medium. This is demonstrated by the responses of the students of the present study who used the Internet more often for pleasure versus academic reasons; a finding similar to that of a previous study conducted by Walmsley, et al. [12]. The main obstacles which were identified by students as barriers to using Internet were time (i.e., delays in getting online for students who access the internet with a dial-up system), and availability of computers. Confidence in the ability to use the internet was not perceived to be a barrier by most students; the Internet is part of the current digital age and is enthusiastically embraced by the 'younger'generation [26].

The results of this study indicate that dental students at the University of Jordan had access to substantial IT resources, demonstrated attitudes toward the computer and the Internet and reported levels of use that were similar to other students in other nations. This comes as no surprise in the age of globalization where knowledge knows no boundaries.

Since this paper was written many changes have been introduced in the University at large; there are now over 2000 PC available for students, distributed in 24 labs and the objective is to reach (1:5) PC-student ratio. Students now register for their courses online and obtain their exam results either online or on their mobile handsets through a special arrangement with the mobile service providers. The processing of grades by faculty is now 'paperless', this is done through a special secure software making this a speedy and accurate process. Wireless internet connection is available in many places at the University including the lecture halls at the school of dentistry. All students at the University are required to pass a computer skills exam on their admission to the University during the first semester, or take a mandatory computer skills course. The University of Jordan library has undergone a quantum leap into the digital age in the last few years, there is now an electronic library accessible to students and staff inside and outside campus, it has an expanding number of electronic journals and CD books allowing access to full text articles and books by many publishers. In the school of dentistry, the curriculum has been improved to include an advanced course on the use of computers in the second semester of the first year. Some of the subjects in the clinical years of the curriculum require students to utilize web-based resources during the course, as a result students are guided on how to locate articles and information of sufficient validity and quality. All lectures and presentations are now presented as Power Point; many of the faculty publish their lectures and additional teaching material online allowing free unlimited access to students anytime, anywhere. Since 2006, most of the objective practical and theoretical tests are computer aided, this has reduced time required to develop and analyze tests also the opportunities to create test item bank and to obtain results immediately [27]. In addition, the detailed curriculum is now available online, and the computerization of all patients records and administration including the main store of the school is underway.

There is no doubt that compared with its potential, computer technology is still lacking in our dental school, but this problem is not uncommon even in the developed world. Some of the reasons, as stated by Welk et al [28] include: the high investment cost for the use of new CAL systems in dental education, a new kind of professional development and change in both the curriculum and instructional goals are required, and finally the production of good computer assisted teaching materials is time and costconsuming and requires cooperation amongst clinicians, software developers, and educational technologists. The introduction of new legislation to posses the JUCDL as a prerequisite for academic promotion and computer competence for appointment as a faculty member are important to encourage academics to adopt this route, but perhaps more steps to encourage faculty to develop computer-assisted instruction and curricula offering academic credits necessary for promotion maybe essential [29]. There is little systematic research to judge the overall effectiveness of CAL in dental education, the medium is young and evolving rapidly [30]. Although, the school of dentistry at the University of Jordan has not fully adopted CAL in dental education but it is not sparing any effort in using this technology as an important adjunct to traditional teaching. It is the authors' opinion that multimedia materials and learning software could greatly enhance the learning process, but more efforts should be placed to integrate CAL in the curriculum. Therefore, the development and sharing of learning material and educational tools for undergraduate dentistry should be a high priority for the dental schools in the future.

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		%	N
1	Do you have access to a computer?		
	Yes	100	268
	No	0	0
2	If yes, please answer the following questions:		
	At university	100	268
	At home	73.9	198
	Other place(Internet cafe)	2.6	7
	Home and Internet café	1.1	3
3	How would you describe the access and availability of the computer?		
	Good/very good	45.1	121
	Adequate	48.5	130
	Poor/very poor	6.3	17

<u><b>1</b>able 1: Questionnaire items on computer access</u>
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		%	N
4	How long ago did you first start using a computer regularly?		
	Not using regularly	44	118
	1-6 months ago	3	8
	7-12 months ago	1.5	4
	13-24 months ago	4.5	12
	25-36 months ago	13.8	37
	37 or more months ago	33.2	89
5	How would you grade your general IT skills (Windows, Microsoft Office, and Internet)?		
	Unable/beginner	29.5	79
	Competent in some basic skills	54.5	146
	Competent in most basic skills	16	43
6	How did you familiarize yourself with computers?		
	Through a course in the university	21.3	57
	Through personal study and experience	69	185
	Through a special course	6.3	17
	Through a course in the university, personal study and experience, Through a special course	1.1	3
	Through a special course and personal study and experience	1.1	3
	Through a course in the university and personal experience	1.1	3
7	How would you describe the quality of IT training you received?		
	Good/very good	8.2	22
	Adequate	39.6	106
	Poor/very poor	52.5	140

Table 2: Questionnaire items on computer skills and training

		by gende	er.			
	B	y year		В	By gender	
	Preclinical	Clinical		Male	Female	
	%(N)	%(N)	р	%(N)	%(N)	р
Length of time students said the	hey had been us	ing computers	s regula	rly		
Not using regularly	44.8%(60)	43.3%(58)		27.2% (28)	54.5% (90)	
1-6 months	3.7%(5)	2.2%(3)		3.9% (4)	2.4% (4)	
7-12 months	3%(4)	0%(0)	Ne	1.0% (1)	1.8% (3)	***
13-24 months	3.7%(5)	5.2%(7)	113	4.9% (5)	4.2% (7)	
25-36 months	13.4%(18)	14.2%(9)		13.6% (14)	13.9% (23)	
37 or more months	31%(42)	35.1%(47)		49.5% (51)	23.0% (38)	
Total	100(134)	100(134)		100(103)	100(165)	
IT skills						
Unable/beginner	30.6%(41)	28.4%(38)		28.2%(29)	30.3(50)	
Competent in some basic skills	65%(75)	53%(71)	Ns	43.7%(45)	61.2%(101)	**
Competent in most basic skills	13.4%(18)	18.7%(25)		28.2%(29)	8.5%(14)	
Total	100(134)	100(134)		100(103)	100(165)	
Quality of IT training at the u	niversity				I I	
Good/very good	11.9(16)	4.5(6)		12.6(13)	5.5(9)	
Adequate	49.3(66)	29.9(40)	***	37.9(39)	40.6(67)	Ns
Poor/very poor	38.8(52)	65.7(88)		49.5(51)	53.9(89)	
	100(134)	100(134)		100(103)	100(165)	
Computer activities						
Internet	79.1%(106)	85.8%(115)	Ns	78.6%(81)	84.8%(140)	Ns
Word processing	25.4%34	48.5%(65)	***	46.6%(48)	30.9%(51)	**
Multimedia	18.7%(25)	26.1%(35)	Ns	36.9%(38)	13.3%(22)	***
Presentation	10.4%(14)	22.4%(30)	**	24.3%(25)	11.5%(19)	**
Medline	0%(0)	23.9%(32)	***	10.7%(11)	12.7%(21)	Ns

Table 3: The Computer skills and training, and the computer activities used for study by year, and

Data management	2.2%(3)	9%(12)	Ns	10.7%(11)	2.4%(4)	**
Total number	471	l		47	'1	

Ns: not significant \*p<0.05, \*\*p<0.01, \*\*\*p<0.001

		%	Ν
8	What features of computers do you use more in the pursuit of your studies?		
	Word processing	36.9	99
	Multimedia	22.4	60
	Internet	82.5	221
	Presentations	16.4	44
	Medline	11.9	32
	Data management	5.6	15
	Other	2.2	6
9	How would you rate your ability to use a word processor to produce a page of text?		
	Unable/beginner	19.4	52
	Competent in some basic skills	45.9	123
	Competent in most basic skills	34.7	93
10	How often do you utilize the computer for academic activities?		
	Everyday	3.7	10
	2-3 days a week	13.1	35
	Once a week	25.7	69
	Once a month	48.1	129
	Never	9.3	25
11	How often do you utilize the computer for personal use?		
	Everyday	21.6	58
	2-3 days a week	27.2	73
	Once a week	31.7	85
	Once a month	15.7	42
	Never	3.7	10
12	Do you have access to a printer?		
	Yes	100	268
	No	0	0
13	If yes, please answer the following questions:		

Table 4: Questionnaire items on computer activities

	At university	100	268
	At home	48.5	130
	Other place(Internet cafe)	3.4	9
	At home and Internet cafe	0.7	2
14	How would you describe the access and availability of the printer?		
	Good/very good	34	91
	Adequate	48.9	131
	Poor/very poor	17.2	46



Figure 1(A): Frequency of using computers for academic activities by gender (p < 0.01).



Figure 1(B): Frequency of using computers for personal activities by gender (p<0.001).

		%	Ν
15	Do you have access to the Internet?		
	Yes	100	268
	No	0	0
16	If you answered yes to using Internet, please answer the following question:		
	At university	100	268
	At home	54.1	145
	Other place(Internet cafe)	4.5	12
	At home and Internet café	2.2	6
17	How would you describe the access and availability of the Internet?		
	Good/very good	41.8	112
	Adequate	51.9	139
	Poor/very poor	6.3	17
18	How easy do you find the Internet to use?		
	Very easy	36.9	99
	Fairly easy	32.8	88
	Average	24.3	65
	Not very easy	4.9	13
	Not at all easy	1.1	3
19	How quick do you think it is to use?		
	Very quick	17.5	47
	Fairly quick	36.2	97
	Average	35.1	94
	Not very quick	9.3	25
	Not at all quick	1.9	5
20	Overall, how confident are you with regard to the accuracy of information on the Internet?		
	Very confident	12.7	34
	Fairly confident	33.6	90
	Average	41.8	112
	Not very confident	11.2	30
		1	1

# Table 5: Questionnaire items on Internet access

	Not at all confident	0.7	2
21	Overall, how confident are you in the relevance of information on the Internet?		
	Very confident	10.8	29
	Fairly confident	33.2	89
	Average	46.6	125
	Not very confident	8.2	22
	Not at all confident	1.1	3
22	How often do you use e-mail?		
	Everyday	15.7	42
	2-3 days a week	19.4	52
	Once a week	34	91
	Once a month	21.3	57
	Never	9.7	26

Table 6: (	<b>Questionnaire items on</b>	activities involving	g the Internet and dentistry

		%	Ν
23	How useful do you think lecture notes on the school web site would be?		
	Very useful	31.3	84
	Fairly useful	23.9	64
	Average	27.6	74
	Not very useful	13.1	35
	Not at all useful	4.1	11
24	Do you think this would stop you going to lecture?		

	Yes			11.2	30
	No			61.2	164
	Possibly			27.6	74
25	How often do you use the Internet for dentistry?				
	Everyday			2.6	7
	2-3 days a week			7.8	21
	Once a week			13.8	37
	Once a month			47.8	128
	Never			28	75
26	How often do you use the Internet for pleasure?				
	Everyday			11.9	32
	2-3 days a week			21.3	57
	Once a week			32.5	87
	Once a month			24.6	66
	Never			9.7	26
27	Do any from the following stop you from using the Internet?				
		Y	es	N	lo
		Y.	es N	N %	No N
	Viruses	<b>Y</b> % 14.6	es N 39	% % 85.4	No N 229
	Viruses Cost of use	Y           %           14.6           20.5	es N 39 55	N % 85.4 79.5	N 229 213
	Viruses Cost of use Time-if the line is busy	Y           %           14.6           20.5           57.8	es N 39 55 155	%           85.4           79.5           42.2	No N 229 213 113
	Viruses Cost of use Time-if the line is busy Availability of computers	Y           %           14.6           20.5           57.8           26.1	es N 39 55 155 70	%           85.4           79.5           42.2           73.9	N           229           213           113           198
	Viruses Cost of use Time-if the line is busy Availability of computers Confidence in the accuracy of information	Y           %           14.6           20.5           57.8           26.1           4.9	es N 39 55 155 70 13	%           85.4           79.5           42.2           73.9           95.1	N           229           213           113           198           255
	Viruses Cost of use Time-if the line is busy Availability of computers Confidence in the accuracy of information Confidence in the ability to use	Y           %           14.6           20.5           57.8           26.1           4.9           7.1	es N 39 55 155 70 13 19	%           85.4           79.5           42.2           73.9           95.1           92.9	No N 229 213 113 198 255 249
28	Viruses         Cost of use         Time-if the line is busy         Availability of computers         Confidence in the accuracy of information         Confidence in the ability to use         Have you visited any sites of interest?	Y           %           14.6           20.5           57.8           26.1           4.9           7.1	es N 39 55 155 70 13 19	%           85.4           79.5           42.2           73.9           95.1           92.9	N 229 213 113 198 255 249
28	Viruses         Cost of use         Time-if the line is busy         Availability of computers         Confidence in the accuracy of information         Confidence in the ability to use         Have you visited any sites of interest?         Yes	Y           %           14.6           20.5           57.8           26.1           4.9           7.1	es N 39 55 155 70 13 19	%           85.4           79.5           42.2           73.9           95.1           92.9           80	No N 229 213 113 198 255 249 215
28	Viruses         Cost of use         Time-if the line is busy         Availability of computers         Confidence in the accuracy of information         Confidence in the ability to use         Have you visited any sites of interest?         Yes         No	Y           %           14.6           20.5           57.8           26.1           4.9           7.1	es N 39 55 155 70 13 19	%           85.4           79.5           42.2           73.9           95.1           92.9           80           20	N           229           213           113           198           255           249           215           53
28	Viruses Cost of use Time-if the line is busy Availability of computers Confidence in the accuracy of information Confidence in the ability to use Have you visited any sites of interest? Yes No Open ended questions	Y           %           14.6           20.5           57.8           26.1           4.9           7.1	es N 39 55 155 70 13 19	N % 85.4 79.5 42.2 73.9 95.1 92.9 80 20	N           229           213           113           198           255           249           215           53
28	Viruses Cost of use Time-if the line is busy Availability of computers Confidence in the accuracy of information Confidence in the ability to use Have you visited any sites of interest? Yes No <b>Open ended questions</b> List your favorite non-dental sites.	Y           %           14.6           20.5           57.8           26.1           4.9           7.1	es N 39 55 155 70 13 19	N % 85.4 79.5 42.2 73.9 95.1 92.9 80 20	N           229           213           113           198           255           249           215           53
28	Viruses Cost of use Time-if the line is busy Availability of computers Confidence in the accuracy of information Confidence in the ability to use Have you visited any sites of interest? Yes No <b>Open ended questions</b> List your favorite non-dental sites.	Y           %           14.6           20.5           57.8           26.1           4.9           7.1	es N 39 55 155 70 13 19	N % 85.4 79.5 42.2 73.9 95.1 92.9 80 20	N           229           213           113           198           255           249           215           53

32 Are there any other comments that you would like to make about the use of Internet in dentistry?



Figure (2A): The frequency of use of the Internet for dentistry (left) and for pleasure (right) by year (<u>p <0.001</u> for dentistry, <u>p>0.05</u> for pleasure)



<u>Figure 2</u>(B): The frequency of use of the Internet for dentistry (left) and for pleasure (right) by gender (<u>p>0.05</u> for dentistry, <u>p>0.05</u> for pleasure)

	Number (%)
Non-dental sites	
Yahoo	23% (61)
Hotmail MSN	11% (28)
Google	4% (10)
Dental sites	
PubMed	9% (24)
Dental journals	2.2% (6)
Other dental sites (dental materials, dental science etc.)	11.5% (35)

Table 7: The most visited non-dental and dental sites for students



# **PARALLEL SESSION #7**

# **INNOVATIONS IN E-LEARNING**

# Rethinking International Education: Champlain College's Global Modules Project

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## Abstract

Champlain College, a leader in both online and international education, uses the Internet to create Global Modules that link the students and faculty at two or three international educational institutions for shared online readings, discussion and teamwork. The readings challenge cultural assumptions as well as promote critical thinking and collaborative learning. Students are divided into virtual groups with equal representation from the participating schools. As a group they try and solve global problems and present their findings to their peers. This presentation will present an overview of the Global Module approach, including the technological and pedagogical implications. More specifically, the presentation will focus on Champlain's innovative efforts to embed the Global Modules approach as a required part of the college's new interdisciplinary core curriculum. The result will be an integrated series of international dialogues spread over the student's university experience. Special attention will be paid to Global Modules dealing with women's issues that were and are being run with universities in Jordan, Morocco, the United Arab Emirates, Canada and India. Examples of student work will highlight Champlain College's attempt to construct an online forum for global dialogue.

## 1. Introduction.

When discussing his hopes for a brighter future, the Jordanian leader El Hassan Bin Talal proposed "promoting a politics of inclusion, and involving ourselves in dialogue and exchange." Noble goals, certainly, but how do we create an environment for this dialogue and exchange? To that end, Champlain College, a small baccalaureate college in Burlington, Vermont, has spent the past two years completely restructuring its core curriculum to best prepare students of the 21<sup>st</sup> century for their role as global citizens. A key component of this new core curriculum is the college's innovative Global Modules project, where Champlain students link up with students at various international universities for short, thematic, course-embedded, line discussions. Starting in the spring 2008 semester Champlain will start positioning the Global Modules as mandatory assignments in certain key required interdisciplinary courses. The goal is to create an integrated series of progressive assignments based on global dialogue carried over the four-year university experience. In this paper we will examine Champlain's new approach to providing an international education.

Before discussing the Global Modules project and its role in Champlain's new core curriculum, it might be a good idea to step back and take a look at a more traditional solution to global learning – study abroad. While the advantages of studying abroad are well documented, and while we are big supporters of study abroad, we feel offering study abroad alone is not enough. Many factors, ranging from financial considerations to tightly structured degree requirements, combine to ensure that only a fraction of university students are able to participate in such programs. We must also realize that the experiences are often singular, isolated events that come late in the curriculum, usually  $3^{rd}$  year, and typically exclude areas like the Middle East.

The Institute of International Education's *Open Doors Report 2005*, clearly shows that the destination of US students is overwhelmingly Eurocentric, with the Middle East hosting a mere 0.4% of all study abroad students from the US. This enormous lack of diversity is unacceptable if we are to prepare students for the global challenges of the 21<sup>st</sup> century. As stated by NAFSA: Association of International Educators, and the Alliance for International Educational and Cultural Exchange, two expert organizations deeply committed to international exchange and study abroad,

"We no longer have the option of getting along without the expertise that we need to understand and conduct our relations with the world. We do not have the option of not knowing our enemies—or not understanding the world where terrorism originates and speaking its languages. We do not have the option of not knowing our friends—or not understanding how to forge and sustain international relationships . . ."

The need for increased diversity in the destinations of study abroad students was also cited as a major challenge by the Commission on the Abraham Lincoln Study Abroad Fellowship Program in their 2005 publication "Global Competence & National Needs".

What solutions have been offered to ameliorate these obstacles? The Commission's recommendation is to spend more money on study abroad. While this may increase participation by students, it does nothing to change the diversification of the student body participants, nor does it address the lack of diversification of destinations offered. The Champlain College Global Modules project is an extremely low-cost, online global-learning solution that allows for the free exchange of ideas and opinions between international students that can be incorporated into any class. Global Modules make international dialogue possible for *every* student, from *every* nation. Further, because, as will be discussed shortly, the Global Modules are designed around topics chosen to inspire focused discussion, it is possible to maximize the exchange. Finally, it is important to keep in mind that the Global Modules are not designed to replace study abroad. Instead, one of our hopes is that by requiring students to communicate with other students from around the world early in their university career it will actually increase the number who study abroad.

To that end, we have imbedded Global Modules into the first two years of every student's classes at Champlain College, as well as in the third year for students who cannot study abroad. Participation in the Global Module project not only raises cultural awareness for all students early in their college careers, they also allow our students to speak freely with students from all over the world, from Singapore to Uganda, from Jordan to Australia. Global Modules are an online global-learning solution that allows for the free exchange of ideas and opinions between international students that can be incorporated into any class. Using Global Modules involve very little training, preparation or class-time, with assessable results that clearly demonstrate their effectiveness.

# 2. Brief History.

For four years professors at Champlain have used the college's software and technical expertise to create short and flexible online Global Modules with other international institutions. We give students, both Champlain and international, access to online shells set up on the college's system. Once or twice a semester the classes "meet" online for assignments, usually in four-week blocks.

Global Modules are designed to link the students and faculty at two or three international educational institutions for shared readings, discussion and teamwork. Their readings, chosen through consultation among the faculty at the different universities, are designed to challenge unspoken cultural assumptions as well as promote critical thinking and collaborative learning. The key is to choose readings and assignments that force the students to work together to cooperate and solve problems, and in the process come to grips with their national or regional biases. Students are broken up into groups with equal representation from the participating schools. As a group they try and solve various national, regional or international problems and present their findings to their peers. Group critique and reflection then round out the experience and place their work in a greater global context.

Week 1	Students post introductions in the online shell and get to know each other
Week 2	Shared reading assignments; students post answers to questions
Week 3	Groups established – equal representation; assignments
Week 4	Groups post projects; group critique

At Champlain we ran our first Global Module in Spring semester 2003. In it we linked two Seminar in Contemporary World Issues classes that were being taught in Burlington and at our campus in Dubai, United Arab Emirates. The students in the two locations shared a common reading on the Grameen Bank, the Bangladeshi organization that gives micro-loans to the poorest of the poor. To get a loan from the Grameen Bank lendees have to agree to Sixteen Resolutions, which are really a means of societal transformation. The first part of the Global Module assignment was an online discussion of the article and what the students thought of the Grameen Bank. This also gave the students a chance to get to know each other by posting introductions. We then broke the students into virtual groups that were half-Burlington and half-Dubai. The group assignment was for each group to come up with their own list of ten resolutions, post them, critique the work of the other groups, and then reflect on what they had learned. By focusing on the
Grameen Bank the students were forced to address issues of poverty, aid, gender inequality, and work together in international groups to solve problems. Not surprisingly, the two groups approached this issue in very different ways and thus learned from each other.

Since that initial semester we've run many more Global Modules, with topics as varied as philosophy, sociology, literature and history. In addition, we've also successfully expanded the scope and added a third partner, our campus in Mumbai, India, which allowed for groups that one-third Indian, one-third Emirati, and one-third American. We've also expanded to other institutions, such as Klagenfurt University in Austria, Al Akhawayn University in Morocco, the University of Melbourne in Australia, Nipissing University in Canada, Moi University in Kenya, THINC College in India, and Princess Sumaya University and the University of Jordan in Jordan. In the fall of 2007 alone Champlain will be running Global Module workshops at interested universities in Sweden, Morocco, Spain, Austria, Hungary, Jordan, the United Arab Emirates, Kenya, Uganda, Malaysia and Singapore.

The selection of participating institutions is a fascinating, exciting, exhausting and sometimes frustrating process. Many factors shape Champlain's vision of an expanded network. First off, Champlain is interested in creating a network with as many varied voices as possible. Consequently, if we are going to add European institutions we want to make certain that we have representatives from as many different corners of Europe as possible. We're very interested in having a strong foundation in Africa and the Middle East, two areas that are all too often ignored or completely vilified in the world press. Once we have focused on a certain country we will then research the universities in that country that might be the best fit. From there we will contact the head of international relations or the chief administrative officer or maybe departments such as Global Studies. Universities that have a reputation for innovative methodology or for an interest in international relations are an obvious choice. However, universities, like people, tend to have their own unique personality and it takes time to figure out the best approach. For example, a small university of twelve hundred students has a different personality and mindset and must be approached differently than a university of thirty thousand students. Sometimes the efforts at expansion are topic-driven. For example, the Woman as "the Other" has proven to be a popular theme and one way that we have attracted new potential partners is by sending information to as many Gender or Women's Studies departments around the world as possible. It is a frustrating process because faculty members or administrators will sometimes initially shy away from the process because the pedagogy is new or because they are not very technologically savvy. Some universities immediately were interested in the Global Modules approach and others took a couple years to warm to the idea. Often the key moment comes when an innovative and respected faculty member takes an interest and becomes an almost unofficial point person for the Global Modules and her/his university. As the network expands, and especially now that Champlain is embedding the Global Modules in the new core curriculum, it becomes increasingly necessary to bring administration into the discussions and the result are memorandums of understanding that allow both institutions greater certainty in planning.

## 3. Women as "the Other".

A key element in constructing a successful Global Module is the selection of a topic, which can be a delicate balancing act. On the one hand you want to choose a topic, along with corresponding readings and questions, that tweak the students, make them question some of their cultural assumptions, and get them thinking in a more global fashion. On the other hand, you don't want to start an argument that is counter-productive. It is essential to give the participating professors the freedom to come up with their own topics if they choose. This helps to ensure that the discussions remain meaningful and up to date by tying them to unfolding world events.

At the same time, one of our objectives is to create a large database of successful assignments, readings, and discussion questions. This gives professors a selection of ready-made Global Modules to choose from and also a guideline for constructing new assignments. Of the many topics that have been explored so far, the most routinely successful is a Global Module entitled Woman as "the Other." In it the students read the introduction to Simone de Beauvoir's *The Second Sex* and use it as a tool to discuss the sense of "otherness" of women in the modern world. Here is the master module for the Woman as "the Other" Global Module:

Woman as "the Other"

Week 1:

Let's take the opportunity to get to know each other. You'll find three folders in the Week 1 Folder, one called <u>Introductions</u>, one called <u>Water Cooler</u>, and one called <u>Questions</u>.

During a normal week, unless otherwise directed, always remember to post at least two times.

We'll begin our reading and discussing next week. With that in mind, we want you to do a couple things this first week:

1. Post an introduction in the <u>Introduction</u> folder. What are your interests? Do you have experience traveling overseas? What do you hope to learn in the Global Modules? Also, take the opportunity to greet your fellow students and find out more about them. Be sure to include contact information such as your e-mail address or IM.

2. Post any questions that you might have in the <u>Question</u> folder. Some of you are probably quite experienced in working online, and might even have participated in Global Modules before, and could help out your classmates if they have any concerns.

3. Check out the <u>Water Cooler</u> folder. This folder is designed to allow students within our Global Module to talk about anything of interest (as if you were standing around the water cooler at work chatting) – current events, movies, books, technology, etc. This will help us continue to get to know each other, and we'll keep this folder open throughout the Global Module. Feel free to introduce a topic or post questions. Keep in mind that you

should always feel free to contribute to the <u>General Discussion</u> folders found elsewhere on the site.

Thanks, and I'm really looking forward to getting started.

## Week 2:

We are going to discuss the status and perception of women. Our text will be Simone de Beauvoir's *The Second Sex*. You will be reading the Introduction: Woman as Other. Follow this link and read her introduction:

http://www.marxists.org/reference/subject/ethics/de-beauvoir/2nd-sex/introduction.htm

By reading and discussing the *The Second Sex* by Simone de Beauvoir we will not only learn about her views, but this will also allow us to introduce the topic of the status of women.

Once you have read the assignment, we will answer a series of questions. You will be required to post answers at least <u>twice</u>, although you can contribute more often if you wish. You can either post an original answer to a question or comment on the posting of another student. Either way, your postings should be detailed and analytical. If you are late posting for the week do not simply answer a question that has already been answered by another student – contribute in a new way. Build upon your fellow students' answers. Think of it as the class as a whole answering the questions.

- 1. Who was Simone de Beauvoir and what was her reason for writing *The Second Sex*? Do you find her arguments convincing? Are her points still valid or has the world changed dramatically since de Beauvoir wrote *The Second Sex*?
- 2. In *The Second Sex*, de Beauvoir makes the point, "But if I wish to define myself, I must first of all say: 'I am a woman': on this truth must be based all further discussion. A man never begins by presenting himself as an individual of a certain sex." What point is de Beauvoir making here?
- 3. In a famous quote, de Beauvoir proposes that, "He is the Subject, he is the Absolute she is the Other." What does this mean? Is woman "the Other?" If she is "the Other," what are the consequences?

Normally there are around eight to ten questions, but in this case three should suffice to give a flavor of the discussion. In week three the students were broken up into virtual groups, in this case half-Moroccan and half-American and given specific group assignments. For this Global Module they were asked to work together to produce specific examples of ways in which the status of women was similar or different in their countries and come up with specific plans for improving the condition of women around the world. In week four the groups posted their assignments and there was a general critique, not only of the assignment itself but also of what the students learned working with each other.

An example of how this approach works can be seen in excerpts drawn from student work from a Global Module between Bouziane Zaid from Al Alkawayn University in Morocco and Robert Mayer from Champlain College. If we examine student postings from Week 2 we can see the students both getting to know each other and grappling with some key issues. In response to the second question, which deals with the necessity of women defining themselves, a Moroccan woman wrote,

By defining herself firstly as a woman, I think that the message Simone de Beauvoir is trying to pass is that women are not just a subcategory of mankind but a real part of it, equal and complementary to men. In a way, I would say that there is not only mankind but also a "womankind". As a matter of fact, it is rare to hear a man defining himself by his sex, maybe because he considers himself in the norm. As William said in his answer to question 3, men have always been dominant in history while women were relegated to the background, and that is why men may not need to affirm themselves. On the other hand, in order to affirm the fact that they are individuals, women always need to recall their individuality in front of men.

The Moroccan student answered the question and began the process of helping the students come to grips with the bigger issues raised. As the discussion progressed another Moroccan woman made the point,

Simone de Beauvoir is totally right in her definition of women as "others" in many societies. In my country Morocco, for instance, women are seen in different way from men. Women do not have the right to laugh or speak loudly. They should come back home at an early time and respect certain rules. In other words, they have to talk, behave, interact in a special way completely different from the male.

Her point was important because she was making the progression from a general theoretical discussion to using specific examples from her home country to back up her argument. It's this exchange between students from different countries that is the core of the Global Module project. Another Moroccan student built upon these earlier points.

In that case of Moroccan women, more than "Others", women are "inferiors". The word "other" includes the idea of a second part but here, in those country where women are very depreciated, and we can say that, in a way, they suffer of a lack of freedom. However, even if this example of Moroccan women is quite true, it exits some exceptions. In big cities like Casablanca for example, it is striking to see how women seem free and open, particularly in their way of dressing. They look like western women. However, men's behavior towards women in Morocco always remind us that we are more considered as an object or a property than as a full human being. (But it's just a very general observation, of course there are a lot of different cases and not all Moroccan men treat women as objects!).

This posting is interesting because we've now added another layer of analysis. The student is providing information about her home country, but is also drawing distinctions between the urban and rural positions of women. It is enlightening that, despite her freedom that the Internet provides for interchange, the student felt the need to throw in the qualifying remark at the end about Moroccan males. Another Moroccan student, this time a male, then proposed,

I don't think that the "specific" situation of women which makes them "the Other" does concern only Arab, Islamic or underdeveloped societies. I always wonder why through the History of leader countries in domains of human rights and gender equality, such as USA and France, there was no woman in the position of the President. I am interested in discussing that point.

Here the male Moroccan student has taken the step of actively asking questions of his American peers, but also, in the process, challenging assumptions about the superiority of the American treatment of women. This is exactly the type of give and take that we are looking for in the Global Modules.

# 4. Summing Up.

Finally, a brief glimpse at some of the assessment feedback from the fall 2006 semester is enlightening. While we have had some extraordinary meetings with international students and faculty members who love the Global Module approach, we also needed some more quantitative evidence. Cinse Bonino, who runs the Champlain College Center for Instructional Practice, created a simple twelve-question survey that we provide for all the domestic and international participants. We now have a couple semesters of assessment material for analysis. Here are the results from five key questions:

I am now aware of a greater number of perspectives on the topic we covered than I was before participating in this Global Module.

- Strongly Agree 60.5%
- · Agree 39.5%

2. I will probably try to find out more about the cultures that I encountered during this Global Module.

Strongly Agree – 35.1%

- · Agree 54.1%
- $\cdot$  Disagree 10.8

3. I feel more comfortable communicating electronically with people from other countries or cultures than I thought I would have before participating in this Global Module

- Strongly Agree 42.1%
- · Agree 52.6%
- Disagree 5.3%

4 I believe that I will now feel more comfortable communicating face to face with people from other countries or cultures because of my participation in this Global Module.

- Strongly Agree 34.2%
- · Agree 57.9%
- Disagree 7.9%

5. I believe that I will be more tolerant when others have trouble accepting or understanding my view on a particular topic.

- Strongly Agree 37.8%
- · Agree 59.5%
- $\cdot$  Disagree 2.7%

While the numbers from all twelve questions were overwhelming positive, these five questions in particular were representative and also very encouraging. Almost ninety percent of the respondents in question 2 stated that they would try and find out more about the other cultures that they had encountered in the Global Module. Questions 3 and 4 are interesting in that they suggest that while the exchange was virtual, it at least had the potential to apply to face-to-face collaboration as well. Question 5, because it focused on toleration in general and not specifically about involvement in a future Global Module, provided very encouraging results.

Discussions take place in a virtual forum that allows for asynchronous dialogue between the participants. The main objective when designing the technology to use is that it must provide a communications portal that anyone in the world with Internet access can use. Champlain College originally designed a custom-built message board with minimal features. The message board offered simple threaded discussions, which provided ease of use for the student to follow the discussion, particularly if English is their second language, as well as ease of use for the instructor to follow the discussion and track postings by individual students. As the Global Modules project has expanded, Champlain College has invested in vBulletin, a specialized commercial bulletin board package that is highly customizable and flexible. This technology was chosen over a similar commercial bulletin board package, phpbb, because it was able to offer several structures to the discussions- flat, threaded or a hybrid. vBulletin also offers an effective way to easily maintain the current and growing volume of modules being run simultaneously each semester, as well as the ability to archive desired discussion material. As we have chosen to increase the sophistication of our technology, Champlain College is always mindful to balance that against potentially limiting participation due to bandwidth constraints.

# 5. Conclusion.

The Champlain College Global Module Program has internationalized our curriculum, fostered critical thinking, inspired much needed dialogue between students and faculty members from different parts of the globe, and given the college a simple yet effective way to create an assessable global learning outcome. As we implement Global Modules across our new core curriculum, it will allow us to start students' awareness of other cultures early, and keep that conversation fully integrated and ongoing in the curriculum, increasingly challenging students and fostering greater international connections.

### Learning Molecules: An Approach to Problem-Based Online Learning

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### Abstract

In the realm of professional development and executive education, organizations must be confident that their training programs facilitate the transfer of new skills and competencies to the workplace. Individual learners must feel confident that they can adapt those new skills and competencies to changing circumstances. eCornell has developed a cohort-centric, instructor-facilitated, problem-based approach to professional development that combines the effectiveness of the face-to-face workshop with the efficiency and scalability of the online environment. Immersing participants in authentic situations while providing Structured Flexibility<sup>TM</sup> that enables them to learn at their own pace, eCornell's approach is grounded in the notion that learning is a social phenomenon and context (not content) is king. eCornell's approach is embodied in a model it calls the Learning Molecule<sup>TM</sup>. This paper discusses the pedagogical and structural foundations of the Learning Molecule and its application to the design and development of problem-based, online learning experiences.

### 1. Introduction

In the rapidly evolving corporate environment, it is no longer sufficient for working professionals to receive a foundational education at an institution of higher learning and expect to rely on that for the duration of their careers. To be successful, they must seek and take advantage of ongoing professional-development opportunities. Even formal undergraduate and graduate programs must go beyond foundational education to provide students with practical learning experiences that teach the skills and competencies they will need to succeed as professionals.

Especially in the realm of professional development and executive education, organizations require a solution that combines effectiveness, efficiency, scalability, and adaptability. Large organizations may require broad segments of their employee populations to complete training programs within a limited time frame and without sacrificing significant time on the job. They must be confident that such programs provide authentic learning experiences that facilitate the transfer of new skills and competencies to the workplace. Individual learners must feel confident that they can adapt those new skills and competencies to changing circumstances.

eCornell—a wholly owned subsidiary of Cornell University—has developed a cohortcentric, instructor-facilitated, problem-based approach to training and professional development that combines the effectiveness of the face-to-face workshop with the efficiency and scalability of the online environment. Immersing participants in authentic situations while providing Structured Flexibility<sup>TM</sup> that enables them to learn at their own pace, eCornell's approach emphasizes the two most important drivers of effective learning: Learning is a social phenomenon: Learning is the product of the interrelationship between social and cognitive factors [1]. We learn as much from our peers as we do from our teachers. Effective learning experiences must therefore include opportunities to communicate, collaborate, and construct new knowledge as well as to reflect on the application of such knowledge to learners' specific circumstances.

**Context (not content) is king:** Knowledge and skills are situated in the physical and social context in which they are acquired; abstracting them from their authentic context irretrievably transforms them [2]. Effective transfer of new knowledge and skills requires that learning occur in the context of authentic situations that reflect what learners are likely to encounter on the job. Learners must have the opportunity to practice the application of new knowledge and skills in a safe, engaging environment that facilitates learning by doing. They must be able to make mistakes, fail painlessly, and try again [3].

eCornell's approach to structuring problem-based learning in the online environment is embodied in a model it calls the Learning Molecule<sup>TM</sup>. This paper outlines the pedagogical and structural foundation of the Learning Molecule and its application to the design and development of effective online learning experiences.

### 2. Implementing a Problem-based Pedagogy.

Students come to eCornell in pursuit of authentic learning experiences that teach the knowledge and skills they need to solve the problems they encounter in the workplace and succeed in their professional endeavors. Problem-based learning emphasizes meaning making over fact-collecting, bringing prior knowledge into play more rapidly and fostering learning that adapts to new situations and related domains [4]. It grabs learners' attention and leads them to study voluntarily [5]. eCornell developed the Learning Molecule<sup>TM</sup> (Figure 1) as a way to structure the implementation of problem-based learning in the online environment.

At the nucleus of the Learning Molecule is the *Scenario* (S). This is the contextualizing component, lending authenticity to the learning experience by presenting a work-related problem, task, or assignment.

eCornell uses scenarios in two different ways in its courses. In the first, learners assume a role in a fictional situation and solve a problem or work through a case study related to that situation. For example, a lesson from a course entitled "Making Capital Investment Decisions," part of a series about financial management for non-financial managers, begins by asking learners to assist the CEO of a fictional organization called Big Red Trucking in his efforts to evaluate the wisdom of a proposed acquisition of another transportation company called MidWest Transportation. Specifically, they must calculate the net present value (NPV) of the proposed transaction.



Figure 1. Learning Molecule<sup>™</sup>

In the second, the scenario functions as an anecdotal frame of reference to help students apply what they're learning to their own circumstances. For example, in a series of courses about change leadership, learners follow the progress of a fictional character pursuing a change initiative at his organization. Watching and listening to him confront the challenges of change leadership in the context of the scenario helps equip learners to confront the same challenges successfully in their own organization.

Orbiting the Scenario are four components serving different functions:

- *Resources* (R) introduce learners to the information and skills they need to be able to address the challenge posed by the Scenario. Resources can take many forms, from simple HTML pages to PDF versions of research documents to media-rich interactivities. For example, in the lesson about net present value described above, after the scenario introduces the term "net present value" in the context of the fictional scenario, a collection of resources explains what it is, how to calculate it, and why it's a useful tool for financial analysis.
- *Utilities* (U) are the tools (job aids, check lists, flow-charts, and so on) that help students apply what they've learned to the workplace. They may be printable documents or even electronic tools that can be downloaded and saved to their local hard drives. For example, the lesson about net present value includes a utility explaining how to calculate NPV on each of two commonly used financial calculators.
- *Collaboration* (C) tools facilitate the peer-to-peer and peer-to-instructor interaction essential to an effective learning experience. eCornell requires learners to participate in asynchronous discussions in order to complete a course successfully. For example, the lesson about net present value includes

a discussion prompt inviting learners to explore how the concept may apply to their own professional circumstances. In addition, eCornell instructors use a built-in chat tool to conduct weekly office hours; online polls and surveys provide other ways to reinforce the learning community.

• The *Evaluation* (E) component enables learners to assess their mastery of the learning objectives. Formats vary, from simple multiple-choice quizzes to complex simulations to course projects and written assignments, depending on the nature of the learning objectives. Often the evaluation returns learners to the problem introduced in the scenario and asks learners to apply what they've learned through their exploration of the resources and utilities to solve it. For example, the lesson about net present value cited above ends with a fill-in-the-blank quiz that asks learners to calculate the net present value of Big Red Trucking's proposed acquisition of Mid-West Transportation, along with several of its permutations.

Together, these five elements comprise the basic unit of content around which an eCornell learning system is organized.

eCornell extended the molecule metaphor to create the *Periodic Table of Learning Elements* (Figure 2).



Figure 2. Periodic Table of Learning Elements

These elements represent different presentational formats or content containers: ways in which learners engage and interact with the course content. The elements are color-coded to correspond to the components of the Learning Molecule: green elements are specific to scenarios, blue to resources, yellow to utilities, purple to evaluations, and orange to

collaboration. Those in gray are "neutral" elements, adaptable to any of the components of the Learning Molecule.

The neutral elements are arranged taxonomically. Each row represents a different media type: document, mouseover, flipbook (a Flash-based slideshow with forward and back navigation), assessment, and simulation. Each column represents a different level of media richness: text, illustration, animation, video. So different media formats can be enhanced with varying levels of richness. For example, a flipbook can be text only; or it can incorporate illustration, animation, and/or audio components. It can even have video embedded in it. The same is true of documents, mouseovers, assessments, and simulations. Figure 3 below shows a screen from an animated flipbook with audio that explains the importance of defining the scope of a proposed change initiative (from a course entitled "Mapping the Political Terrain of Allies and Resistors," part of the series of courses devoted to change leadership).



Figure 3. Animated flipbook with audio

Each element of the periodic table is assigned two numbers (analogous to the concept of atomic weight in organic chemistry): learner weight (LW) and production weight (PW). Learner weight represents the amount of time eCornell expects the average learner will require to complete a particular element. For example, the resource called Ask the Expert (ATE) is the online equivalent to raising your hand in a lecture and asking a question. eCornell identifies a collection of questions related to a topic learners are likely to ask, then record the subject-matter expert's answers to them. Learners click the question to listen the answer. The ATE has a learning weight of 7, which means learners will require

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an average of seven minutes to complete it (approximately one minute per question for seven questions).

Production weight ranges from 1 to 32 and is a relative measure of the effort required to produce a particular element. For example, a text document (i.e., a simple HTML page) has a PW of 2, while the ATE has a PW of 12. That means that we estimate the ATE to require six times the effort to create as a simple text document. Currently at eCornell, 1 unit of PW translates to approximately 1.6 person-hours of labor. However, the relationship between PW and person-hours is variable, according to how facile individuals are in working with particular templates, the efficiencies they may develop over time, and so on. What's not likely to change is the relationship between the amount of effort required to produce the various elements.

eCornell uses various combinations of elements from the Periodic Table to construct Learning Molecules (Figure 4). Each Learning Molecule represents an individual topic or lesson within an eCornell course. Not every topic or lesson includes all five components of the Molecule; most, however, include a scenario.



Figure 4. Structure of sample topics

Prior to the commencement of the design process, eCornell sets overall limits to LW and PW. For example, most eCornell courses are six hours in length, which translates to a course-long LW of 360. And given the size of the production team, the length of the development time frame, and the budget, eCornell currently assigns a PW limit of 320 (about 512 person-hours) to a six-hour course. Throughout the design process, overall LW and PW is tracked using the metrics assigned to each element. If the total LW is over the specified limit, content may need to be trimmed from the course or more efficient ways to present the content may need to be identified. Likewise, if the total PW is over the specified limit, the level of media richness in the course may need to be reduced. (Because the periodic table contains elements of various weights that can fulfill the same

learning objective, the process of reducing the weight of the course need not compromise its quality.)

These metrics remove the guesswork from the design process. Before committing time, effort, and dollars to the production process, instructional designers can be certain learners will be able to complete the course within the target time frame, and the production team will be able to build the course on time, on budget, and with the available resources.

# **3.** Structured Flexibility<sup>™</sup>: The eCornell Course Experience.

Integral to the eCornell learning experience is a unique approach to asynchronous learning that eCornell has termed Structured Flexibility<sup>™</sup>. When students register for an eCornell course, they are placed into a section comprising up to 35 learners. Each section is led by an instructor. All eCornell learning experiences have defined start and end dates. Students have access to the course material beginning on a certain date and must complete the required elements of the course within a specified time frame: two weeks for a six-hour course; four weeks for longer, 15-hour courses.

Within this specified time frame, students work asynchronously and at their own pace, logging on to the course whenever it's convenient for them. At the same time, they remain part of a cohort group whose sense of community is reinforced by periodic communication from the instructor and by their required participation in asynchronous online discussions.

Just as classroom educators make discussion an integral part of their students' learning experience, eCornell embeds opportunities for discussion into the flow of the course. However, experience has demonstrated that most learners choose not to take advantage of such opportunities. Left on their own, the majority of online students approach their learning experience as an individual activity, rather than as a collaborative one.

eCornell therefore requires students to communicate and collaborate. To complete a course successfully, students must contribute meaningfully to at least two required discussions per six hours of content. The quality of their contribution is evaluated by the instructor, and students do not receive credit for having successfully fulfilled a discussion requirement unless and until the instructor is satisfied. In that way, eCornell ensures that all students contribute to the construction of a shared knowledge base.



Over the course of a typical six-hour, two-week learning experience, the rhythm of student collaboration in an eCornell course might look something like the following:

Figure 5. Structured Flexibility<sup>TM</sup>

The two-week session begins on a Wednesday and ends two Tuesdays hence. (This affords working professionals two weekends within which to complete the required elements of the course.) On the day before the start of the session, the instructor sends an email introducing her/himself, welcoming the students to the class, setting expectations, and so on. Throughout the two-week experience, the instructor continues to communicate with individuals as well as with the group, reminding them of upcoming milestones, checking in with students who may be lagging behind, and so on. At the end of the session, the instructor sends a final email summarizing the principal learning points, inviting any further questions, and thanking students for their participation.

Also on the day before the session begins, the instructor seeds all the course discussions with initial posts—the first red dots within each discussion topic in the diagram above. (In addition to the two required discussions per six hours of content, the course may include a number of optional discussions to which students are invited—but not required—to contribute.) On the following day (the first day of the session), students begin posting their responses to the various discussion prompts (the black dots). Some may post immediately; others may not have time to contribute to the discussions until the weekend; still others may delay for a week or more. Once their initial post to a required discussion has been approved by the instructor, they are encouraged to check back to read and respond to the contributions of their peers.

At the end of the two-week session, the formal portion of the learning experience comes to an end. At that point, students no longer have access to the instructor. However, they do have access to the course material for an additional six weeks (four weeks in the longer, four-week courses), enabling them to use the course for just-in-time performance support, refresh their knowledge, print anything they might want to save, and so on.

## 4. Conclusion.

By conceptualizing a metaphor that is informed by a pedagogy and implemented through a taxonomy, eCornell has developed a unique system for translating content and pedagogy into effective online learning experiences for the purpose of professional development and executive education. The combination of the Learning Molecule and Structured Flexibility provides authentic learning experiences that enable students to build the necessary skills to confront the challenges they face on the job, while giving them the flexibility to work at their own pace in a manner that conforms to their individual learning styles. Learners become active participants in their own education, developing and practicing new skills in a safe, engaging, collaborative, online environment.

Knowledge without the ability to apply it is merely information. The eCornell approach is designed to ensure the transfer of learning to the workplace as well as the ability to adapt newly acquired skills and competencies to evolving circumstances. eCornell instructors facilitate the learning experience, answer learners' questions, and support them in their ability to complete the required elements of the course. At the same time, the peer-to-peer collaboration that is integral to every course enables learners to share best practices and build a collective knowledge base. In a world in which professional development and continuing education are increasingly vital to both individual and organizational success, the Learning Molecule and Structured Flexibility provide a uniquely effective solution to these ongoing challenges.

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### Interpreting in Zones of Crisis and War: Improving Multilingual Communication through Collaborative Virtual Learning

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#### Abstract

War and conflict know no linguistic boundaries and language specialists play an essential role in intelligence gathering before and during a conflict. Ending a conflict and delivering emergency and humanitarian aid across language barriers represents a major challenge, for which few of the organizations entrusted with operations in the field are well equipped. This problem is compounded by the fact that there is a chronic shortage of interpreters in zones of crisis and war willing to work in the line of fire or in areas of natural disaster. Interpreters are often recruited because they "know" both the local language/dialect and English, and not because they have been trained as translators or interpreters. They lack both essential professional skills to perform adequately as interpreters, as well as the necessary professional ethics to support crisis management and humanitarian efforts in a stressful environment. Our project seeks to remedy this situation by extending the development of our learning environment for interpreters (Virtualinstitute $^{\odot}$ ) to include ad hoc and in the field training of interpreters. This paper reports on the first project phase, the needs analysis carried out in collaboration with the International Committee of the Red Cross (ICRC), and the development of two distance learning modules. It also provides an overview of the various components of this virtual learning environment, including the component EVITA, which allows interpreting students to download audio and video files, record their interpretation on dual-track and upload their performance into the virtual environment for systematic feedback from teachers, tutors and peers.

#### 1. Introduction.

War and conflict know no linguistic boundaries. Language specialists often play an essential role in intelligence gathering before and during a conflict. Ending a conflict and delivering emergency and humanitarian aid across language barriers represents a major challenge, for which few of the organizations entrusted with operations in the field are well equipped. This problem is compounded by the fact that there is a chronic shortage of interpreters in zones of crisis and war willing to work in the line of fire or in areas of natural disaster.

Interpreters are often recruited because they "know" both the local language/dialect and English, the language of international relief operations, and not because they have been trained as translators or interpreters. It is safe to say that hardly

any have undergone training in interpreting, as the results of the first phase of our project confirm. Thus, they lack both essential professional skills to perform adequately as interpreters, as well as the necessary professional ethics to support crisis management and humanitarian efforts in a stressful environment.

The consequences are dire both for the people in need of a professional service and for the interpreters themselves. Staff deployed in the field are often unable to communicate properly with the local population and find it difficult to assess real needs and to deliver the services they were meant to provide in a way that is commensurate with the financial and human effort that has gone into planning such relief or crisis management operations. Often the objectives of such operations cannot be fully met because of communication break-downs. The consequences for the interpreters are no less disappointing and painful: lack of proficiency in English, misplaced loyalties, having to assume roles that "empower" them to pass judgment during interrogations or asylum interviews, for example, without requisite deontological training, thus inadvertently participating in human rights violations.

Over the past few years attempts have been made to develop hand-held translation devices that are safe to be used in the field (BabelFish, Language Weaver), but experts are unanimous in their assessment of such devices saying that they cannot replace human interpreters, although they can make the job of translating everyday phrases easier and do fill a sudden gap when an interpreter is unavailable.

### 2. The project and its partners

Our project entitled "Interpreting in zones of crisis and war" is managed by the *Ecole de traduction et d'interprétation (ETI)*, the world's oldest interpreting school. Founded in 1941 it has pioneered the training of interpreters both in consecutive and simultaneous modes. Its proximity to international organizations has afforded the opportunity of having many of the best interpreters working in Geneva on staff and of placing many of its graduates in these very same organizations.

ETI is currently the only school worldwide to have developed a virtual learning environment for interpreters (<u>http://Virtualinstitute.eti.unige.ch</u>) which has already been the subject of a number of publications. ETI's interpreting department has considerable experience in distance and blended learning, also in countries with less than optimal computer/internet infrastructure and is thus fully cognizant of the need to develop modules that can be delivered at low bandwidth and with variable accessibility options.

The IUED (University Institute for Development Studies, University of Geneva) has been involved in local conflicts in various continents. Its staff has often experienced difficulties communicating with various actors willing to participate in peace making or peace building, many of whom use international languages but very poorly, others use only little known languages.

The ICRC (International Committee of the Red Cross) undertook a survey among its delegations in the field to establish how needs are perceived in terms of training of field interpreters and how virtually delivered learning modules can fill such needs in an efficient and economical way, in order to build capacity rapidly.

#### 3. Analyzing the needs and improving interpreting skills

The objective of this project has been to gain a detailed understanding of multilingual communication needs in zones of crisis and war and to translate these needs into the development of learning materials delivered to interpreters working in the field mainly via the internet, but also through the use of other suitable media, to allow them to upgrade their skills without taking extended leave from their jobs.

#### 3.1. The role of the project partners

IUED has extensive experience in analyzing the real needs of developing countries and in translating these findings into recommendations for action. This project relies on IUED expertise in zones of crisis in partnership with the ICRC and the United Nations as two organizations that deploy staff in the field where serious multilingual communication issues arise.

In carrying out this needs analysis IUED relies on the extensive field mission experience of ICRC, who identify particularly pressing needs in terms of regions and languages, where the outcome of this project would be particularly beneficial to improving communication and thus delivery of relief services.

#### 3.2. Project flow

The needs analysis phase preceded the development of learning materials by ETI. Although it was expected that needs would vary depending on the type of crisis situation with respect to communication scenarios, technical terminology and ethics requirements, we assumed that the commonalities across situations would be greater than the differences. ETI thus focused on the commonalities that emerged from the needs analysis and has developed two training modules to pilot this program:

- Module 1 focuses on the specifics of communication situations with regard to professional ethics and on empowering the interpreter to better understand what is at stake in various communication situations in order to improve communication for all involved.
- Module 2 focuses on essential consecutive interpreting skills, including sample communication scenarios and essential technical terminology.

Both modules will be delivered at distance over the internet, or blended using other suitable media such as CD-Rom. ETI has developed a virtual learning environment (http://virtualinstitute.eti.unige.ch, see Fig. 1 below) for interpreter training and successfully deployed that technology over the past 36 months with participants in over ten countries and four continents. This <u>Virtualinstitute</u> © combines the technical facilities to teach interpreting at distance (speech bank, double-track recording, feedback functionalities) with the pedagogical environment of collaborative learning. This project offers a modular approach to improving interpreting skills combined with the opportunity for interpreters in different crisis zones to learn collaboratively via the internet, thus

creating a community of practice where experiences of learners can be leveraged to enhance the training effort. English has been designated as the pivot language, ensuring usefulness of training materials around the world; target languages are chosen in accordance with the most urgent needs identified by the project partners during the needs analysis phase (Arabic, Urdu, Hindi, Burmese in addition to the more widely used languages such as French, German and Russian. For detailed results of the needs analysis see section 4.1.).

## 4. Project Outcomes

The outcome of this project has four dimensions:

- Development of a tool for analyzing multilingual communication needs in zones of crisis and war;
- Development of two distance learning modules and setting up of a distance learning environment for interpreters working in the field;
- Delivery of distance learning to interpreters in at least two zones of crisis and evaluation of interpreter performance after completion of modules.
- Delivery of a handbook focusing on management of language and cultural difference in the field.

This paper reports on the first two outcomes (Analysis of multilingual communication needs in zones of crisis and war; and development of two distance learning modules).

### 4.1. Analysis of multilingual communication needs in zones of crisis and war

The questionnaire sent to field interpreters working for ICRC includes six questions relating to number of languages used, type of training received, type of stressful situations experienced, issues of role conflict, and ethical choices. The seventh and last question relates to the type of further training field interpreters would like to receive.

Mother tongue	Percentage
Arabic	19.23%
French	15.38%
English	11.54%
German	11.54%
Japanese	11.54%
Tajik	7.69%
Amharic	3.85%
Georgian	3.85%

Italian	3.85%
Polish	3.85%
Punjabi	3.85%
Uzbek	3.85%

Working	Percentage
languages	
English	84.62%
French	26.92%
Urdu	23.08%
Arabic	19.23%
Hindi	19.23%
Russian	15.38%
Burmese	11.54%
Amharic	7.69%
Farsi (Persian-	7.69%
Dari)	
Indonesian	7.69%
Nepali	7.69%
Spanish	7.69%
Azeri	3.85%
Danish	3.85%
Kirundi	3.85%
Swahili	3.85%
Swedish	3.85%
Tigrigna	3.85%
Turkish	3.85%

Type of Training	Percentage
Learning on the job. With no previous training	80.77%

Training as a community or court interpreter	0.00%
Experience as a community or court interpreter	7.69%
Formal training as a conference interpreter	11.54%
Training as a field interpreter	3.85%
Other	23.08%

## Table 3: Type of training received (n=27)

23.08% of respondents experienced moments of *extreme stress* while working as field interpreters. Examples include:

- direct exposure to situations of hardship, torture and executions
- presence of a prison superintendent
- the changing political environment requiring a change of jargon
- an official asking for interpreting out of the blue after having refused it up front
- working with local dialects after having trained in a classical form of the language
- the absence of direct individual contact with detainees
- having to cope with many persons speaking at the same time
- having to manage the emotional load in the detainee's narrative
- having to deal with a double time lag resulting from an irregular rhythm, for which both the delegate and the detainee are responsible
- having to explain what has just been interpreted because the answer doesn't correspond to the question
- having to cover a work load for more than one interpreter for an extended period of time.

38.64 % of respondents have encountered situations where they were *uncomfortable with their role while* working as field interpreters. Examples include:

- Disagreeing with a speech they had to interpret because they know better than the delegate
- Being approached by persons in danger, without being able to help
- Difficulty of maintaining one's role because the delegate could not manage a smooth running of the meeting, forcing the interpreter to take over
- Having to add more material in order to ensure understanding between both parties
- Being a woman and having to interpret for a raped male detainee who is normally conservative and having to manage a heavy emotional load

- Restricted movement in conflict zones (incursions, curfews, enclosures)
- Having to manage incoherence in cultural contexts, avoid offending remarks
- Having to interpret for high ranking officials in front of journalists
- Having to interpret for interlocutors who understand the language and only listen to the interpreter out of courtesy
- Underestimating the knowledge of an interlocutor, or his ability to understand a foreign language
- Lack of respect by some delegates for the local culture
- Interpreting in front of very experienced interpreters and field officers

30.77 % of respondents have been faced with difficult *ethical choices* while working as field interpreters. Examples include:

- Having to tell people that they can't help them, protect them or even provide them with a simple document, actions they would have taken had they been involved as individuals rather than as interpreters
- Having to choose between professionalism (translating exactly what was said) and trying to save face and the reputation of the institution, because the delegate's speech was culturally offensive
- Asking the interlocutor to rephrase his answer before interpreting it because it does not correspond to the question
- Considering intervening in the course of the interview when it looks headed towards a dead end or towards conflict, which might compromise the acceptability of the institution's crisis response
- Working with young delegates with no field experience in or knowledge of the local culture.

The Virtualinstitute<sup>®</sup> collaborative learning environment:



Fig. 1 Anonymous interface of interpreters' virtual learning environment

The *type of training* field interpreters would consider useful is summarized in the following table (multiple answers were possible):

Type of Training	Percentage
Training in interpreting techniques	76.92%
Further language training	57.69%
Training on coping with particular issues (stress, ethics, role definition, etc.)	53.85%
Other	3.85%

Table 4: Further training requested by field interpreters (n=27)

The above results confirmed our original plans to develop, as a first step, two learning modules that would respond to the most urgent needs of field interpreters in crisis and war zones: a better understanding of professional ethics, and improved consecutive interpreting skills. The large number of specific examples of stress and role conflict further corroborated our idea of setting up a virtual learning environment for field interpreters that would capitalize on the social dimension of learning and sharing of experiences.

## 4.2. Virtual learning modules - Overview

The learning environment we use is a Student-Centered Learning Environment (SCLE) as defined by Land & Hannafin (1997)[9] and Jonassen & Land (2000)[8]. This type of learning environment is characterized by the following elements: the learner occupies a central place in the elaboration of his/her own knowledge and skills. Activities are anchored in real contexts. Emphasis is given to negotiating and understanding personal cognitive models as well as the broader cognitive context. Participants' experiences within learning activities are taken into account. Finally, technology is used to elaborate and support meta-cognitive processes. Learning theories supporting SCLEs share a unique epistemology which consists in defining the learning process as a voluntary, active, intentional and conscious act. Learning is thus composed of a set of activities driven towards intention, action and reflection (Jonassen & Land, 2000)[8].

Socio-constructivism is the social variant of constructivism, a learning philosophy that emphasizes the learners' engagement in constructing knowledge and competence on the basis of what they already know. During this process the learner modifies existing mental schemata and constructs new ones. The social dimension results from two educational philosophies coming together, the cultural approach represented by Vygotsky (1962) [19] and the Swiss School (Perret-Clermont, 2000)[14]: they both proceed on the belief that beyond the learners constructing their own knowledge individually, they also interact with their peers in order to check their newly developed cognitive schemata against the beliefs of their peers. This in turn develops the learners' ability to verbalize knowledge and to argue their point and promotes the conscious use of new knowledge structures as well as a clearer understanding of their limitations.

Collaborative learning can be seen as one instantiation of the socio-constructivist approach as it emphasizes and structures social interaction through the formation of specific rules and processes. Dillenbourg's (1999)[6] theory of collaborative learning comprises four dimensions: 1) the criteria that define a collaborative learning situation, 2) interaction, 3) processes, and 4) effects. A learning situation can be defined as collaborative if and when all participants are more or less at the same level of cognitive development, are capable of engaging in the same types of activity, enjoy more or less the same status within their community, share a common goal and work together. An interaction can be defined as collaborative if and when learners' cognitive processes are disturbed, if and when peers communicate in a sustained manner and negotiate points of view and when no member of the community tries to impose his or her point of view. In other words, the members of the learning community establish common ground (grounding) and negotiate a common solution. Among the processes we encounter repeatedly in a socio-constructivist learning environment are induction, when learners try and accommodate their peer learners' cognitive overload; verbalization, i.e. consciously arguing one's point of view, and cognitive conflict. The results of such a collaborative effort are difficult to measure and quantify, as it is difficult to isolate all the variables; but research in this domain points to the potential for conceptual change and increased selfregulation. Collaborative learning requires on-going stock-taking of shared goals, constant efforts to ensure grounding, both of which in turn require the ability to manage information and knowledge.

While the project we report on here is designed to cater to different modes of content delivery, the preferred variant is indeed the one that brings interpreters in crisis and war zones together in one community portal. ETI's experience in training interpreters in war zones (Iraq) has shown that internet connections are usually quite stable and can support the type of collaborative learning envisaged in the Virtualinstitute<sup>©</sup>.

The Virtualinstitute<sup>©</sup> uses PostNuke, a content management system available in the public domain which offers a variety of core functionalities and complementary tools allowing the online interaction between and among teachers, tutors and participants. Depending on the immediacy of this interaction, we can distinguish between synchronous and asynchronous tools. Whereas the former require users to be on-line at the same time, the latter do not. Having said that, some tools can be used both synchronously and asynchronously and thus constitute a hybrid category.

The following asynchronous tools are used:

> News

The news system, an electronic notice board, was conceived for the publication of information regarding portal activities, e.g. collective feedback, syntheses and summaries of chat sessions, as well as digests of participants' productions.

➢ Calendar

This interactive calendar highlights all important dates and portal related activities. When placing the cursor over a highlighted date a dialogue window displays a brief description of the event, e.g. the beginning or end of a module, a scheduled chat session or an activity deadline.

➢ Library

Much like a regular library, the electronic library is a collection of digital resources (text files, audio files, video files etc.) for participants to *down*load, such as required readings for particular modules as well as multimedia or PowerPoint presentations.

Activity folder

The concept behind the activity folder is not entirely dissimilar to that of the library, although the directionality is inverted. This file-upload system has the function of an electronic file cabinet and allows participants to *up*load the final product of their on-line activities, usually in form of a text or hypertext file.

➢ Forum

A forum is an on-line discussion board allowing content to be posted organized by topics and structured in threads. As a dynamic tool the forum lends itself to on-line discussions and, using the *file attachment* option, it can be used for collaborative content creation.

Portfolio

The portfolio is a personalized web space allowing participants to publish a brief introduction about themselves and set up links to their most valuable and pertinent contributions on the portal.

> Journal

The journal tool is an online personal diary which participants, tutors and teachers are encouraged to use to verbalize their reflections. This meta-cognitive tool is both process and content oriented. The author can decide to make individual journal entries public (i.e. accessible and visible to participants, tutors and teachers alike) or private (i.e. accessible and visible to the author only).

> Shout box

As the name suggests, this is a tool allowing users to post quick messages in a dialogue box on the portal to communicate with all users (hence "shout") in real-time.

≻ E-mail

Although undeniably the most popular tool for electronic messaging, this tool is hardly used for the online activities taking place in the Virtualinstitute©, as it is difficult to reconcile with the underlying pedagogical philosophy of collaborative learning and community building.

As to synchronous tools we use:

➤ Chat

A chat room is a location on the portal allowing users to communicate with each other about an agreed-upon topic in real time by typing messages which are almost instantly displayed on the screens of all those users who are in the same chat room.

➢ Wiki

The WIKI (from Hawaiian "wiki wiki" for "quick") is a collaborative hypertext tool allowing users to create and edit Web page content. In other words, several users can work on (i.e. modify) one and the same document and save it on the server. Consequently, draft versions of documents no longer need to be circulated among group members as all users have online access to the most recent version.

> Pager

The pager tool is an instant messaging tool that allows establishing instant contact with other on-line users and to communicate with them in real time over a pop-up window.

➤ Who is on-line

This is an awareness tool to provide information about who is on-line on the portal at the same time. It supports the social dimension of the learning environment, especially when participants are scattered all around the world.

The underlying pedagogical philosophy and the specificity of simultaneous interpreting are at the core of the learning environment and have been implemented with the following custom made tools, most of which are personalized adaptations of PostNuke modules, while others were custom made to meet arising needs.

Evaluation tool

The evaluation tool was designed as an interactive tracking tool allowing teachers and tutors to track participants' online activities (i.e. their individual contributions on the forum as well as their individual or group activities in the activity folder). This tool allows teachers to keep a tab on the progress of individual participants, to post grades and feedback for submitted work.

► EVITA©

This component allows for simultaneous interpreting practice via the internet by offering a dual-track recording functionality (original sound track and interpreted performance are available in one and the same MP3 or WAV file) embedded in a pedagogical environment that is based on the theory of deliberate practice in the acquisition of an expert skill.

➢ Pscenario<sup>®</sup>

Pscenario© provides a template for planning all modules and activities. It includes all information pertinent to both an individual or collaborative learning and allows for harmonization of pedagogical content presentation across different modules.

> Templates

Teachers and tutors devise templates in order to provide cognitive scaffolding for particular portal activities and solicit focused answers. These templates allow easy comparison between answers and facilitate feedback and tracking.

# 4.3. Project module 1: Professional ethics for field interpreters

The following is an excerpt from the Module 1 description developed with Pscenario<sup>®</sup>. The on-line version provides the entire range of asynchronous and synchronous tools to support student learning, whereas the CD-Rom version is designed for self-study and includes self-assessment tools such as quizzes and answer sheets.

# Module 1

# Professional ethics for field interpreters

## Objectives

This module focuses on the role of field interpreters in crisis and war zones and is designed to help you develop strategies to meet the manifold challenges to your role as interpreter. This module features three activities.

# Time available

The module will be completed entirely at distance/ or locally with a CD-Rom. It represents approximately 20 student working hours. The on-line version allows for synchronous (chat room, shoutbox) and asynchronous (forum discussions) interaction in the virtual learning environment (Virtualinstitute©), which will add to the projected number of hours.

# Activity 1

The interpreter's role as cultural and linguistic mediator

# **Objectives**:

Familiarization with concepts of cultural and linguistic mediation: impartiality, neutrality and detachment. Defense of these values: ensuring that clients are familiar with interpreters' professional ethics, alerting clients to potential threats to professional ethics, withdrawing from assignments. Learning about interpreters' responsibilities: assessing risk to impartiality due to personal beliefs or circumstances; confidentiality; avoiding risk of discrimination against on the grounds of race, colour, ethnic origin, age, nationality, religion, gender, sexuality or disability.

# Activity details:

Reading different codes of ethics:

aiic

http://www.aiic.net/ViewPage.cfm/article24.htm

UK-NRPSI

http://www.nrpsi.co.uk/pdf/CodeofConduct07.pdf

US-NAJIT

http://www.najit.org/ethics.html

OZ-AUSIT

http://www.ausit.org/eng/showpage.php3?id=650

Develop a comparative table with definitions for the following concepts: Impartiality, neutrality, detachment. Add a narrative and describe how each of these concepts is dealt with in the four codes of ethics and highlight differences in appreciation across the four codes. Supplement your narrative with examples of how these values may have been challenged in your own field experience. Total number of words: max. 500. Upload to Activity Folder.

Time necessary: 5 hours

# **Evaluation**:

Formative evaluation by tutor (on-line version) on forum and tracking tool; selfassessment against answer sheet (CD-Rom version)

# **Expected result**:

The interpreter should acquire a basic understanding of key concepts in professional ethics, be able to relate them to field experience and defend them when working with clients.

# Fig. 2 Pscenario development for Module 1, Activity 1

Interpreting in Zones of Crisis	Objectives:	View   Edit
and War -	<ul> <li>To educate ad-hoc and field interpreters on</li> </ul>	
Training Module I -Ethics	practice.	
Instructor:	<ul> <li>To lay out the dos and donts in the</li> </ul>	
MultipleTeachers	<ul> <li>everyday aspects of the profession.</li> <li>To familiarise the subjects with the existing</li> </ul>	
	codes of conduct applied by some of the main professional interpreter associations.	
	Content:	
	The training module adopts an interactive and	
	participatory approach. It will be completed entirely at distance, or locally with a CD-Rom. The	
	on-line version allows for synchronous (chat room,	
	shoutbox) and asynchronous (forum discussions) interaction in the virtual learning environment	
	(Virtualinstitute©). Internet research is an	
	critical thinking is relied on to get across the	
	philosophy of the professional ethics of	
	interpreting.	
	ACTIVITY I	
	Activity details:	
	alic	
	UK-NRPSI	
	OZ-AUSIT	
	Develop a comparative table with definitions for	
	the following concepts: Impartiality, neutrality,	
	each of these concepts is dealt with in the four	

Fig. 3 Pscenario implementation Module 1, Activity 1

## 5. Discussion and conclusions

The primary objective of this project is to improve the skills of interpreters working in crisis and war zones. While much effort has gone into developing hand-held devices to support bilingual communication in crisis and war zones, the results have been rather disappointing as the entire cultural dimension has been missing. While these devices are useful in providing a quick translation of individual words and simple phrases, they cannot replace the human expert who helps parties navigate the complex system of social, cultural and linguistic norms that are essential to bilingual and multilingual human communication.

Crises and wars know no linguistic boundaries and there is hardly ever sufficient lead time to develop electronic support devices. Our project considers human interpreters who work in the field (rather than via remote set-ups with interpreters working through phone and ISDN lines) as the best guarantee to ensure human communication, as language and extra-linguistic features need to be appreciated in their immediate communicative setting. In addition, we strongly believe that local capacity building should be an essential component in any development project, ultimately allowing a nation to become independent of outside support. Improved skills for interpreters in crisis and war zones thus provide an excellent spring board for these very same interpreters to function during post-war and post-crisis reconstruction, enabling nations to participate more fully in rebuilding their societies and economies.

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#### **Different E-learning Paradigms - a Survey**

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#### Abstract

S

At the beginning of this decade a new Learning Management System (LMS) was developed at Bergen University College as a continuation of its for-runners. This system has been a great commercial success with the foundation of a company. Their e-learning system, "its' learning", is now being used in many universities, high schools and primary schools in our country and abroad.

New e-learning paradigms are now introduced at our university. The "Dynamic Presentation Generator" (DPG) and Dynamic Content Manager (DCM) systems are two such systems. One very important aspect of the DPG system is the decoupling of content from the formatting. This means for instance that in an educational context the system offers reuse of content and presentation patterns for developing continually online courses. The system uses the concept of a presentation pattern as a mechanism to capture the key aspects of a web presentation: layout, navigation and data structure. In the DMC project these ideas are further developed. One focuses on removing the tight association between learning material to specific courses. In this system one defines a conceptual atomic unit of knowledge and builds up courses by the organization of these knowledge elements from the repository. The system allows the educator to create an arbitrary collection of knowledge elements, tag them with meta-information as a single unit and link the unit with previously saved and similar aggregations. The DCM system uses the ideas of Concept Maps to model the relationships between the knowledge elements that can be created by the instructor or the educator.

#### 1. Introduction

E-learning has become an important part of our educational life. Different webbased Learning Management Systems (LMS) [6] have been developed to support the learner in the learning process. Previous learning methods were restricted to access and assimilation of knowledge. A web-based system is a valuable support for face-to-face communication as well as a way of transmitting the learning material to enhance the students' own studies. The art of designing good e-learning systems is difficult and is a great challenge for the human mind. The way this is done is also dependent on the learning culture in each country. The key issues are to facilitate new learning modalities for the younger generations. This is like a self-learning process where previous goals undergo continuously changes. Traditional classroom learning was former mostly based on *behaviouristic* learning theories where the learner is the object of assessment [20]. The teacher has the necessary knowledge, initiates the learning process and 'transmits' her knowledge to the learners. Another learning approach, *constructivism*, focuses on the learner's abilities to develop her own mental models and learning concepts. This approach has become more and more accepted to be the most relevant method to promote learning, even at the university level.

In the last years we have also seen a shift towards socio-cultural learning theories where learning is seen as integrated in social, historical and institutional practices [8]. Learning emerges as a mixture between theoretical knowledge, practice and discussions among students and supervisors. Focus here is not only on the 'single learner', but on the learner's activities in a community of practice [23]. The socio-cultural learning paradigm is a part of the constructivism in the spirit of Vygotsky [22].

#### 2. The E-learning process

Using only traditional lecture-based learning is not enough for the students of today. This type of teaching can be ineffective and often creates more passive students in the learning process. By introducing web-based teaching systems one is able to create more constructive learning scenarios. The students may then be more active and more able to construct their own mental models of the learning objects, rather than doing only pure knowledge acquisition [1,17]. But there are problems with web-based teaching too. If the website is too overloaded with applications this may introduce noise in the learning process.

LMS has become a central agent for fulfilling these goals of optimal flexibility process, and LMS is an obvious tool for administration of students in e-learning courses, delivering learning material, as well as an arena for communication, problem solving and providing a common workplace for teachers and students.

Online learning is a major force giving optimal flexibility due to the *time* and *place* of the learner's study activities, and with the latest technological development there are vast opportunities for both synchronous and asynchronous cooperation, both between students and teacher and between students. These new communication tools facilitate dialogue and collaboration between the participants, even with the use of low-technological and low-cost computer tools [18].

Computers are well suited to deliver learning materials in different forms, checking what activities the students has undertaken, testing through quizzes and multiple-choice-tests the amount of 'acquired knowledge' the students possess. But the main findings from many studies indicate that without careful planning and painstaking efforts towards creating a learning environment enhancing student activity, promoting and rewarding collaboration and experience-sharing, the LMS carries out an *instrumental* form of teaching and learning. In accordance with Biggs [1], good pedagogical design requires consistency between *curriculum*, *teaching methods*, *environments* and *assessment*.

#### 3. Paradigms of E-learning systems

#### **3.1 Prior Systems**

About ten years ago web-based learning systems were constructed and used that had great impact on the development of e-learning systems of today [9,10]. The "Gudmundstad" and "Reidar" learning environment at that time in Norway [11,12] had all the key facilities of a modern e-learning system. However, one major problem was that all the educational aspects of the system were hard-coded. Hence, important aspects of an e-learning system, such as its flexibility, reuse of learning content and presentation of learning material were missing. It was then difficult to construct flexible modes of learning because the use of the system has to follow a certain predetermined pattern. The systems that we now are developing in Norway are more flexible and founded on better learning principles.

### 3.2 it's learning System

"it's learning" is an e-learning system that has been developed in Bergen, Norway (<u>http://www.itsolutions.no</u>). It has been a great success in the Scandinavia market. The "it's learning" platform is designed for schools and universities. The origin of the "it's learning" system was a student project at Bergen University College in 1999. "it's learning" is a tool for supporting and enhancing different learning activities, new teaching methods and also providing easy access to knowledge.

"it's learning" has a variety of built-in tools for communication and cooperation such as internal message system, e-mail, chat, SMS notifications, discussion forums, etc. This offers a lot of possibilities for the instructor of a course. However, on the other hand much of the tools are not necessary to use in a course by an ordinary user. The tools may appear as noise that disturbs the user in a given learning situation. One problem is that the system gives the user too many possibilities. An ordinary user does not need all these options. Another problem is that the graphical layout and navigation are not consistent. This makes it difficult for the users to have a global overview and control of the learning objects [7]. "it's learning" is also a tool for course administrators and course leaders. The system provides a range of automatically generated reports that provide an overview of a group and individuals progress within the learning cycle. The problem is that the reports do not have a consistent design.

#### 3.3 The DPG and DCM System

The Dynamic Presentation Manager (DPG) system [4] offers a more flexible learning platform that can easily be adapted to different learning situations and different types of courses. This is a very important aspect in practical education since it offers reuse of both presentation patterns and learning content.

A new project has now been started at Bergen University College. The Dynamic Content Manager (DCM) Project focuses on removing the tight association of the learning material to specific courses. It defines a conceptual atomic unit of knowledge and builds up courses by an organization of these knowledge elements from the repository. In the following sections we will describe the new paradigms, the DPG and DCM, more thoroughly, and how they are related to a modern e-learning platform or paradigm.

### 4. DPG

#### 4.1 Decoupling from formatting

Consider a scenario where a teacher who is satisfied with the web pages that comprise a presentation on the net, would like to *replicate* the web pages with new content. In the worst case, the teacher has to start from scratch and re-implement the web pages with the new content. A problem with most of the e-learning systems of today is that the formatting is tightly coupled with the content. Decoupling of the two aspects are not always trivial. Cutting and pasting between existing and new pages is not always a good option, and usually the teacher will not have the necessary knowledge to program such a task.

A simple web-based system that could take the new content and create a new representation based on the formatting and the functionality of the existing web pages could overcome this problem. By generating net-based presentations (for example online courses) based on presentation patterns one could solve such a problem. A *presentation pattern* specifies the pertinent aspects of a presentation: page rendering, the navigation and the requirements for the content it can display, so that a presentation can be generated by supplying the right kind of data. This strategy decouples the content from the formatting, and both the content and the presentation pattern can be reused. This decoupling means that the same content can be used to create other types of representations based on different presentation patterns, and the same presentation pattern can be applied to different contents to create the same type of presentation, as long as the content conforms to the patterns. In order to simplify setting up new on-line courses one wants solutions that do not require particular programming skills. The main objective of the teacher is to develop and presents good learning material.

### 4.2 Use of the DPG system

The learning content of the DPG system is specified in XML, and its structure is dictated by the course pattern. The teacher needs only support the content of the learning material in order to create an online course. The system takes care of the rest; dynamically generating the web pages of the course and making them accessible to the users.

The experience has shown that there are several advantages of using presentation patterns to create online courses. For instance, an initial investment in defining a suitable navigation structure and visually appealing layout can be capitalized on in later courses, as these aspects of a presentation are captured in the presentation pattern. From a course administration point of view, no programming experience is needed to prepare and update the content, and web-based tools are available for content generation and
maintenance. In terms of cost and effort, the threshold to deploy this system is low compared to other such systems.

If the administration tool modifies the content, a publishing engine automatically updates the presentation. One high-priority task is to create new presentation patterns. Typical examples of new patterns would be for slide shows, for interactive presentation of a lecture or for "webifying" articles and books. The main challenge will be achieving this goal through reuse of web-based presentation components. The aim is not just to create dynamic HTML pages, but also to develop functionality that exploits the content in new ways. The administration tool will also be extended to streamline the process for online course development, for example, by providing better support for content generation and customization based on presentation patterns.

#### 5. The DCM System

Most of today's e-learning systems are based on the *constructionist* pedagogical theory. As such, they focus on enhancing the interaction of the student and instructor via the availability of various resources and activities. The educator avails various resources to the learner during the running period of the courses she is giving. There is mostly little support for the educator while creating the learning materials and because most systems do not have an easy-to-use navigation mechanism of existing resources, much effort is duplicated. The separation of learning content from specific courses and provision of visual navigation and arbitrary aggregation of the existing learning material helps the educator reuse existing resources and lets her focus on enhancing the quality of the knowledge unit in the repository.

## 5.1 Organization of Knowledge

The DCM system tries to remove the very tight coupling of learning material to specific courses. It defines a conceptual atomic unit of knowledge and builds up courses by organization of these knowledge units from the repository. This gives the ability to create knowledge elements at a finer granularity level which can be re-used across various courses. Resources like lecture notes, presentations, attachment files, questions etc... are attributed to the knowledge elements and hence can be imported while using existing knowledge elements. The DCM is designed with the functionality of knowledge elements, courses and resources versioning and history tracking so that changes made to the underlying knowledge elements is carefully tracked. This ensures that a specific course or some aggregation of the knowledge elements the educator has created, can appear unchanged as far as she is concerned while giving her a chance to follow the various revisions made on it.

A great emphasis is given on the design of the system and hence provisions are made for the seamless addition of external functionalities. The concept of dynamic presentation patterns is put into use in the DCM project. This gives the system the feature of being highly customizable in that the presentation of courses, resources and navigation, can all be enhanced according to the configuration set by the site administrators. The instructor is also be given the freedom to define the appearance of the courses she is giving and can use already used presentation patterns as well as define her own.

## 5.2 Concept Map

Concept Map is a graphical tool for organizing and representing knowledge [16]. We here define a concept as a perceived regularity in events or objects, designated by a label. When dealing with a huge collection of learning material in the repository, the level of its use greatly depends on its naturalness of its presentation and ease of navigation.

There is a lot of research going on world wide how to best model an arbitrary aggregation of small knowledge elements. The DCM system uses the ideas of Concept Maps to model the arbitrary relationship that can be created by the educators by their selection of the knowledge elements from the repository. The DCM provides the educator with a graphical navigation of the knowledge repository. Such a visual presentation gives the educator a feeling of the resources of the repository and enables her to create her own universe of collection of knowledge elements. The interconnection between the various knowledge elements, defined by many educators, can be used for data mining purposes and for creating better structuring of the knowledge repository as a whole. In a specific course the motivation of using Concept Map is to model the dependencies in the learning process. A sample Concept Map is shown in figure 1 on the next page.

## 5.3 Student Modelling

The DCM system also supports student modeling. Questions are related to the knowledge elements. Some question types have been supported with an extensible framework so that more types can be added as the project undergoes further iterations. The system defines a very simple model of the learner and puts her in some category with respect to a specific course she is taking. Currently the educator is responsible for updating the category of the learner, based on assessment. The DCM has a practice module where the learner goes through questions that have been associated to the knowledge elements of the course she is taking. The learner's category is taken into consideration and as a default optional filtering mechanism while providing the learner with practical questions.



Figure 1. A sample concept map created using IHMC CmapTools.

## 6. Discussion and Conclusion

There are a number of benefits by establishing a learning platform that separates the content from the presentation. In the future one may have a repository of learning content and presentation patterns that teachers can use for creating online courses. A number of methodologies, technologies and tools exist today for organizing content for web-based presentations. The design and development of data intensive web applications is an area of active research [3]. These and other research teams are attacking the problem by defining the structure, navigation and layout of a web presentation using various data modelling formalisms. At the moment these approaches are still in the research domain, but may give valuable results in the future.

#### 6.1 Impact for World-Wide Education

In many ways the DCM project may help to fulfill UNESCO's and World Bank's aim of giving access to education for students in developing and emerging countries [5]. It gives an ICT tool which is flexible with a user-friendly interface to be compatible with the main software on the market. It supports the student's work with the learning content in different ways, due to different teaching methods, learning goals, individual cognitive preferences and other conditions that influence the learning process. Being an independent platform, DCM can contribute to develop educational systems for developing and emerging countries to empower their inhabitants by getting access to better educational tools. Talking about education as a tool for democracy, the word literacy is an important concept. In this situation we speak about ICT literacy [18] which is defined as giving the students knowledge, skills and attitudes which they need to handle the influences of ICT in their lives.

#### **6.2 Concluding Remarks**

We have introduced two new paradigms for e-learning systems which offer more flexible learning platforms that can be adapted to different learning situations. The DPG system promotes reuse of both content (i.e. learning material) and presentation patterns (learning structure) for developing online courses. By using the DPG system nonprogrammers can easily use the system to create online courses, once the presentation pattern has been defined. The approach is valuable in many online learning situations where a full-blown e-learning system will be an overkill. Such a problem is contained in most of the commercial systems of today and may disturb the learning situation, both from a user and a course administration perspective.

In the DCM project we want to establish an e-learning platform that separates the learning platform from the different courses. This will enhance more adaptive learning where the students may solve problems which are more suited to their knowledge level. We believe that this will also introduce more flexibility in the learning process where the students can assimilate the learning content in many different ways. This is implemented by using different Concept Maps for the syllabus. Such a platform will also contribute to reuse and share of the learning material.

By introducing software agents [19] in the systems we may be able to construct even more intelligent e-learning systems. User profile agents may collaborate with other agents to get the best learning material for the students [13,20]. The DCM platform is very much suited to handle agent based learning that makes the system more flexible and adapted to different kinds of users and their knowledge level. We are currently working on these aspects to include them into the DCM system.

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## Modeling the Communities of Practice of E-Learning "CoPEs"

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#### Abstract

Today, we are witnessing the emergence of Communities of Practice (CoPs) in several fields such as engineering, management, and teaching. The purpose of this article is to extend the application of these communities to the e-learning field which handles interdisciplinary techno-pedagogic knowledge: cognitive, psycho-pedagogic, multimedia, software...We propose a new category of CoPs called CoPE (Communities of Practice of E-learning) which combines two fields: CoPs as basic field and e-learning as an application domain. We define the concept of CoPE and the underlining processes taking into consideration learning situations, actors and their roles, activities and possible types of interactions, and environment made up of services, tools and resources. The concepts related to CoPE have been illustrated through a case study realized within the Swiss project of distance education program "CoseLearn" leading to International Master in e-Learning.

#### 1. Introduction

Recently there has been an increased recognition of the importance of Communities of Practice (CoPs) in several fields including engineering, management, teaching, etc. However, most communities are facing challenges when they work together to create, manage and continuously improve the Community. Although this field is experiencing a significant development in content and services in the e-learning domain through learning management systems (LMS), this development faces a number of challenges related to: i) the difficulty in interpretation of concepts like the scenario, learning situation, activity, role, etc. ii) the multiplicity of approaches, models, methods, techniques and tools used in the development of the online systems [1], and iii) the heterogeneity of learning platforms.

The need for capitalization is necessary in terms of knowledge and know-how related to the field of e-learning associated with the development of distance learning tools and their use, the exchange resulting from techno-pedagogic knowledge, and the collaboration between various actors of the e-learning. Several studies [2, 3, 4] related to CoPs in the teaching domain in general and many online learning communities using course management systems such as Blackboard have also been widely used in online education [5] but, to our knowledge, so far no study targeted the Communities of Practice of E-learning (CoPEs) and the principal concepts they generate. In this article, we focus on how to solve the concerned problems within the framework of a CoPE.

## 2. Communities of Practice (CoPs)

Collaborative learning becomes powerful and exciting when it occurs in the context of a community of practice. The main objective of CoPs is to establish a structure where tacit and explicit knowledge are shared and exchanged among various members within a given domain. These members share a common interest and coordinate their activities to find answers to questions and problems they encounter as well as to define the best strategies to be applied and the best tools, resources and services to be used to produce an artefact. In this section, we recall the basic concepts related to CoPs. Based on these concepts, we will define their counterparts in Communities of Practice of E-learning.

## **2.1 Definitions**

A Community of Practice (CoP) is a community whose main goal is learning. CoP is a concept initially derived from the work of Lave and Wenger [6] showing that learning means to participate in order to gain expertise. A CoP can be considered as a tool by which knowledge is owned in practice. It is about a group of professionals who gather and organize themselves, face to face or virtually, in order to: i) share information and experience, related to their area of expertise, ii) exchange and cooperate in order to solve problems encountered in their activities, iii) learn from each other and develop their professional competencies, and iv) build knowledge and formulate best practices to be followed in the realization of their daily activities. These professionals will deepen their practical knowledge and their know-how in the field and interact on a progressive basis [7]. The implication in the exchanges is generally free [8].

In general, a CoP relates to a specific domain such as engineering, management or teaching. It can specialize and treat a particular topic such as mathematics or medicine. Some communities are homogeneous and gather only individuals from the same field and even the same vocational activity, whereas others can gather all individuals with a common interest. Many studies have defined the characteristics of CoPs, amongst them are those of reference [3]: interdependence and implication; micro-culture, representing the build up of a collective practice; social organization; spontaneous selection and organizational development of individuals; durability corresponding to a certain lifespan; and interaction space sharing. Other characteristics were reported in reference [9], for example: identity and common language; dynamics and evolution, etc.

## 2.2 Duality « Participation – Reification »

CoPs are characterized by a permanent negotiation which relies on participation and

engagement of all members. It is carried out through two processes [10]: participation and reification. The former concerns the participation of members through their actions, their thoughts, and their communication. Reification is about shaping the members' experience by producing artefacts such as abstract concepts, tools, symbols, stories, words, etc.

# 2.3 Structure

CoPs are characterized by three fundamental features: i) a mutual engagement; ii) a joint enterprise, and iii) a shared repository [10]:

(i) A mutual engagement is a way where participants help each other in order to share knowledge about the practice.

(ii) A joint enterprise is the practice that participants of the community share jointly. It can be a way of producing new resources or adopting new forms of work.

(iii) A shared repository represents the memory of the community (tools, procedures, symbols, concepts, etc.). This is adopted during the existence of the CoP.

# 3. E-learning

The application of Information Technologies for Teaching (ITT) gave birth to a new form of learning called e-learning. The objective of introducing ITTs is to improve the quality of the online training by facilitating the access to the resources and web services and remote collaboration. In this section, we introduce online learning systems and their life cycle. This life cycle is elaborated in section four to define the activities in a CoPE.

# 3.1 On-line Learning Systems

The field of e-learning is seen as a process of learning where the practice of the pedagogy is focused more on the learner, who is equipped with interactive online systems. It is not a question of offering the learner simple content any more, but rather proposing learning scenarios. A scenario helps in describing the context of use, the identification of actors and clarification of their role. It also helps define and orchestrate activities intended for these actors using adequate environment according to the objectives and available technologies [11]. An online learning system is a set of linked elements (methods, tools, services, procedures, and routines), having the objective to produce individual and collective competencies, and assist in learning<sup>14</sup>.

# 3.2 Online Learning System Life Cycle

The life cycle of an online learning system (Figure 1) is composed of two main phases: (1) the acquisition phase, and (2) the utilization phase.

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<sup>14</sup> e-formation glossary: http://www.educnet.education.fr/superieur/glossaire.htm



"Figure 1. Life cycle of an online learning system"

(1) The acquisition phase generally includes three stages: i) analysis stage, ii) design stage, and iii) implementation stage. The *analysis stage* consists of establishing specifications which describe the needs and the requirements of online learning. Analysis models such as ASPI (Analysing, Sustaining and Piloting Innovation) [12] can be used, which aim at defining an approach of piloting the techno-pedagogic innovation. The *design stage* specifies, according to a model such as EML and IMS-LD, the learning scenarios based on the specification obtained in the previous stage. Finally, the *implementation stage* consists of realizing in a learning environment such as an LMS the learning scenario specifications obtained from the previous stage.

(2) The utilization phase concerns the progress of the system developed in the preceding phase. It is a follow up and evaluation of different learning activities (utilization) with possible corrections and improvements added to the system (maintenance).

## 4. Communities of Practice of E-learning (CoPE)

In this section, we present the Communities of Practice of E-learning (CoPE). The CoPE concept combines the two fields discussed above: CoPs and e-learning which we consider respectively as their domain of definition and application (Figure 2).



"Figure 2. CoPE = CoP \_ E-Learning"

## 4.1 Motivations

Today companies, schools, universities, and organizations of all scales are using elearning as a tool of training, learning and professional development. An increase in interest in e-learning is seen through the development of large projects being launched all over the world. However, despite the large quantity of knowledge accumulated in this field, the know-how and feedback from acquired experience are not always capitalized and exchanged in a systematic way between actors in this field. In the present study we focus on the problem of capitalization of techno-pedagogic knowledge, tacit and explicit in the domain of e-learning. We attempt to solve this problem within the framework of a CoPE. It is about considering a virtual space of exchange, sharing, and resolution of problems encountered by the actors of the e-learning during all phases of an online learning system life cycle.

# 4.2 Definitions

Our research suggests below a definition of a CoPE by adaptation and enhancement of a CoP as discussed in section 2 and proposed by Lave and Wenger [6]. A CoPE is a group of professionals in e-learning who gather, collaborate, and organize themselves face to face and mostly virtually in order to:

- share information and techno-pedagogic experiences related to the development and use of online learning system;

- exchange and cooperate in order to solve together techno-pedagogic problems;
- learn from each other and develop competencies in engineering pedagogy;

- build (improve and/or create) together techno-pedagogic knowledge and model the best practices to be followed in the realization of the online learning system;

- promote the application of e-learning standards such as: IMS-LD to specify the learning scenarios; IMS-LIP for the learners description; IMS-LOM for the pedagogical resources qualification; and SCORM for inter platforms exchanges;

- define terminology, glossary, or ontology, conciliating the various views and articulating them around the above mentioned standards. According to Pernin [1], this is essential if we are aiming at large scale sharing and improvement of the practices concerning building activity scenarios.

The exchange inside the CoPE involves two dimensions during the acquisition phase of an online learning system life cycle:

(1) The "*Product*" dimension relative to the design components: roles, activities, resources, services, tools, and properties, etc. These components can be: analysis, design or technique components;

(2) The "*Process*" dimension relative to the pedagogic design tools are: approaches, methods, techniques, and tools used by the pedagogic design actors.

# 4.3 Learning Situations

The learning situations in a CoPE are characterized by collaborative aspect and particularly the informal character, through which members interact with each other in a free and spontaneous way (according to their needs). However, the topics that best fit these situations are those which do not have straight solutions and which invite dialogue, confrontation and discussion [13]. There are several types of learning situations in a CoPE. We recommend the following three situations relative to the learning situation in a CoPE: (1) Problem Situations, (2) Decisional Situations, and (3) Project Situations.

(1) **Problem Situations**: consist in finding solutions to common problems encountered during the two phases of acquisition and utilization in LMS. The learning objectives are to (as stated in [14]):

(i) Promote the transfer and the integration of knowledge;

(ii) Acquire abilities and skills in analysis, synthesis, adaptation, critical thinking and team work;

(iii) Create collective intelligence and shared vision of resolution.

*Example:* How can you incorporate a Java Applet for a given exercise in Moodle<sup>15</sup> LMS in order to make it interactive?

(2) **Decisional Situations**: is often assimilated with the decision of choosing between several alternatives during the acquisition phase of the life cycle of an online learning system or the validation of some results of the design.

*Example:* What type of learning situation do we select in a specific course? Or what role do we choose to ensure a moderation activity in a given group (tutor/moderator-learner)?

(3) **Project Situations**: concern the final build up and realization of the online learning system according to the acquisition cycle. Confrontation of individual practices allows best practices to surface.

*Example:* Development of an online learning system related to a course on system engineering for master students in computer science field.

# 4.4 Components of the Learning Situations

In this section we present the components of learning situations, namely the actors with their roles, the activities, and the learning environment.

# a) Actors and Roles

According to Wenger [10], the level of engagement of a member in a community can evolve in time or according to the considered topic. The core of the community is often composed of members who are strongly committed. This level of commitment is weak in the periphery of the community [15]. The authors in [16, 17] describe the progression of an individual towards the centre of the community by means of five roles: (1) visitor who does not have a stable identity in the community; (2) beginner who needs to learn about the community and to be integrated in its social life, (3) regular, an established member who takes part in the life of the community, (4) leader who contributes to the management of the culture of the community. In the CoPE the actors come from the e-

<sup>15</sup> http://moodle.org

learning domain like teachers, pedagogues, tutors, experts, etc. These actors have different levels of skills and knowledge based on their training and level of expertise in the field. Their competencies can be measured by the number of active participations, the specialty and the seniority in the field, or other metrics. For a better management of their work, the actors can organize themselves in groups on the basis of their objectives and concerns.

The CoPE has the particularity of assigning some roles immediately from the beginning of the activity while others are negotiated between participants. A member can take a role of senior in a field where he is an expert while he is a simple participant in another field for which his competency is limited. For example, the advice or an opinion would rather be considered from a senior and expert member than from a beginner or less qualified member. This member would not have the privilege to validate a given practice. In order to ensure a correct operation of CoPE, we have chosen to define the roles according to the classification presented in Figure 3. We distinguish four roles: (1) *the support members' role*; (2) *the learner members' role*; (3) *the visitor members' role*; and (4) *the guest members' role*.

(1) **The support members** contribute to the continuous and effective function of the CoPE. They facilitate the realization of the activities in the CoPE. This role may be divided into five sub-roles (Figure 3):

(i) *The coordinator* supports the development of the community and learning. He/She supervises and identifies important questions in the e-learning domain and evaluates the CoPE.

(ii) *The moderator* is the guide of the community, and animates the learning process. He/She must ensure that the participants have visibility and comprehension of their work. He/She locates quiet members and ensures that they get the chance and opportunity to express themselves.

(iii)*The manager* helps to better manage the CoPE memory and facilitates an easy retrieval of the resources.

(iv)*The reporter* is responsible for the identification and publication of relevant knowledge of the CoPE (reification).

(v) *The administrator* is responsible for maintaining technical environment that supports the CoPE and helps members to use it.



"Figure 3. Actors' roles in a CoPE"

(2) **The learner members** contribute to the realization of the activities of the CoPE with different levels of participation. This role may be divided into two sub-roles:

i) *The participant* (contributor) who contributes to the current activities of the CoPE: exchange of information, negotiation, argumentation, confrontation of ideas and practices, etc.

ii) *The expert* who is a member having high level of skills or important know-how. He/She is a key figure and the CoPE relies on the expert for decision-making or validation of new practices.

(3) **The visitor members** do not belong to the CoPE. They have limited access to the CoPE space and take part in the activities according to the rights that were allowed to them.

(4) **The guest members** include people who have a particular competency in a given field. They are invited by certain members of the CoPE.

## **b)** Activities

The members of the CoPE carry out joint activities to exchange techno-pedagogical information. These activities can be synchronous or asynchronous, and are often collaborative, and informal. They intervene in the framework of a learning situation. They correspond to the stages of analysis, design, implementation, and utilization phase of the learning life cycle. Consequently, we propose to classify them into four types of activities:

- (i) Analysis activity
- (ii) Design activity

(iii) Implementation activity

(iv) Utilization activity

Figure 4 outlines a list of activity for each type.

## c) Learning Environment

The actors of the CoPE carry their activities in a learning environment. A CoPE requires a technical environment which offers a virtual space to its members in order to realize their learning activities. We propose four cases of environment structure:

(1) Use of a specific environment intended to CoPEs. This solution, although not currently considered, would allow CoPEs to have their own environment which would exactly fit their needs. However, this solution is likely to be too expensive.

(2) Use of a generic environment intended to CoPs. These environments, although not currently available and not specific to the CoPEs form a satisfactory solution. A compromised solution with the first solution would be to make these environments flexible so that they fit the type of community, in our case the e-learning domain. One of the largest projects launched in 2006 in this field is the European project PALETTE<sup>16</sup>. The project aims to equip CoPs in the domains of management, engineering and education, with a set of tools necessary to their operation.

(3) Use of an LMS environment type. It is about choosing an existing learning platform (LMS) such as Moodle and assigning a space for the CoPEs. This solution remains limited since the services offered by the LMS are not particularly designed for learning activities in a CoPE.

(4) **Use of an ad hoc environment**. It consists of a set of tools and independent services provided separately. The major inconvenience of this solution is the lack of integration of these tools and their heterogeneity which makes the follow up of the CoPE activities difficult.

Regardless of the kind of CoPE environment type selected, we plan the exchange with the LMS learning platforms in two ways: (1) LMS  $\rightarrow$  CoPE exchange which particularly aims at illustrating discussions inside the CoPEs by practical examples resulting from real situations encountered in the LMS, and (2) CoPE  $\rightarrow$  LMS exchange which by way of example consists of validating technical solutions about the LMS, found in the CoPE environment. In order to better organize the interactions inside a CoPE, we suggest structuring the environment in many virtual workspaces as shown in Figure 5. Each space is held in reserve for a particular type of activity, which corresponds to a precise stage of the life cycle of an online learning system. Four categories of space are then obtained: **Analysis Space, Design Space, Implementation Space** and **Utilization Space**, to which we add a fifth **Free Space** reserved for general questions/remarks. This space is divided

<sup>&</sup>lt;sup>16</sup> PALETTE: Pedagogically sustained Adaptive Learning through the Exploitation of Tacit and Explicit knowledge, http://palette.ercim.org/

into a public space and many private spaces. Each of the other four spaces is divided into three subspaces reserved to three types of learning situations:



#### Implementation Activity



## "Figure 4. Classification of activities' types in a CoPE"

(1) *A subspace of problem resolutions* where exposed problems are resolved, offering simulation services, reasoning, and brainstorming.

(2) *A subspace of decision* where decisions are taken, offering tools of argumentation, mediation, and confrontation of ideas and multi-criteria choices.

(3) *A subspace of project* where other ordinary activities are held: analysis, design and implementation activities.

Each space possesses the appropriate tools and services designated for: argumentation; mediation; help in decision making; synchronous/asynchronous communication; data interrogation; cooperative build up of documents, resources and pedagogical scenarios; interaction and decision tracking (Rational Design); storage of artefact (Reification); on-going activity follow up of active members as well as the state of on-going projects (awareness), etc. The CoPE memory is essentially composed of used resources; obtained results (artefacts); exposed problems; best practices; and future learning scenarios (tracking).



## "Figure 5. Representation of a CoPE environment view"

## 5. Case Study

In this section, we illustrate through a case study the concepts related to CoPEs as stated in the preceding section. This case study concerns a CoPE developed and realized within the framework of the project of distance education **CoseLearn**<sup>17</sup> "Coopération Suisse en matière de eLearning" that was initiated by **QualiLearning**<sup>18</sup> company which consists of promoting e-learning in a number of French-speaking countries in Africa. The main aim of this program is to promote e-learning by progressively implementing a Virtual Campus in more than 50 partner universities. **CoseLearn** program leads to the professional diploma of "*Master International En e-Learning*" (*MIEL*) (International Master in e-Learning). The CoPE is made up of principal actors of the project (Professors; Tutors; Administrators) and master candidates (University teachers; Computer center engineers). The Master candidates are held to carry out within the framework of their final projects a structure and a tool of online education.

The situation of training called upon within the framework of this CoPE cover the three types of situations of training (§4.3): (1) problem situations; (2) decisional situations; and (3) project situations. The first two types of situations relate to the totality of the members independently of the final projects while the last type primarily concerns each project team separately.

The problem situations comprise in finding answers to the various questions encountered by the candidates during all their training and instruction, namely during the duties stated in various subjects as well as during the final project. The decisional situations mainly consist in identifying the possible alternatives of design and development, and the criteria and/or the arguments necessary to the selection. Finally the project situations consist in exchanging the practices, which appear by a viable know-how in terms of construction of the online education courses (best practices).

The roles (§4.4) intervening in this CoPE are primarily: (1) members of support, represented by the teachers ensuring the training and the technicians in charge of the technical administration of the system; and (2) learning members, represented on one hand by the master candidates themselves (participants); and on the other hand by the tutors (experts). It is noticed that the two other types of roles, "Invited" and "Visitors", are not present in this CoPE, and this can be explained by the early stage of this CoPE.

The activities carried out by this CoPE cover four types of activities (§4.4): (1) Analysis Activity; (2) Design Activity; (3) Implementation Activity; and (4) Utilization Activity. The last one makes it possible to exchange the feedbacks obtained in the experimental classes.

Concerning the technical environment, the CoPE uses the LMS Moodle which corresponds to the third case of the learning environment in §4.4. This solution offers the

<sup>&</sup>lt;sup>17</sup> Coselearn (the Swiss cooperative program for e-learning): http://www.coselearn.org

<sup>18</sup> http://www.qualilearning.org

advantage of natural coupling (CoPE  $\leftarrow \rightarrow$  practice of e-learning) since Moodle is also being used as an environment of the online education structure and tool carried out within the framework of the experimental classes.

## 6. Conclusion and Perspectives

The aim of this article is to extend the application of the Communities of Practice (CoPs) to the e-learning field. The proposed category called CoPE (Communities of Practice of E-learning) is considered the center of reflection of techno-pedagogic practices and promotes collaborative and cooperative learning. The definition we came up with for CoPE was obtained by adaptation of CoPs defined by Lave and Wenger [6]. The concepts related to CoPE have been illustrated through a case study developed and realized within the project of distance education program **CoseLearn** that leads to International Master in e-Learning.

With regards to our work, we plan to provide a specification language of the learning scenarios in CoPEs. This language will be based on IMS-LD, which is used for the specification of learning scenarios in e-learning, and will make it possible to facilitate the communication between the environment and the LMS.

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# **PARALLEL SESSION #8**

# **VISIONS FOR THE FUTURE**

#### Bridging the Digital Divide: Successful Innovations in Private-Public Sector Partnerships

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#### Abstract

In this paper I explore the latest trends in the use of Information and Communication Technology (ICT) for humanitarian and development purposes. In particular, I will focus on the digital divide and its implications for economic sustainability, and on ways that multinational organizations can partner with the private sector to improve the knowledge transfer process, educational efficiencies and reduce costs. Using the Digital Alliance Foundation as a working example, I will discuss the latest trends in "technophilanthropy" including recent initiatives that illustrate ways in which the private and public sectors can successfully work together. (Digital Divide; ICT for Development; Techno-philanthropy; Private-Public Sector Partnerships; Technology Education; Educational Technologies)

#### 1. Introduction

The digital divide concept was first introduced over a decade ago by United States Vice President, Albert Gore, in a speech given to the residents of Knoxville, Tennessee. During this speech he introduced the digital divide concept in the context of US children not having access to the "information superhighway". Specifically, Vice President Gore stated, "We challenged the nation to make sure that our children will never be separated by a *digital divide*" (emphasis added) [1]. Later in the same address, President William Clinton expanded on the concept to include an important developmental dimension. "Of course, as Al said, there could be a great digital divide. If we don't broadly share the knowledge and the technology that is developing, it could work to promote inequality, frictions, anxieties among people. But if we do it right, it can be a great force to help us meet our challenges and protect our values together."Later "bridging" the digital divide became a major initiative for the Clinton/Gore administration in particular within the United States. The Clinton/Gore Administration stated, "Today, President Clinton announced that he intends to lead a New Markets tour in the Spring of 2000 to focus national attention on the digital divide -- the growing division in the United States between information 'haves' and 'have-nots.' This issue has also been a top priority for Vice President Gore, who has worked to bridge the digital divide by ensuring that all of our children have access to educational technology." [3].

The idea of bridging the digital divide was soon applied to international development issues. The United Nations and other multinational agencies expanded their activities to address this emerging global issue. The United Nations Secretary General, Kofi Annan, explained that information and communication technologies can improve the lives of people in developing countries. He said, "The past year has been marked by a great surge in the United Nations' effort to build international consensus around the central goals of sustainable development and poverty eradication. Great hopes have been raised. The challenge now is to translate them into reality. There is a vast potential for investment growth in the developing countries. Information and communication technologies (ICT) can help us turn this potential into concrete opportunities that will help the poor work their way out of poverty, while at the same time benefiting the world community as a whole." [4]. In particular, in 2006, the United Nations Global Alliance for ICT and Development was formed under the direction of Kofi Annan to serve as a global forum that would comprehensively address the cross-cutting issues related to ICT in development. In 2007, the Digital Alliance Foundation-a non-profit humanitarian organization-was formed to provide capacity-building, vocational ICT skills to marginalized populations, NGOs, in-country aide staff and governmental organizations in an effort to alleviate unnecessary human suffering.

#### 2. The Problem

The digital divide is a multifaceted issue threatening to undermine the economic growth and competitive advantage of individuals, communities and entire regions in emerging economies. Not only is the "divide" widening, but the chasm is deepening with the accelerating rates of technological innovation. Although there are many possible measures of the digital divide a simple indicator is the relationship between the expansion of broadband connectivity, affordability of Internet connectivity and the overall Human Poverty Index. In Figure 1, we see the expansion of broadband connectivity over a five year period. It is not surprising that the greatest expansion of broadband connectivity per 100 inhabitants is greatest in countries commonly referred to as "developed".

It is also not unexpected to learn that broadband connectivity is generally associated with the affordability of Internet connectivity. In Figure 2, we see that in developed countries, the cost as a percent of monthly GNP per capita is lowest (represented by the dark blue regions of the world). In the developing world, the cost for Internet connectivity is higher as a percentage of monthly GNP per capita – this is particularly acute in Saharan and Eastern Africa. Again, this is not a startling notion. According to the ITU, "One of the biggest challenges for the uptake of ICTs and for building a people-centered and development-oriented Information Society is the affordability of the services. The Digital Opportunity Index monitors the mobile communications that promise to bridge the digital divide in many parts of the world, as well as more recent technologies such as broadband and mobile Internet access. The price of broadband continues to fall worldwide, by as much as twenty per cent a year over the last two years according to ITU's analysis, while broadband speeds continue to increase. The lower cost of ICTs greatly facilitates their diffusion and utilization, and contributes to increased digital opportunity." [6].



Figure 1. Broadband expansion 2001-2005 [5]

Now as we begin to compare the expansion of broadband connectivity and overall Internet connection affordability we discover a noteworthy similarity in relationship to the overall Human Poverty Index as produced by the United Nations Development Program. In Figure 3, we see that the overall Human Poverty Index is lowest in Western Europe and North America. Once again, this is not surprising data. Countries commonly referred to as "developed", rank the lowest in the overall Human Poverty Index. We begin to see a pattern emerge between both broadband expansion and the affordability of Internet connectivity in relationship with the lowest scores on the Human Poverty Index.

In Figure 4, we see that this relationship continues at the opposite end of the Human Poverty Index. Here we see that the same countries in Saharan and Eastern Africa that appeared in the most expensive regions for Internet connectivity as a percent of monthly GNP per capita are also present at the bottom of the Human Poverty Index.

The scope of this paper does not attempt to explain the causal relationships between broadband expansion and overall affordability of Internet connectivity as they relate to the Human Poverty Index. Certainly, additional study is warranted to better understand these complex relationships. Nevertheless, these poignant similarities serve as effective measures of the overall digital divide.



Figure 2. Internet affordability (cost of 20h internet connection as a % of monthly GDP per capita) [7]

Huma	n Poverty Index (HPI-1) Va	lue (%)
A composite index measuring deprivations in and healthy life, knowledge and a decent sta note 1.	the three basic dimensions ca ndard of living. For details on	ptured in the human development index—a long how the index is calculated, see <i>Technical</i>
HDI Rank	1 Country	
1	Norway	
2	Iceland	**
4 3	Australia	**
4	Ireland	**
5	Sweden	**
6	Canada	
7	lanan	
8	United States	
9	Switzerland	
10	Netherlands	
11	Finland	**
12	Luxembourg	
13	Belgium	**
14	Austria	
15	Denmark	
16	France	
17	Italy	
18	United Kingdom	
19	Spain	
20	New Zealand	
21	Germany	**
22	Hong Kong, China (SAR)	**
23	Israel	
24	Greece	
25	Singapore	6.3

Figure 3. Human poverty index – top 25 [8]

146	Swaziland	52.5
147	Togo	39.2
148	Djibouti	30.0
149	Lesotho	47.5
150	Yemen	40.6
151	Zimbabwe	46.0
152	Kenya	35.5
153	Mauritania	41.0
154	Haiti	39.4
155	Gambia	44.7
156	Senegal	44.0
157	Eritrea	38.1
158	Rwanda	37.3
159	Nigeria	40.6
160	Guinea	52.0
161	Angola	40.9
162	Tanzania, U. Rep. of	36.3
163	Benin	47.8
164	Côte d'Ivoire	41.5
165	Zambia	45.6
166	Malawi	43.0
167	Congo, Dem. Rep. of the	40.9
168	Mozambique	48.9
169	Burundi	40.7
170	Ethiopia	55.3
171	Chad	57.9
172	Central African Republic	47.8
173	Guinea-Bissau	48.2
174	Burkina Easo	58.3
175	Mali	60.2
176	Sierra Leone	51.9
177	Niger	56.4
+//	1190	5011

Figure 4. Human poverty index – bottom 32 [9]

It would appear that the affordability of Internet connectivity, in both relative and absolute terms, is not just a symptom of an underdeveloped infrastructure but would appear to be a contributing barrier to overall development. In a challenge directed to the private sector, United Nations Secretary General, Kofi Annan stated, "The new information and communications technologies are among the driving forces of globalization. They are bringing people together, and bringing decision makers unprecedented new tools for development. At the same time, however, the gap between information "haves" and "have-nots" is widening, and there is a real danger that the world's poor will be excluded from the emerging knowledge-based global economy." [10].

The growing chasm between digital natives (information "haves") and those who are digitally challenged (information "have not's") is a significant multinational issue. Entire economies are strained to achieve sustainable competitive advantage in a rapidly evolving global, information-based economy that is increasingly dependent on access to timely, accurate data and the ability to act on it effectively. Even the most remote business seeks the productivity and efficiency available through the application of information communication technologies. This need for productivity and efficiency is particularly acute within geographically dispersed aide organizations that rely on incountry staff to execute their humanitarian missions. Precious donations needed to support basic humanitarian efforts can be wasted through the lack of basic computer skills that many in the developed world take for granted. Relatively simple technical training activities can result in a profound impact on lowering administrative costs and enable the staff to more effectively conduct their needful humanitarian activities.

#### 3. Innovative Solutions

A problem as pervasive and complex as the digital divide cannot be solved with a single program or by a single entity. It requires an innovative, collaborated, multistakeholder approach. The private sector alone spends billions of dollars each year on ICT-related education and assessments worldwide. Within this sector, competitive dynamics produce an environment ripe with creatively and innovation, generating practical, cutting-edge educational solutions. Multinational entities such as the United Nations Economic, Science and Culture Organization, the International Telecommunications Union and the International Labor Organization, to name a few, direct meaningful initiatives regarding ICT for development. Significant research and development is also carried out by leading academic institutions such as the Massachusetts Institute of Technology. Civil society and NGO's are also engaged in much needed efforts to both address the digital divide and basic human needs. With all of these entities-and many others-actively engaged in ICT education and development work there is no shortage of "best practices". It is only through the coordination and focus of these often disconnected efforts that truly transformative results can be achieved. It is this vision of creating a multi-stakeholder alliance of like-minded organizations and motivated individuals that serves as the foundation for and *la raison d'etre* for the Digital Alliance Foundation.

#### 3.1 Advocacy and Strategic Partnerships

An important guiding principle of the Digital Alliance Foundation is the commitment to advocacy, and coalition building through strategic partnerships. As previously mentioned, the digital divide and its resulting impact on emerging economies is a multifaceted issue being addressed by a multitude of organizations around the world. It is therefore important to not only raise awareness of this important concern but also establish meaningful strategic alliances to leverage existing resources and capitalize on the knowledge and experience of others. No single individual or entity can address the digital divide in isolation.

A routine aspect of the Digital Alliance Foundation is to participate in appropriate forums, planning meetings and other events in order to build relationships, share insights and focus combined resources on the problem. The MIT Linc Conference is an excellent example of this type of advocacy and strategic partnership effort. Through the distribution of this paper itself the collective experience of the Digital Alliance Foundation will be shared for the benefit of other organizations. No doubt contacts will be made and strategic alliances formed as a result.

The impact of these activities can be seen in previous participation in strategic events. For example, as a stakeholder in the United Nations Global Alliance for ICT and Development, the Digital Alliance Foundation was invited to participate in the CODI V conference sponsored by the UN Economic Commission for Africa in Addis Ababa, Ethiopia earlier this year. This conference focused on ICT and workforce development. Surprisingly, the Digital Alliance Foundation was the only US-based organization present that had direct experience and alliances with the private sector. As papers were presented, the Digital Alliance Foundation had the opportunity to provide valuable contributions and perspective otherwise absent in the conference. In addition, several strategic relationships were formed that will be discussed later in the paper.

As a result of the CODI V meetings the Digital Alliance Foundation was then invited to participate in the follow-on meetings to the World Summit on the Information Society hosted by the International Telecommunications Union and the United Nations Global Alliance for ICT and Development in Geneva, Switzerland. Once again the Digital Alliance Foundation was able to successfully contribute to the proceedings by sharing its experience in the development of global training programs. As before, several strategic relationships were formed as a result of the participation in those meetings which continue to serve as a foundation for future efforts and initiatives.

Additional strategic events in 2007 include: the Clinton Global Initiative Annual Meeting in New York (September 26-28), the MIT LINC 2007 Conference in Amman, Jordon and Dubai (October 28 – November 1), and the Global Knowledge Partnership Conference in Kuala Lumpur, Malaysia (December 11-13).

#### 3.2 Multi-stakeholder Advisory Council

Through innovative, private-public sector strategic partnerships and collaboration with multinational agencies and the civil society, the Digital Alliance Foundation is incorporating the best practices from all relevant contributors and putting them into practice where they are needed the most. This process is facilitated by the dialogue generated by a diverse and richly experienced advisory council.

The Digital Alliance Foundation Advisory Council is, by design, comprised of a wide array of multinational organizations, humanitarian organizations, NGO's, academic institutions, professional associations, representatives for key ICT private sector companies and qualified experts.

Currently representatives from the multinational organization segment include the United Nations Global Alliance for ICT and Development. Additional dialogues are currently under way with UN Economic Commission for Africa, UNESCO and the International Telecommunications Union. Humanitarian organizations and NGO's include: Reach the Children (www.reachthechildren.org); the Rising Star Outreach Foundation (www.risingstaroutreach.org); and the Geekcorps (www.geekcorps.org). The Digital Alliance Foundation is also in negotiations with the Ascend Alliance (www.ascendaliance.org).

Private sector ICT companies include Microsoft Learning, Novell Education, Sun, and Skill Technologies. Additional representation from Yahoo! Teachers, Cisco Systems and even Moodle (a participant in the MIT Linc 2007 Conference), are in negotiations. Several professional organizations are exploring ways to become involved including: the Computing Technology Industry Association (www.comptia.org), the Association of Test Publishers (www.test-publishers.org), the Performance Testing Council (www.performancetest.org) and the American National Standards Institute (www.ansi.org) and its international affiliates. Finally, prestigious academic institutions including the Massachusetts Institute of Technology are members of the Digital Alliance Foundation Advisory Council.

This unique combination of perspectives, experience and skills provide a rich environment in which Digital Alliance Foundation projects are reviewed, evaluated and implemented.

#### **3.3 Digital Literacy Curricula**

In collaboration with the UN Economic Commission for Africa, the Digital Alliance Foundation will define "digital literacy" in quantifiable educational objective terms with a resulting training and certification program. In order to accomplish this task a conceptual framework is useful. There are at least three significant dimensions to consider while constructing a meaningful conceptual framework. These are: difficulty, specificity and audience size.

The notion of digital education is inherently hierarchical when considered in terms of difficulty. In other words, certain technical tasks are more complex and/or require more prerequisite knowledge in order to accomplish them. For example, saving a file in a word processor is generally less difficult than creating a network via a wireless network hub. One could equally say that saving a file is less complex and requires fewer foundational skills in order to accomplish the task than creating a wireless network. For the purposes of this proposal and the digital education conceptual framework, a general scale from easy to difficult will be used to create a hierarchy in which to order tasks, skills and standards.

To further simplify the conceptual framework, digital education will be stratified into four basic levels with increasing degrees of "difficulty", complexity and/or amount of prerequisite knowledge or skills. The foundation of digital education framework consists of the most basic Digital Literacy principles or what the most basic ITC user should know about computers, software and basic communication technologies. This level is not vocationally oriented but serves as a common knowledge base upon which more advanced computer and communication skills can be developed. Tasks at this level could include: cellular telephone usage, turning the computer on and off safely, saving files, using e-mail, using a web browser, and very basic word processing.

The next conceptual level is Digital Proficiency. This skill level builds off of knowledge and skills of the Digital Literacy level. Digital Proficiency is typified by the average office worker with average computer and communication skills. This could include such things as: moderate levels of word processing, spreadsheets, presentation software, e-mail, Internet usage, cellular telephony and cellular applications and very basic troubleshooting and cell phone maintenance. These users are average but are vocationally functional in a typical office environment but should not be confused with so-called "power users" or specialists.

Based on the foundations of Digital Literacy and Digital Proficiency a potential student has the opportunity to specialize their knowledge and skills and begin to apply them in more advanced and specialized vocational situations. The final conceptual level is Digital Expertise. This level is also vocationally-oriented and represents the highest

degree of ICT knowledge and skills necessary for a given profession. These hierarchical relationships are illustrated in Figure 5 below.



Figure 5. Digital education difficulty

The notion of digital education is also influenced by general or more specific educational principles. At the most basic levels, skills are general and can be applied across a broad range of situations and vocational situations. As students add digital knowledge and skills they become more specialized. This concept is illustrated in the vertical dashed lines running through the Digital Competency and Digital Expertise levels in Figure 6 below.



Figure 6. Digital education specificity and occupation orientation

For example, true ICT-related careers such as network administrator, web designer or office application specialists would emerge after the foundational knowledge and skills identified in the Digital Literacy and Digital Competency levels. In these vertical specializations, ICT knowledge and skills are applied into vocational categories. These vocational ICT applications are not limited to ICT-related careers that deal exclusively with technology. Specialized users apply ICT to their specific careers. Examples include: ICT in medical careers, ICT in agricultural sciences, or ICT in travel and tourism. Although these careers use ICT as a part of their daily activities they are not defined by it. These vertical ICT education standards play an important role in defining what an individual needs to know in order to be successful in their chosen profession.

As students advance in their acquisition of digital knowledge and skills they would build on the specialized ICT education they have acquired at the Digital Competency level. For example whereas with Digital Competency a student might prepare to become a Network Administration, with Digital Expertise they would become Network Engineer. At this level of complexity much more attention would be given to planning, implementing, maintaining and troubleshooting skills for ICT in a specific vocational category. This leads to the final dimension needed to complete the conceptual framework for digital education - audience size. This concept is illustrated in Figure 7 below. In this illustration the pyramid shape represents the reducing size of the student populations as the difficulty and specificity of skills increase.



Figure 7. Digital education audience size

The largest numbers of potential students will naturally be at the bottom of the pyramid as Digital Literacy represents the most basic digital knowledge and skills. It is also the most general and serves as an excellent foundation for additional studies. One could argue that Digital Literacy represents what anyone should know about computers and basic communication technology. Digital Literacy although not vocationally specific, does represent a slightly more advanced user who would need to apply their

The benefit of this reduction in students as they advance up the Digital Education pyramid is largely financial. Basic, general and foundational Digital Literacy by definition will be less complex, likely to be less affected by technological changes and be the least costly. But it represents the largest potential student population. As the skill levels increase so do the educational complexities, the need to stay current with the latest in technological developments and ultimately the costs to maintain a valid digital educational program. Fortunately, these increasing costs are offset by the fewer number of students pursuing advanced specializations.

In application, existing materials produced by organizations such as Microsoft will be validated via formal job task analyses in five geographic representative regions of the UN Economic Commission for Africa to confirm their appropriateness for any given region. Retrofitting existing materials represents a significant cost and time saving strategy. Once curriculum standards have been established the program will be rolled out across the African continent and subsequently to other UN Economic regions.

#### **3.4 Digital Alliance Technical Training Centers**

One of the largest costs associated with digital education is providing convenient access to the latest hardware, software and broadband Internet connectivity. In on-going negotiations with UNESCO, the Digital Alliance Foundation is exploring ways to leverage the existing technical infrastructure supported by UNESCO's Community Multimedia Center (CMC) Program. In this program hundreds of CMC's are already in place in a variety of African, South East Asian and Latin American countries. Thus by facilitating a four-way dialogue between UNECA, UNESCO, Reach the Children and the Digital Alliance Foundation, a beneficial synergy of missions has been discovered. To date, the Digital Alliance Foundation is currently negotiating the pilot sites for its ICT Education for All/Digital Literacy Initiative. The task is to discover a geographically representative sample in the five African regions that correspond with UNESCO's CMC footprint and the local offices supported by Reach the Children.

Through this multi-lateral approach, millions of dollars in infrastructure costs can be leveraged, providing value to existing programs and promoting more efficient use of resources. The current pilot sites under evaluation are found in: Central Africa: Cameroon, Congo/Chad; East Africa: Ethiopia, Kenya; North Africa: Egypt, Morocco; Southern Africa: South Africa, Mozambique; West Africa: Ghana, Senegal.

## **3.5 Digital Alliance Technical Instructors**

Another significant expense associated with ICT education is maintaining a sufficient number of qualified instructors. The Digital Alliance Foundation team has learned from years of experience in the private ICT training sector that the most efficient and costeffective method of skills transfer from subject matter experts to end users is via a leveraged training model.

In a leveraged training model, Digital Alliance Technical Instructors will seldom, if ever, train end users directly. These highly qualified instructors will focus their attention on training local, in-country trainers. In this way, ICT education is both scalable and adaptable to a local culture. In partnership with local Digital Alliance Trainer Centers (UNESCO CMC's or others), Digital Alliance Technical Instructors will train local instructors who will in turn, train additional trainers and end users. Local instructors will be responsible for regionalization and cultural adaptation appropriate for the region. Digital Alliance Technical Instructors will conduct their training via in-country training missions or via regularly scheduled e-learning training sessions.

The actual staffing of Digital Alliance Technical Instructors will likely arise through strategic partnerships with humanitarian organizations and academic institutions with the required subject matter expertise. The Digital Alliance Foundation is currently in negotiations with Geekcorps to provide just this type of training expertise.

#### 3.6 Learning Management, Distance Education and Skill Inventory Systems

Regardless of the training topic, educational technologies provide critical curriculum storage, management and delivery tools. Other technology tools serve as online assessment engines and sophisticated skill inventory reporting. This technical infrastructure is the backbone of the global Digital Alliance Network.

Once again, employing the concept of leveraging existing resources and coalitionbuilding through strategic partnerships, the Digital Alliance Foundation is creating a sophisticated technical infrastructure in which it will maintain, manage, and evaluate its programs' various initiatives.

The Digital Alliance Foundation is currently in negotiations with Moodle (www.moodle.com), the leading open-source Learning Management System (LMS) provider, to explore ways in which the two organizations can leverage existing resources for their mutual benefit. Simultaneously it is negotiating the use of the Yahoo! Teacher's online Open Education Resource (http://teachers.yahoo.com/), to provide a forum for social networking and best practices for Digital Alliance Technical Instructors, staff and students. The Digital Alliance Foundation is also negotiating with KRYTERION, Inc., (www.kryteriononline.com), to provide state-of-the-art secure, online testing services that interface directly with Moodle's LMS.

Finally, the Digital Alliance has successfully negotiated a strategic partnership with Skill Technologies to provide its online Knowledge Explorer technology to analyze and graphically represent the skill inventory of an individual or capacity of a specific Digital Alliance Technical Training Center. This data can also be aggregated to provide an inventory of skills for a village, region, country or even continent. Through this strategic partnership, the Digital Alliance Foundation will be the first humanitarian organization with the capacity to reliably provide an accurate measurement of the actual digital skills gap (based on established criteria or objectives) for an individual over time or for any combination of participants in the program. This technology will provide an empirical report on program efficacy and progress from the macro level down to the micro or individual levels.

These technologies employed as a result of strategic partnerships and collaboration will save the Digital Alliance Foundation millions of dollars in infrastructure and administrative costs while providing unequalled measurement and management capabilities.

#### 4. Conclusion

The digital divide is a significant barrier to development but not an insurmountable problem. Forward-looking individuals and organizations are beginning to think creatively on how to employ ICT's to their advantage. A good example of this is the daily practice of processing parking tickets in New York City. The tickets are written in New York, scanned and e-mailed to Ghana for processing. By the next day, the tickets are processed and entered into the appropriate databases at a fraction of the cost had they been processed in New York itself. This seamless and cost effective system is an example of a local economy capitalizing on its local skill sets to create competitive advantage – and it can happen anywhere. India is an excellent example of what can be accomplished.

The "wheel" has been invented and it is simply a waste of valuable time and resources to try and create it again. Best practices exist all around the world but they have not been effectively coordinated – until recently. The private sector should not be viewed as heartless or uninterested in making a difference in humanitarian projects and the public sector cannot afford to attempt to solve digital illiteracy in isolation. The Digital Alliance Foundation is beginning to bridge the digital divide, providing capacity-building, vocational, ICT skills to marginalized populations, in-country aide organizations, NGO's and governmental agencies. It works with the private sector, public sector, NGO's, civil society, multinational organizations, governmental agencies and qualified, motivated individuals to accelerate the rate of technical skills transfer from the technology "haves" to the technology "have not's" leveraging existing resources and technologies. This is the heart of its techno-philanthropy initiatives.

There are more than enough resources, experience, knowledge and goodwill to narrow the gulf created by the digital divide. Our success or failure is in our hands - as are the lives of the millions whose lives can be changed by our combined efforts.

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# Collaborative Team e-Learning for PEACE E-LEARNING VISION AND BEYOND

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# The Fourth Annual Conference of Learning International Networks Consortium (LINC) MIT LINC 2007

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## Abstract

The spreading of the culture of peace e-Learning and tolerance is one of the main objectives of this paper through, Gaza International Foundation for Peace on Earth (GIFPE). In this paper we describe five projects which GIFPE is a partner of; that aim to create a new era of peace e-Learning and hope in the Middle East. These projects are: Greater Middle East Collaborative Cross-Cultural e-Learning module; Global University System/Palestine/Gaza Strip & West Bank; One Laptop per Child module; the Palestinian Education Initiative (PEI); and the English Language Connection Module. These projects propose the building of bridges between e-Nations; Global Peace through Global University System, working with people-to-people. Education has always been considered in the Palestinian mind as one of the a crucial components of not only to create a nation but also to build a genuine, and sustainable Global Peace e-Learning Initiative based on moral principal rather than political or ideological doctrines. These projects are encouraging to continue to pave the way for progress on the road to peace by developing methods to foster the social and political change needed to achieve true peace between all e-nations with their people, the people–to-people.

## 1. Introduction

The spreading of the culture of peace e-Learning and tolerance is one of the main objectives of this paper through, Gaza International Foundation for Peace on Earth (GIFPE). Thus, GIFPE's work will hopefully cause fanaticism and extremism to shrink and melt in to the ocean of understanding and respect that we all create in the near future. GIFPE will show Middle-Easterners and the international community that peace e-Learning can bring many benefits to the area. For example, it can bring people together to discuss issues, and can offer lessons that enhance mutual understanding and respect.

With aid of new e-technology we have the opportunity today to create a better future by creating a space where all e- nations and young adults can learn about each other and build friendships, understanding, and compassion, in a relaxed and fun environment.

As the world is becoming smaller, technology has become a basic part of our life. Information Technology has succeeded in improving knowledge and opening doors. But here in the Middle East; one of the most important spots in the world, we are still in the middle of developing this process. Technology has become more focused today. There is a greater focus on technology in the occupied Palestinian territories, and there has been a notable development within existing Information Technology infrastructure.

MIT of the Greater Middle East e-Learning Initiative and Peace e-Learning process and current events have perhaps taught us, that many people in the Middle Eastern region are experiencing one of the most important times in their lives right now. But, today, many scholars strive to live peacefully together in the Middle East. To encourage this development, much needs to be done in order to prepare people to think independently, and to become tolerant, open-minded, democratic, and responsive to the needs of peace and the development of their societies. This development will allow us to construct a long lasting and durable peace together.
We can, and will construct long lasting and durable peace e-Learning initiatives. In this paper we describe five projects which GIFPE is a partner of; that aim to create a new era of peace e-Learning and hope in the Middle East. These projects are: Greater Middle East Collaborative Cross-Cultural e-Learning module; Global University System/Palestine/Gaza Strip & West Bank; One Laptop per Child or INK PC Computer module; Palestinian Education Initiative (PEI); and the English Language Connection Module.

The people of all countries in the world including the Middle East should understand that in order to live harmoniously with each other, it is necessary to consider the living conditions of others and make sure that others live under the same conditions. To encourage the positive developments of democracy, tolerance and open mindedness, intelligent and creative people should exemplify peaceful coexistence and mutual understanding.

The rest of the paper is organized as follows: section 2 presents Greater Middle East Collaborative Cross-Cultural e-Learning module; section 3 presents Global University System/Palestine/Gaza Strip & West Bank; section 4 presents One Laptop per Child or INK PC Compute module; section 5 presents Palestinian Education Initiative (PEI); section 6 and the English Language Connection Module; and finally, section 7 concludes the paper.

# 2. Greater Middle East Collaborative Cross-Cultural e-Learning Technology

Greater Middle East Collaborative Cross-Cultural e-Learning Technology [1] is an initiative that was developed by the Learning International Networks Consortium (LINC), —an MIT based research group that participates with numerous international communities. We aim to further investigate the feasibility of the proposed project. LINC is an MIT-based initiative involving people from all over the world. Peace e-Learning technology is a tool and vehicle. Therefore, our goals are to build a strong community of people across countries and boundaries, to build support networks across national, religious, cultural and other boundaries, and to manage this process not only during their education but also afterwards.

We use education as a strategic vehicle for building trust and achieving change, not only to impact technical knowledge or specific skills. In this perspective, we will need to define measures for the effectiveness of our community building efforts, in addition to metrics methods that are more common in measuring educational outcomes. The goal of the proposed program would be to use distance learning in order to offer high school teachers a program leading to a Masters Degree in education, with emphasis on science and mathematics teaching.

The main catalyst of this initiative was a LINC presentation about students in the West Bank and the Gaza strip and the difficulties they have in attending regular classes due to the currently unsettled situation. Obviously, in such a case, e-Learning becomes a necessity rather than an additional option. The increased demand for higher education in these areas and the limited resources available for traditional learning coupled with physical and security obstacles make the proposed e-learning based program a viable alternative which might lead to the creation of a full-scale educational institute capable of contributing its role into regional development, leading to the spreading of awareness, the avoidance of extremism, and most desirably, the promoting peace values. Finally, Peace Education goes beyond simply learning about peace; it teaches the very a culture of peace!

# 3. Global University System/Palestine/Gaza Strip & West Bank

Global University System (GUS) [2] aims to create a worldwide consortium of universities and healthcare institutions to provide the underdeveloped world with global e-learning and e-healthcare/telemedicine via broadband Internet technologies. The aim is to achieve "education and healthcare for all" anywhere, anytime and at any pace. Education and job skills are the keys in determining a nation's wealth and influence.

GUS is headquartered at the Global E-learning Center at the University of Tampere in Finland, under the direction of the UNESCO/UNITWIN Networking Chair, held by Dr. Tapio Vari. The GUS/Palestine/Gaza Strip and West Bank (GUS/Palestine/GS&WB) consortium member institutions will also become members of this Chair Program.

GUS/ Palestine/Gaza Strip and West Bank (GUS/Palestine/GS&WB) [5] is a project to create GUS/Palestine/Gaza Strip and West Bank, which is to be emulated in other developing countries. Its Secretariat will provide overall administration and co-ordination of GUS and emerging programs. GUS/Palestine/GS&WB will be a consortium of the Islamic University, Gaza International Foundation for Peace on Earth and The National Research Center and other local stakeholders, etc., and will serve as the overall framework for initiatives entailing rural and community-based development activities, especially (not exclusively) those pertaining to Healthcare, Education, Life Sciences, Physical Sciences, Earth Sciences, Communication Sciences, Management Sciences, Humanities, Economic and Social Sciences, Agriculture and Fishing.

GUS/Palestine/GS&WB is designed to provide tools to enable the people of the region to participate fully in their own development and to bring their culture forward, thriving with the influx of opportunities, and contributing to new prosperities. GUS/Palestine/GS&WB will provide a modernizing tool to fast-track peace-building, peace-consolidation and socio-economic development of the participating communities, and contribute to the accelerated integration of Palestine into the world economy, export and trade facilitation, rural and community-based economic growth.

# 4. One Laptop Per Child (OLPC) or INK PC Computer Module.

One Laptop Per Child (OLPC) module is a new project, established recently at the World Economy Forum (WEF) with the co-founder of the Media Lab at the Massachusetts Institute of Technology (MIT). Laptops are both a window and a tool: a window into the world and a tool with which to think. They are a wonderful way for all children to "learn learning" through independent interaction and exploration. However, the laptops will only be distributed to schools directly through large government initiatives such as Extended Middle East e-Learning Initiative by MIT, and Global University System and Palestinian Education Initiative (PEI) by Palestinian Authority. The issue of access to

computers in schools will no longer focus on improving the computer to student ratio. With this plan in place teachers and students will have one-to-one access making the computer a ubiquitous tool for the educator and the learner.

Wireless access to the Internet will allow students and teachers to acquire information that is not available through conventional methods. In addition, curriculum of the Palestinian Education Initiative (PEI) is being developed that will leverage this technology so that both teachers and students will excel in a world that is driven by information.

# 5. The Palestinian Education Initiative (PEI)

The Palestinian Education Initiative [3] aims to assist the Palestinian People in fulfilling their commitment towards integrating ICT in the education system within a model of public/private partnership. Such a model has proved to be efficient with respect to building the local information technology industry for the development of innovative learning solutions in partnership with world-class firms. In this way we establish economic value leading to mutually beneficial business opportunities.

Creating an information society is not an objective per se, but must serve as a principal means in the comprehensive development of the Palestinian society. It is the vision of the Palestinian Authority (PA) to build a Palestinian information society that facilitates information access to all and to adopt ICT as a basic means of moving the Palestinian People forward and achieving the goal of a self-reliant and independent economy. This vision cannot be realized unless a concentrated effort is made by the public sector, the private sector and civil society in concert. Therefore, the Ministry of Telecommunications and Information Technology encourages public-private partnership as well as the involvement of the population in the implementation of ICT related initiatives. The national ICT strategy can be presented in the following six pillars: Governmental Role; Infrastructure Development; HR development; Education and Training; Attention of the Palestinian Content Industry; ICT and Informatics as a means to Economical and Social Development; and Development of E-Learning and Distance Learning.

Due to the limitation of natural resources that Palestinian people have, it is the optimal investment in Hunan Resources (HR) that guarantees sustainable social development. E-learning can function both as complementary to and as assistance to traditional learning. It makes it easy to manifest information and didactic materials regardless of time or place and it encourages discussion and brings about innovation and scientific research. Setting rules for e-Learning that goes hand-in-hand with traditional learning and providing the necessary infrastructure at the lowest cost can be an incentive for this kind of education. E-learning as complementary to traditional learning will ease the access to education from those parts of the population whose level of participation is comparatively low, such as people living in rural areas or young women. The society at large will benefit if these underutilized groups become active participants in the society.

Peace e-Learning is a part of solution of the Palestinian Education System, which means to achieve our Palestinian expansion in education and training. E-Learning is seen from

our prospective as learning with the help of information and communications technology tools. These tools may include the Internet, intranets, wireless networking, PC (personal computers) based technologies, handheld computers, interactive TV and also e-technology to support traditional delivery - for example using electronic whiteboards and video conferencing in the classroom.

# 6. English Language Connection Module

Education and knowledge are not able to stop all wars and other armed conflicts from occurring around the world, but they are a necessary precondition for a more democratic and peaceful cohabitation between human beings, peoples, and states. We help people to recognize and improve their situations, to help determine their political and economic futures, to reduce mutual enemy images, and to build up trust towards other humans, peoples, and states.

English language learning international e-Learning module [4] is a "neutral" common language and the English language classroom as the preferred locus for an implementation within the mainstream schooling system in each community. English teaching programs (tailor-made for non-native speaker) act, as the initial stage to be implemented using e-leaning and web learning community pedagogy and internet communication through a platform connecting students from Gaza and with students from the International community, thus creating a channel of dialogue based on core humanistic values, empathy and acceptance of each other's personal and group narratives. In our quest for the basic process of gaining / developing multicultural awareness and deciphering its components, we have developed an educational program composed of two central elements:

- 1. English language and English language teaching.
- 2. Information and Communication Technologies (ICT).

Together, they are vehicles for change in the global scale and central factors in the cultural /sociological reshaping of our world through the Greater Middle East e-Learning Initiative and Global University System. We are using those two powerful tools in the regional world of individuals and groups, and in the educational arena. In that small-scale environment, we found English language and ICT to be important agents of change, as powerful as in the global arena. They have a crucial role within local diversified environments - facilitating the revitalization of pluralistic communities and cross group interpersonal multicultural dialogue, especially between youth belonging to communities in conflict.

English language Model has a motivational, social and pedagogical role. English is used as a neutral communication tool and as an equalizing tool in interpersonal cross-group interaction. The social technologies enable, not only small group dynamics, but also self expression self-expression at the individual level. In addition, they contribute in expanding student literacy and allow remedial educational interventions, empowering both the individual and the group. It is these social technologies that are crucial when developing self-esteem, dealing with local acculturation deficiencies in pluralistic local communities, and building virtual alternative communities for youth belonging to communities in conflict.

# 7. Conclusion

Gaza International Foundation for Peace on Earth (GIFPE) has committed itself to strive to reform the inherited Palestinian Education System with the aim of assisting in the preparation of the Palestinian students and citizens towards life for future success in democratizing, economic, and societal pursuits.

GIFPE has been working very hard to help and build an educational system responsive to the social, cultural and developmental requirements of the Palestinian people. However, GIFPE has faced many challenges while in pursuing that goal. We faced many challenges, among them is the necessary unification of the two systems of education in Gaza and the West Bank, the expansion of school buildings in order to meet the enormous demand on education, the equipping of schools with needed labs and materials equipment, the training of teachers, and the development of special programs to meet the different needs of the population. Indeed, still these challenges need to be purposefully and comprehensively addressed in order to secure that high quality education is offered to all Palestinian students.

Only with these reforms we can truly prepare today's Palestinian students for future participation in the global knowledge economy. In order for these goals to be achieved, a considerable effort is called for including international partners, to work collectively with us on this mission of a genuine peace.

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# E-Learning: Revised Expectations and More Realistic Understanding of its Potential

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#### Abstract:

International assessment tests (TIMMS, PISA, and others) and reports from leading experts in education (The recent Horizon Report 2007) - all portray the growing disillusionment from e-learning and ICT -enabled practices. The achievement gaps and the digital divide are major problems not only in the developing countries but in the developed ones as well. Our lesson learned from several pilot projects among hundreds of high school students, from different ethno-cultural, religious, socioeconomic backgrounds, echo these findings, based on authentic field experiences.

The paper is an effort to answer how, despite all the social technologies, the abundance of content-generating tools, the "smart boards" in classes and the wonders of web-based access to information - too many high school students (soon becoming university students) lack comprehension skills (reading, viewing and mixed media screen comprehension), scientific thinking and creativity.

*E-learning is still learning. The bits do not block old impaired proficiencies and past incompetence from migrating to the new learning environments. In the hands of specially trained tutors, implementing given pedagogical strategies, networking, authorship and other ICT tools, can facilitate powerful remedial interventions empowering and potentiating gifted and underserved students . It is relevant in intercultural collaborative learning.* 

*Keywords:* E-learning , online reading comprehension, PISA 2009 , creativity, online empowering educational model

#### Introduction

The paper suggests a necessary revision in our approach to the proliferation of ICT and related emerging digital media - within the educational arena. Following Barzilai-Nahon (Barzilai-Nahon,2006), networks and technologies are not a neutral artifact, but are cultural and social spaces. It is certainly so in education, especially with e-learning practices and collaboration across ethno-cultural borders. The focus should move beyond technology, efficient operation and management, to the users' relevant personal, cognitive, cultural and social contexts. That approach will help us put in perspective unfulfilled past expectations. Much more important, reframing the disillusionment will enable more comprehensive solutions to current problems.

Three main arguments are raised in this paper; following gained "bottom up" insights and findings from field implementations of an educational program that combines both computer-mediated and high -touch human intervention, among pupils belonging to different ethno-cultural communities:

1. E-learning future, depends on solving past problems, first. There is an urgent need to reframe gaps and divides in the educational systems, looking at comprehension skills (reading, viewing and mixed media screen comprehension), critical / scientific thinking and creativity, as the important prism through which one conceptualizes goals and assessments.

2. ICT and Internet technologies are not the cause of gaps and divides. They are just the magnifying glass, exposing old maladies of the educational systems, aggravated in the Information Age. When used by tutors, and within specially designed ICT-enabled learning environments and social media, they can serve as powerful remedial tools, as well.

3. Harnessing creative thinking and promoting cultural adaptability are essential in nowadays-pluralistic societies. The empowering dialogue model of Language Connections, implemented as an intervention program, helps both low and high achievers, belonging to high-context and low-context cultural communities.

Bits gaps and divides: reframing assumed causality and conceptualizing new pedagogical approaches and their assessment

#### The disillusionment and its cause

In many developed countries, most of the pupils inhabit media and information rich environments, combined with embedded pervasive computing at schools. The problem, as described by NMC ("New Media Consortium"), the international consortium of world leading 250 learningfocused organizations (Horizon 2007 Report), is that despite the ICT saturated environment and contrary to the conventional expectations, the students' information literacy skills are not improving. More frustrating is the fact, that in a sea of user-created content, collaborative work, and instant access to information - the skills of critical thinking, research, and evaluation are rare and there is a widening gap between understanding how to use tools for media creation, and how to create meaningful contents. Although new tools make it increasingly easy to produce multimedia works, students lack essential skills in composition, storytelling, and critical thinking.

The introduction of ICT and related digital media learning environments is considered as the cause for the gaps and divides related to impaired comprehension and meaning making skills: the RAND Reading Study Group, and Coiro (Coiro,2003); Leu,(Leu,2007) and others.

ICT and Internet technologies are not the reason for the gaps and divides.

Acknowledging that, helps us focus on the real core issue. Once accurately diagnosed, we can come out with effective remedial interventions.

The problem reflects a long standing persistent minority differential in achievement in the United States and other pluralistic societies (Labov, 2001). It exists for years in bastions of the Western developed world as exposed in comparative tests among pupils from OECD countries (CNN (REUTERS), 2002). It is caused by years of absence of an adequate pedagogy and of trained teachers (Zohar and Dori,2003; Zohar,2004). It is a characteristic phenomena, not only among pupils who are tagged as "low achievers" in suburban areas, but among pupils from leading schools in the educational system, as echoed in some case studies with Muslim and Jewish pupils researched by Springman (Springman,2006).

There is no need for a new cognitive strategy, or for specially designed new reading environments, as suggested by some (Coiro, 2003). Following Storrer (Storrer,2002), for text and hypertext alike, coherent meaning making equally starts with structuring the content. Nowadays, that is an "impossible mission" for too many students, in both developed and developing countries.

In comparative international tests (TIMMS, PISA), they fail in "traditional" regular offline texts, when asked to hypothesize, analyze, match to categories, evaluate information, construe meaning, understand structure, interpret narrative or recognize a theme.

The assumption has been that the digital divide and inequalities in educational achievements across countries / communities / individuals, are related to issues of affordability, access, operating training and distribution of knowledge / content (either by centralized learning management systems, or by decentralized open networked learning). That conception led to either necessary, but not sufficient solutions, such as: technological infrastructure, access, or to ineffective didactic and pedagogical strategies, such as: simplified and /or abridged ready-made knowledge, drills and training practices. Apparently, the reality is much more complex as show the disappointing outcomes.

#### The need for creative thinking and cultural adaptability

Including ICT literacy and online reading comprehension in the PISA 2009, OECD comparative tests (Leu,2007), is a decision that should have been made long ago. Yet, there are serious preparations needed in each national education systems.

Following the "Robinson report" (Robinson, 1999) by Sir Ken Robinson, in our rapidly changing world and pluralistic societies, promoting the ability for creative thinking and promoting cultural adaptability, is essential. It means that the comprehension skills (reading, viewing and mixed media screen comprehension) should be complemented by composition of meaning competence. The trouble is, writes Robinson, that the educational system is not designed to promote this sort of innovative thinking that is so urgently needed.

Furthermore, with the participatory culture, the convergence of media and the personal cultural production and communication across multiple channels (Ito,2006), the new illiterates are those familiar with the technologies, but lost when required to retrieve, interpret, reflect and create new content. When facing the most powerful informational resource that has ever appeared in history, the Internet with the equivalent of more than 37,000 libraries of Congress (Leu,2007), each one of us should have the cognitive competence of the giant thinkers and scientists of the past.

One of the fundamental problems is that most schools and university graduates, do not have what is needed: they are not prepared to communicate well, to collaborate and to think creatively (Robinson, 1999); traditional modes of literacy no longer suffice in today's multicultural societies (Kramsh,1999); imaginations of both teachers and students are excluded from literacy teaching (Egan,2006).

Writing and reading are similar acts of meaning making and they have parallel cognitive processes (Kucer, 1985, Hayes, 1996), and so do comprehension and the composition of meaning. They all share similar structuring components. Acknowledging these structuring components, when reading and creatively composing meaning online and offline, is central in the theoretical conceptualization upon which Language Connections' empowering dialogue model is based.

ICT-enabled learning and social media technologies as powerful remedial tools in Language Connections' empowering dialogue model

#### The empowering dialogue mode

Two emerging technologies related to ICT are used in the dialogue educational model: social networking and authorship (user-created content, opening the doors for almost anyone to become an author, a creator, or a filmmaker). High-touch human intervention throughout the instructional process, both synchronic and a synchronic, is combined with computermediated tutoring.

The essence of Language Connections' model, lies in building gated social communities of learners belonging to different cultural communities. This model facilitates social intergroup (and intragroup) interpersonal interactions, fosters empathic dialogues, enables each participant to tell personal stories, in words and pictures, in individual photoblogs, and to post comments in others' photoblogs and in a shared space. It is a computer- assisted- communication platform combined with tutor - assisted - learning environment. It is a social environment, acting as an alternative new peer group and a learning environment, connecting the participants in shared collaborative intergroup assignments, with common themes researched locally and globally using common methodologies. It is both a friendly simulation of a multicultural setting and a lab for attitudinal change.

The gains, through literacy practices and inquiry based learning are

maximized, when metacognitive strategies are employed to make the process explicit and to tap into the students prior knowledge while getting the student to identify relevance to their own lives. Individuals can make a difference, when they are brought to a lift-off line, igniting a change process, which they will follow independently. The curriculum is adapted to current participants' specific relevant topics of interests, local curricular requirements and decided upon research themes.

Findings from 2006-2007 implementations among Muslim Jewish and Christian high school pupils from Tel- Aviv and Jaffa (,Israel), Gaza and Ramallah ( the Palestinian Authority), Assykkala ( Finland) {based on multisite case-study research conducted by Springman 2006) studying several implementations of Language Connections' model among Muslim Jewish and Christian high school pupils from Tel- Aviv and Jaffa (,Israel), Gaza and Ramallah ( the Palestinian Authority), Assykkala ( Finland). The findings were the following:

In various levels, all pupils: 1. acquired multicultural awareness (empathic cross community dialogues); 2. developed verbal literacy; 3. developed visual literacy; 4. developed digital media literacy.

Findings from other parallel implementations with low achievers in some schools and with groups of individual students- suggest that the model helps develop higher-order thinking: developing metalingual and metacognitive skills and critical thinking and potentiating both low and high achievers, belonging to high-context and low-context cultural communities. Quoting a principal of a Muslim high school in Israel: " for the first time, students experience, what they CAN do, and are not frustrated with what they CANNOT do"(Springman,2006).

In the research, the online assessment has been evaluated. The advantage of a web-based gated platform is in its transparency (regarding texts and images posted by each participant, and the interpersonal and group interactions), allowing a much more accurate developmental assessment It enables a better educational interventions and better tailor- made empowerment plans for each participant.

#### **Implications and conclusion**

The guiding concept behind the empowerment dialogue model is to prepare local tutors in each high school and thus enable to duplicate the model in more regions. From our experience, "centers of dialogue", in a school, change the schools' climate- from inside, act as change igniters and have a growing impact on wider circles. Metaphorically, what we try to do is give swimming lessons to the students, so they can develop swimming techniques and confidence, in a closed and controlled pool, before entering the big sea. Thus, helping them acquire metacognition with ICT and digital media technologies as the preferred vehicle, for better educational outcomes.

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#### The Global Text Project: The Arabic Imperative

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#### Abstract

Mass education is a critical tool for reducing the poverty that is endemic in many countries. Textbooks are a critical element of mass education because they provide a structured approach to learning. However, texts are unaffordable in many countries because the established publishing model cannot manage its costs to price books appropriately in the less developed economies. The Global Text Project is a new publishing model based on Internet distribution and open content collaborative authoring by the world's academic community to create texts for undergraduate university programs. Text creation will include the standard academic quality control process, peer reviewing, to ensure texts are authoritative. Professors and students will be encouraged to contribute changes and improvements, but in line with the open software model, only the chapter editor will be able to edit a particular chapter. Initially, the project plans to produce books in Arabic, English, Chinese, and Spanish and in cooperation with partner universities in Egypt, China, and Chile. Aspects of the Arabic division of the program are discussed, including content localization and translation. The forces that drive globalization enable scholarly communities to combine their talents to collectively assist many in the world to gain a better education.

#### **Addressing A Global Problem**

Poverty ensnares more than half the world's population, which lives on less than two dollars per day [1]. We all have a responsibility to do something for our fellow humans and find ways to use our skills and knowledge to make some effort, however small, to address this global problem. Mass education is an effective means of leveraging many out of poverty, and investments in educational materials have a return up to 14 times that of the return on physical resources [2]. Textbooks are intrinsic to nearly all education

systems; however, the developed world's business model for publishing textbooks does not meet the needs of those in the developing world. For example, a Biology textbook priced at \$108 in the U.S. sells for \$51 in Africa [3]. The U.S. GNI per capita is \$43.500. In Uganda it is \$280, according to the World Bank. Obviously, a different publishing model is needed to provide access to the educational resources that are essential for the mass education of the world's poorest inhabitants. We have established the Global Text Project <globaltext.org > to develop and disseminate open content electronic texts as an alternative publishing model to meet the educational needs of the developing world.

It is common for teachers and professors in most academic subjects to design their courses around a textbook, which provides a structured approach to learning from an authoritative source. Those with a comprehensive understanding of a topic typically write textbooks, and they have the experience to decide what should and should not be covered. Thus, textbooks and their authors play a pivotal role in mass education. Hence, we need to find a means of delivering textbooks at affordable prices, and ideally without cost, to students in the developing world.

There are two key technological and social developments that point to an opportunity to create a new model for textbook publishing. *First*, in the last decade we have discovered that the Internet is a low cost channel for distributing information products in digital form. *Second*, global digital communities have emerged that willingly collaborate to create content (e.g., Wikipedia) and software (e.g., Linux) that are freely available to all. These communities are reliant on the Internet to support their open collaboration.

There is a third element that also potentially plays a critical role in our endeavor. The world has 132 million university students [4], a massive, relatively untapped, intellectual resource. Too frequently, their intellectual efforts (e.g., assignments) are discarded at the end of the term. Professors need to develop infrastructures that enable some of this intellectual talent to be harnessed for the benefit of the global community. Our experience in working with graduate students to develop an XML textbook [5] was enlightening. We learned that students with appropriate supervision could develop a useful textbook and were highly motivated by the assignment.

The Global Text Project aims to exploit the two previously mentioned developments, the Internet and global electronic communities, to engage the latent global asset of university students, and to marshal the world's academic and practitioner communities to collaboratively create free textbooks for students in developing countries.

Textbooks are required across the board, from kindergarten to doctoral programs. As university faculty, we are most familiar with the university system and know how to operate in the international academic environment. Thus, it is sensible for us to focus on the area where we have the most domain knowledge. Thus, we have decided to concentrate on courses at a comprehensive university, though the general model is applicable to any educational environment.

#### **Openness Fit**

Engaging a community in the open production and sharing of intellectual works has been the goal of the World Wide Web since its incarnation at CERN in 1990. However, the openness of the methods by which these intellectual works are created and shared varies considerably. We can identify four dimensions of openness: access, editing, reviewing, and timeliness (see Table 8).

Table 6: Openness dimensions			
Access	Open	<>	Proprietary
Editing	Everyone	<>	Few
Reviewing	Informal	<>	Formal
Timeliness	Dynamic	<>	Static

**Table 8: Openness dimensions** 

Open access means that a source's content is freely available for anyone to read or download (e.g.Wikipedia or Linux). Whereas, one usually pays for access to proprietary content. The opportunity to edit content can vary from everyone (Wikipedia) to a few (open source software or a proprietary book). Opening editing to everyone means a topic can have a global perspective and examples can draw from the full range of human activity. In contrast, when there are only a few authors, knowledge is often limited to their locale and personnel experiences. While experts on a topic often overcome their localness through long-term focused attention on their domain, they still have difficulty encompassing the diversity provided by the pooled experiences of many distributed contributors.

Sources also vary in the level of formal reviewing undertaken before public release of the content. Open source software and academic journals are typically reviewed extensively (we treat software testing as a form of reviewing) before release. Conversely, edits to Wikipedia are immediately seen by all readers, who are in effect informal reviewers because they can correct any errors they detect. Consequently, any content developer has to decide which combination of the openness dimensions provides the best fits to the goals of the producers and the needs of the consumers.

Many people are reliant on a textbook's quality. Instructors and students wants to be assured that the content is correct, relevant, and timely. A textbook must be a credible authoritative source in order to gain adoption. At the same time, we would like to engage readers in improving the content by correcting errors, maintaining the currency, adding material to cover important omissions, and providing diverse illustrative examples and cases. Thus, we believe that the correct mix for the Global Text Project is completely open access, editing capability for a few, and formal reviewing. As a result, we have designed an infrastructure to produce reputable textbooks that can stimulate a high level of reader involvement.

Timeliness is the fourth dimension of openness. Some aspects of an intellectual work start to decline in value as soon as they are released because they contain data that age (e.g., the number of university students in the world). Thus, parts of these static works can gradually become incorrect. Alternatively, if content is electronic and editors are willing to accommodate suggested improvements, a books currency can be readily maintained. In order that each text has the necessary degree of consistency and quality to meet educational objectives, an editorial board will be created for each of them. The goal is to balance community involvement (i.e. faculty, students, practitioners) with the need for content currency and accuracy. Thus, we manage texts as if it they are peer-reviewed journals and have an editor-in-chief for each book as well as chapter editors.

The editor-in-chief develops the structure of a book by identifying chapters and their sequence, assures complete coverage of the topic, identifies links between chapters, manages consistency between chapters, and recruits chapter editors. A chapter editor creates the structure of the chapter, takes a lead role in writing the chapter, recruits contributors to help with writing the chapter, develops exercises and support material. Where appropriate, editors are encouraged to engage their students in developing a chapter and its ancillary material.

A core feature of the publishing model is that instead of relying on a few people to write a book, we employ a highly parallel model with one or more persons per chapter. A major disadvantage of the essentially serial traditional model is that a textbook might take 18-24 months from initial proposal to final publication, with a concomitant dating of some material. A parallel, open content model can produce a text faster *and* keep it current.

# **Quality control**

The academic publishing system has well-established quality procedures, and we mirror many of these in the production of books (see Figure 3). We have also designed quality control processes for the development of a book's outline of its general content and for the translation of a book. In addition, we have a Quality Assurance Board that reviews our quality control procedures and other aspects of the project every six months.

We are in the process of taking the notion of student quality circles [6] and adapting it to our goal of getting students involved in making their books better. We hope we will gain greater insights on how to create effective student quality circles from our pilot projects. We are also testing some of these ideas with our students.

Students, no matter the status of their economy's development, deserve the best texts we can create and they can make better. With a constant concern for quality, we believe we can produce quality texts within the significant constraint of relying on volunteers to create and maintain the core intellectual effort.



Figure 3: Chapter quality control

#### Scaling and workflow

Scaling is a critical issue when designing a system to handle a large number of distributed authors. Potentially, we can have thousands of authors, and we need to find a way to combine their efforts into a cohesive electronic text. In addition, we need to rely on open source software for two reasons. *First*, some of the authors in the market we plan to serve might not be able to afford proprietary software. *Second*, we want to use open source software to enable us to start quickly, and then modify the software to meet our needs more closely as we learn exactly what they are. The text workflow is captured in Figure 4.



#### Figure 4: Text workflow

We allow authors to write in their preferred word processor (usually MS Word) and provide them with a template with a set of styles for about 20 types of headers (e.g., case study) and body texts (e.g., indented paragraph). We can provide the styles for both MS Word and OpenOffice Writer. We use OpenOffice Writer to import and convert documents to open document format (ODF) and check that the styles have been used correctly as many authors are not familiar with the use of styles. Next, OpenOffice Writer's export feature is used to create a XHTML file, which we then run through a Java program to remove unwanted XHTML code and tags. The resulting sparse code is then loaded into Drupal <drugal.org>, an open source content management system (CMS). We have created a set of cascading style sheets (CSS) for screen and print rendering to match the styles supplied to authors, and these replace the default set provided with Drupal.

There were several reasons for selecting Drupal. *First*, it has a book module that supports creation of chapters and their automatic linking. As well it supports one click printing of an entire book. *Second*, roles can be defined (e.g., chapter editor) and used for access control. *Third*, the editor can be customized, so that when maintaining a chapter authors have a pull down list of the same styles used for preparing the chapter. These styles are applied to the text as it is edited using the same CSS as for rendering a chapter on the screen. Thus, authors use the same set of styles in all phases of writing and editing chapter. *Fourth*, Drupal is open source and once we have a very clear idea of our needs, we can use the book module as a foundation for creating a Global Text module.

We believe that we have the foundations of a workflow system that will enable us to efficiently put together the efforts of many authors. Of course, we will continually review this set of processes to find other ways to improve the process. Ideally, we might get some authors to write directly using the Drupal editor, but we are very conscious of the need to fit the workflow to the familiar habits of our scarce resource, the altruistic author.

#### The Arabic Dimension

The Global Text Project will publish in several major languages. There are several factors that support publishing in Arabic. First, Arabic is widely spoken in many developing economies. Second, textbooks are expensive in many Arabic communities. Third, many Arabic students prefer texts in their native language.

#### Ain Shams University—The Arabic partner

Egypt's Ain Shams University <net.shams.edu.eg>, one of the largest universities in the Arabic world with around 200,000 students, is the Arabic partner for the project. It will assist with localizing software and translation to Arabic. The Faculty of Computer & Information Sciences, the contact point at Ain Shams, has the skills and resources to develop a scalable infrastructure to support the translation and publication of free, open content, electronic Arabic textbooks.

Translation into Arabic, however, is a challenge because the language has a particularly high level of complexity. Arabic cannot be processed like other languages, such as those that are Latin-, Cyrillic-, or Asian-based. The Arabic language is particularly difficult for standard language processing for several reasons:

- Arabic words often have multiple meanings, with ambiguity averaging around 70 percent, which makes exact matching difficult. For example, "MLK" \_\_\_\_\_ can be "MaLiK"= king, "MaLaK"= angle, or "MuLK"= kingship
- There isn't a consistent way to translate proper names into Arabic, because there isn't an exact match between the letters of the Roman and the Arabic alphabets. For example, the name Mohamed can also be written as Mohammed, Muhamed, and there are numerous other variations of the single Arabic \_\_\_\_\_.
- There is no standard translation scheme for some technology and scientific terms. This is a significant problem in rapidly changing technological fields, such as computer science, where new words and acronyms arise frequently. Thus, Arabic translators will need to have considerable domain knowledge of the material being translated.

One approach we are considering is to have students learning English undertake the first round of translation and review, with a domain expert completing the task. For example, one student's class assignment could be to translate a chapter from English to Arabic, and another student's assignment would be to review the translation. In this way, we could engage students in meaningful assignments that create value for other students. Our experience is that such assignments are highly motivating because students, like everyone, want their work to have enduring value.

#### **Looking Forward**

Ultimately, a free, open content library will be available for students covering all major subjects in an undergraduate program. Only by creating a library of this dimension can we effectively address the needs of higher education in the developing world.

Globalization affects all of us, but the very same forces that drive globalization also enable us to combine our talents to affect globalization. We can collectively assist many in the world to gain a better education.

#### **Conclusions and Recommendations**

- 1) Internet-education is defined as the use of information and communication technologies to provide education on a remote basis. It is a fundamental tool for overcoming the lack of access to education that is suffered by millions of people throughout the developing world.
- 2) Internet-education is a vital tool for providing access to education for rural and remote areas in developing countries. It is particularly viable in countries with large surface areas and/or scattered population, where in the majority of cases it represents the difference between providing and not providing access to education.
- 3) Internet-education must not be viewed as a one-off project or as a series of programs to be implemented over a given period of time, but rather as a long-term effort that must form part of each country's educational policy.
- 4) Egypt has an excellent opportunity now to lead the region in this field as it has the best fit of human resources to make it happen while the technology required is within reach. We should do our best not to fail in this mission, as we only have one chance to lead. If we waste it, others will immediately seize the chance and guide the region.
- 5) Internet-education must not be considered in isolation by each of the government sectors involved in its development, or by the various public and private institutions concerned; on the contrary, its planning and implementation must be part of a joint multisectoral effort aimed at maximizing the impact of its use at national level by making efficient and effective use of the resources available to that end.
- 6) The implementation of Internet-education programmes does not necessarily call for a costly infrastructure of equipment and communication media. Relatively simple applications that do not involve costly communication arrangements or sophisticated equipment have shown themselves to be both useful and effective in the implementation of successful distance programs at all levels.
- 7) The internet is consolidating itself as the main resource for lending viability to Internet-education projects thanks to its great accessibility, simplicity and low cost. It is therefore necessary to establish special conditions under which primary and intermediate State schools and other similar institutions can connect to the Internet and thereby gain access to high-quality educational content developed by universities and associated bodies.
- 8) The Ministry of Higher Education & Ministry of Education and Ministry of Communications and Information Technology have an extremely important role to play in regard to the promotion of Internet-education in developing countries, by fostering the participation of, among others, the various government sectors (education, telecommunications, science and technology, etc.), the

- 9) private sector and international organizations, with the ultimate aim of putting together a comprehensive education program at the national level.
- 10) Great attention should be paid to the importance of training and sensitizing those involved in the development and dissemination of Internet-education programs, in such a way that they make effective use of the tool rather than becoming, through ignorance and/or fear, an obstacle to that dissemination.
- 11) It is international organizations such as UNDP, EUC, USAID, ITU, World Bank and IDRC that are in the best position to engage in a special effort to make governments aware of the importance of drawing up "national Internet-education polices" which call on the participation of all social partners for their development and implementation.
- 12) It is important to foster the implementation of pilot projects and Internet-education system prototypes that can serve to demonstrate the advantages of this technology to decision-makers in developing countries. The positive results achieved under such projects should spur them to promote Internet- education policies at the national level and to push for more Pilot Projects and programmers.
- 13) Efforts must be made to inculcate a "Internet education for development" approach that gives priority to socially beneficial distance learning and promotes multisectoral projects and associations aimed at sharing resources and reducing costs.
- 14) When it comes to promoting Internet Education, horizontal cooperation, fostered by such organizations as UNDP and EUC, USAID, World Bank and IDRC is a key factor in stimulating the use of existing products and resources and in supporting, through technical cooperation activities, the development of new Internet-education products and systems, thereby maximizing the benefits of this technology for the developing world.
- 15) An Internet portal, which could be provided by HDF, would be of great value for disseminating the Internet-education projects and activities being carried out in Egypt and in the region, and for encouraging the establishment of discussion forums for exchanging experiences at the regional (Saudi Arabia, Palestine and Yemen) and global levels on the various aspects of distance education.
- 16) E-Content, E-Library and Knowledge recognition initiatives should take first priorities.
- 17) Collaboration of Technology, Pedagogy and Internet Experts is a vital issue for internet education.
- 18) Creating the awareness about Internet Education Terms and definitions are very important.
- 19) ICT-Learn 2008 conference and Exhibition theme is: "Towards a Knowledge society"," Narrowing the Gap between Global and Local Companies"
- 20) We should carefully study how some initiatives failed in the past. In doing so, we will know how to avoid failure in this task. Failure occur because of one or more of the following reasons:

- Ignore the problem: We notice so much reluctance in our academic community to get engaged. These may be traditionalists who fear change or loss of jobs.
- Fake it: Make it look good for media coverage while has no serious impact in the field.
- Abuse it: Let those with hidden agendas take lead.
- Wrong it: Improperly executing of good ideas turning out bad results, thus leading to misrepresentation of the issue and ruin the solution.

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#### Developing Tomorrow's Competencies Today, in an Open Way

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#### Abstract

The world's channels for the diffusion of competence-related information and insights have matured to the point where educators in developing countries, working together and aided by networks such as LINC, can be far better informed about competence-related trends, and better able to give informed answers to questions such as these:

- What kinds of professional competencies (specific instances of know-what, know-how, know-who, know-why, care-why and respect-why) should students aspire to, if they want to be in demand for tomorrow's jobs?
- How could those competencies be imparted and updated locally to global standards, cheaply and rapidly?

Both classes of question (What and How) can be addressed by developing an Open Competency Environment, OCE, as the hub of a multi-lingual global Knowledge Network focused on in-demand competencies. The overall system would be 'peer-topeer', linking students and educators with communities of professionals; training and mentoring networks; repositories of Open Educational Resources; and accreditation and recruitment networks. That combination would broaden student horizons and increase graduate employability. This could be of great value to regions that under-perform on measures of professional capacity (e.g., number of R&D jobs per million citizens).

Readers are invited to help to shape OCE's development. The prospective building blocks include a) LINC, b) the Open Competency Framework and general Open Standards (as in OpenLearn and the Open Knowledge Initiative); c) Open Tools, Processes and Content (e.g., Open Access [research], Open Content [teaching], Open Innovation); d) networks of excellence for professional learning and competencies, such as Europe's ProLearn and Pro-LC.

# 1. Introduction

A recent study of education policy, jobs and the challenge of globalization [1] cites [2], which claims that job shortage is 'perhaps the single most important underlying threat to peace and stability around the world today', and asserts that people need 'a fair chance at a decent job'. How does this match up to the aspirations of learners?

Research into career success, e.g. in the UK's Centre for Longitudinal Studies, part of the Institute of Education, have shown that childhood aspirations are more important determinants of success in getting a professional job than childhood ability, childhood poverty or one's birth country and language.

To re-cast this in terms of consequences, a child who lacks vision, direction and motivation is likely to fail later in life, compared to a child with a positive self-belief about their future, and strong and believable role models to concretize the future they envisage for themselves. The latter child is more likely to gain valuable qualifications, experience and contacts, and to achieve a successful professional career (although not necessarily the one they predicted in their youth).

What shapes childhood aspirations and influences early self-beliefs? One answer: what children hear and see around them. As part of its global commitment to social justice, the Open University is involved in a number of child-focused projects in the developing world (the South), such as TESSA and DEEP. Some impressions:

- Many children in the South, especially in rural communities, have low aspirations and narrow horizons, as a result of lack of access to experiences that are taken for granted in wealthy developed countries, such as meeting people who have professional jobs; being able to talk to parents and grandparents (because of HIV and wars, a growing proportion of children are orphans); and being able to learn from other community members ("it takes a whole village to raise a child" becomes a poignant maxim if most of the village houses are empty).
- By contrast, people with access to mass media, mobile phones and the internet are better able to learn about the developed world (the North). As part of that, they hear about the goals and life choices of students in different locales, some of which will be privileged, and about the lifestyles, technologies and skills that are common in those locales.

I am unaware of well-grounded research on this, but my impression from many overseas trips is that access to mass media is a mixed blessing. Because of exposure to glossy depictions of high-income professionals, the aspirations of consumers of mass media (children, students, their parents and their advisers) are rising to levels that are currently unrealistic except in a few favoured countries. Increasingly, people seek not a 'decent job' but a 'golden future' job, regardless of the current reality in their country.

# 1.1 Golden future jobs

What constitutes a golden future job varies across the world. In a wealthy developed economy it might mean a job with a high element of 'knowledge work' of a kind that is intrinsically interesting, fulfilling, offers choice over how and when the work is done, and can command a premium salary immediately, plus good prospects of rapid advancement to senior management positions in a multinational company. In most developing countries, there are few such opportunities today, hence the brain drain to advanced economies.

Experience in developed countries and rich developing countries suggests that the number of golden future jobs will rise significantly if there is a high level of inward investment by the private sector.

#### **1.2 Mismatches**

Even when there is a vibrant private sector, as in the Gulf States, with vacancies for golden future jobs plus a commitment by hirers to give preference to local graduates (e.g., as part of the 'Tawteen' or 'localization' programme in the Middle East and North Africa), it can happen that local graduates cannot be hired for the golden future jobs they aspire to, because the courses they took were based on very out-dated knowledge, with little commercial value.

The result of this mismatch:

- Employers take on expensive foreign workers to fill those jobs, undermining national capacity-building.
- Locals who are out-competed for those jobs and who cannot improve their qualifications miss out on lifelong opportunities for professional development and for realising their potential.

Mismatches and under-supply of appropriately-skilled professionals are to be expected if a developing country's training providers, policy makers and business people lack access to reliable sources of knowledge about the developed world's golden future jobs and about the technologies, processes and relationships underpinning them. This is why, historically, developing countries have been amongst the last to hear about the new competencies associated with innovations and golden future jobs in advanced economies, and to update their degree courses, and why their graduates find it hard to compete in terms of current knowledge with graduates from advanced economies, and many end up with inferior jobs or no jobs at all.

The gap between poor developing countries and rich developed countries is widening, since the latter countries are investing to stimulate innovation and growth, and are beneficiaries of a virtuous cycle: the more they invest, the greater their success and the greater the number of golden future jobs. For less developed countries to catch up, they must find faster ways to identify competencies likely to be in high demand, and faster and cheaper ways to provide their graduates with those competencies. If they can do this, then the result could be plentiful 'decent jobs', some of which will lead to golden future jobs.

#### **1.3 Solutions**

The remaining sections of this paper set out some modest proposals for achieving a breakthrough. The technical underpinning is a global peer-to-peer system, outlined here but yet to be built, called the Open Competency Environment, OCE. The initial focus of the OCE is competencies that are in-demand today. As the number and type of participants in OCE grows, and knowledge sharing increases, it is envisaged that OCE will broaden its coverage to include detailed and domain-specific instances of professional competencies (including know-what, know-how, know-who, know-why, care-why and respect-why), as well as forward-looking information, such as advance warning of competencies that emerge from R&D, or competencies that futurists predict will be needed.

# Disclaimer

The views in this paper are those of the author, and may not necessarily reflect the views of his sponsors for attending LINC 2007: the OpenLearn and ProLearn projects and Open University Worldwide.



# **PAPER FAIR PRESENTATIONS**

#### **Security Model For E-Education Process**

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#### Abstract

Today's world, becoming more competitive, every day is demanding from organization the flexibility to adapt themselves to the permanent situations of market change. Information Technological changes have caused the growth of electronic learning technologies that provide organizations with opportunities to redefine and/or refine existing business activities. On the other hand, the joining together of information and communication technologies and increased reliance of organizations on such advances has caused a range of information system security issues to the face. This research presents the design and implementation of a global e-learning system that provides the basic security requirements including confidentiality, integrity, non-repudiation, replay protection and the most important entity authentication. The main aim of this research is to provide a new securing model to protect the e-learning material from unauthorized distribution, exposed and from being altered or modified. The model will be based on using cryptographic techniques such as public and private keys generated using RSA and DES encryption mechanism. This research ends with conclusion.

#### **1.0 Introduction**

Data communication is an important part of our living. Thus, protection of data from abuse is necessary. Additionally, new information and communication technologies have become major resources and basis for learning in higher education. Technologies have several potentials to support different instructional strategies and provide an efficient way of delivering electronic course material and improving comprehension. The contemporary universities need to increase lifelong learning opportunities to its students any time, any place and at any rate to be successful in the global educational marketplace [1].

The use of e-leaning in the educational process has grown significantly in the last few years, however, it is a relatively insecure, hence, most educational organization haven't yet taken into considerations or any new strategy for securing e-learning process [2].,

implementing e-learning is complex. Implementing e-learning is about project management, change management and risk and security management [3]. Additionally, the topic e-learning or e-education is having much attention especially because worldclass universities such as MIT, Harvard and Stanford in the United States and Oxford in the United Kingdom are implementing it [4].

E-learning can be defined as the online delivery of information for purposes of education, training and knowledge management [5]. This definition means that the Internet and computer will be used in the e-learning process. Thus, e-learning is more complex and intertwined the opportunities for intrusion and attack. E-learning security involves more that just preventing and responding to cyber attacks and intrusion, it involves copyright protection, integrity, availability, non-repudiation, authentication and authorization.

Computer security is the shield that all types of organizations and governments use to protect sensitive, commercial and classified information from unauthorized users [6]. A break of this shield has implications that go far beyond any financial form that could be assigned to such an intrusion or adversary. The concepts of computer security are practically basic in nature, however, implementing security in a continually changing technological environment is a big challenge, but it has to be met by organizations, individual users and governments. Therefore, the threats in computer security must be understood.

Organizations such as educational institutions that want to implement an e-learning system must protect all its resources such as: electronic educational material, students' private information, transaction processing and other types of data on transit. These organizations need to establish a risks and security department to design and implement updated and new strategies for protections.

A lot of progresses have been made in the mechanics of providing online instruction but, the needs for privacy and security have been widely ignored related to e-learning context [9]. Privacy can be described as a learner's ability to maintain a special area within which the learner can control the conditions under which personal information is shared with others [7]. Security examines ways and means for implementing data integrity and protection policies for organizations involved with e-learning.

# **Research Methodology**

The methodology of this research will be based on building an algorithm for the e-Learning system security model. A complete implementation have been done to convert the e-learning security model into an applicable software package that is being used to automate the e-learning process concerning the dissemination and authentication of elearning courses material.

# 2.0 Security Issues of e-Education

As pointed out by Furnell [9], little attention and small concentration has been devoted to the security concerns of e-Education. E-Educational institutions organizations have to present innovative approaches in its e-educational process. Effective adoption of e-

education system has to be comprehensive and should contain the following features [10]

- An expert-rich content and curriculum
- flexibility and convenience
- continuous assessment and real-time feedback
- multimedia simulation, rich case studies and threaded discussion
- cooperative and interactive learning without time or space constrains, and
- safe-enough privacy and security for delivery and collaborative education.

Most of all, security issues cover all security problems connected to network especially the Internet technology. These security issues encompass of denial of service for elearning systems, integrity of data delivery, copyright protection and unauthorized access to the private resource or information in the e-learning systems. These problems have to be well protected using the existing security technologies such as digital signature for authentication, private keys and secure-IP data delivery, and intrusion detection for unauthorized access or denial of service.

Copyright protection prevent student from downloading the e-Course of the course material and view it offline. Thus, method and approaches have to be presented to let student view the content offline at the same time these content have to be well protected from copyright violation. It is, therefore, a great privilege for an e-Education system to permit its students to download the e-Course material onto their own computers and view it offline. This will let students study the material anytime, anywhere, even when they are not connected to the Internet. But, Caution must be considered to prevent users from making illegal copies of the downloaded materials.

The above discussion related to security organization now could conduct some strategy to protect it self. First organizations need to know all threats and risk that could encounter, and then decide about a protection approach or approaches that could be selected such as using cryptographic techniques, firewalls, Digital Certificates, SHTTP, .. etc.

**Figure** 1 below shows the stages that organizations need when they decide to adopt a strategy or tools for the security plans to secure their resources from an outside threats and attacks.





#### 3.0 The Proposed Model (SmEs)

The architecture overview of the proposed model is shown in **figure** 5. This model, the total security model for e-Learning system (**SmEs**) proposes a comprehensive solution for the security problem of the e-learning process.

The SmEs model composed of two faces, the entity server-side (ES) and the entity client or student-side (EC). The architecture of the entity server-side is shown in **figure** 3 and the architecture of the entity client-side in shown in **figure** 4.

# 3.1 The Entity Server (ES)

In the e-education server (ES) a lot of processes and configurations are need to be prepared. These processes and configurations will be briefly discussed in the following sub sections:

# 3.1.1 E-learning Infrastructure

The entity server (ES) is the administration center of the model. It is used for handling student registration, course registration, course payment, as well as course materials hosting and downloading, authentication and authorizations processes. A course launcher (see course launcher section) will be configuring in the ES to handle courses submitted to students. Three types of databases will be prepared in the ES: Course Packages and Course Voucher database and Students' Database (see course voucher and course package section). The electronic content of each course (e-course) is saved in the Courses Package Database. The Course Voucher database contains information related to courses, private key, and students' payment fees. A Course Launcher is used to submit e-Courses packages to authorized and registered students. The Students' database will be prepared to contain all potential students' profile, which include information about each student such as: student name, address, ID, Passport ID, etc.

# 3.1.2 Course Voucher and Course Package

When the e-course launcher is used to build and launch e-courses, two objects must have been created for the specified e-course: the course package and the course voucher. Each course had a course voucher, which contains related information to the specific course such as: course name, course number, voucher number and key information. It contains the encryption key for decrypting the Course Package. This means that, for viewing the ecourse material, student must have both the Course Package and the Course Voucher for the specific course. Once the e-Course is successfully launched, the Course Package will be available and could be downloaded by authorized students.

The course launcher will send the course voucher and course package encrypted using the private key of the specific course (Kpr) to the authorized student. The course voucher is supposed to be encrypted using the private key of the course (Kpr) and will be stored in the courses database. The authorized student can download the course voucher, decrypt it

using his public key to get the private key, which he can be used to decrypt the course package and eventually view it using his computer, see figure 2. To get this available e-Course, student is supposed to have been registered for it (for more details please see the "Course Registration" section).

With this mechanism, the e-course material will be fully protected. The Course Voucher (cV) and the Course Package (cP) are encrypted using a public key of the student and sent to him. The course voucher encrypted with the student's public key  $E(cV)_{Kpu}$ . All these operations of encryption and decryption will be done automatically by the course launcher after the student request the e-course when completing the course registration.



Figure 2: The Mechanism Of Viewing The E-Learning Contents, own model

# 3.1.3 Course Launcher

When an e-Course is created and designed, two objects, the Course Package and the Course Voucher, will be created from the e-Course material. The Course Launcher in the entity server will send these two objects encrypted using the public key of the entity student (see **figure 2 and 4**). These two files will be decrypted using the software (entity student), which was installed into the students computer (see Course Registering & Paying section), which is a module integrated into the SmEs System (see **figure** 2). Under the Voucher Administrator, the objects are stored in a database and made available for students to be downloaded.

#### 3.1.4 **DSS** for Student

Each entity student who completes the registration and the fees payment will be granted a public key and a Digital Signature, which he can use to send, receive, sign, encrypt and decrypt documents such as Course Voucher, Courses Packages, announcements, courses details, grades, assignments etc.

The RSA cryptosystem is a public-key cryptosystem that will be used to present both encryption and digital signatures (authentication). Digital signatures are generated through ES, as well as verified. Signatures are generated in conjunction with the use of a private key; verification takes place in reference to a corresponding public key. Each signatory (Registered student) has his own-paired public (known to the public) and private (known only to the student) keys. Because an authorized student using his private key can only generate a signature, the corresponding public key can be used by anyone to verify the signature.

The process for sending a digitally signed encrypted message is similar. In this case, the

sender (ES) must retrieve the student's public key from the student's database. Then uses it to encrypt the document and send it to the entity student (EC). The entity student (EC) then uses its own private key to decrypt the document, and with this mechanism the elearning will be sure that only the recipient student can read it, thus, integrity, confidentiality and attenuation will be assured. Additionally, the digital signature provides another advantage, the non-repudiation. In a cryptographic context, the word repudiation refers to the act of disclaiming responsibility for a message (ie, claiming it was sent by a third party). The mechanism strategy in the SmEs model insist that the student attach a signature in order to prevent later repudiation, since the e-learning institute may show the message to a third party to reinforce a claim as to its origin.



Figure 3: Entity Server-Side Architecture (ES), Own Model

# 3.2 The Entity Student (Client) Side (EC)

The other part of the SmEs model is the entity student or client side (EC), which composed of the following processes, and operations, please see **figure** 4.

# 3.2.1 Course Registering & Paying

First of all, student who wishes to enroll in any program using the e-learning system has to contact the institute using e-mail or any other communication channel (publish web site). During this first contact the student must fill an application form. This application form is used to gather important information about him such as name, e-mail, passport number etc. After that if the student accepted then he/she has to pay for the registration and courses fees using secure electronic payment system. Then, the ES will send to the registered student a software (EC) attached with his e-mail. This software the entity student (EC) will be used by the student to conduct all learning and educational activities. This software will automatically generate private and public keys for the student. A copy of the public key will be sent to the ES to be kept in the student' database and course voucher.

To register for an e-Course, the student has to invoke the entity server (ES) (see **Figure** 3 and 4). The ES will establish a secure communication connection with the Course Voucher administrator to obtain the Course Voucher. The ES will validate the student's Computer License sent by the Course Launcher and encrypt the voucher with the EC

public key. The encrypted Course Voucher will be sent to EC, and then stored in the student's machine in its encrypted form.

In order to get an available e-Course from the ES, student has to register for it. Student can use his EC and can download the Course Package and obtain the Course Voucher from the ES to enable the student to view the course material offline. Student can only download the course voucher one time after charged for obtaining the Course Voucher. However, the student will not be able to make illegal copy of the e-course (see Course Voucher and Course Package section).

# **3.2.2** Student PC's License (SPCL)

Potential student registers, fills the required information (Student Profile), pays fees and sends this information to ES system using his e-mail or any other secure communication channel. The ES system will receive and saved this information in the students' database. A copy of the student' profile will be sent and saved in the student's personal computer.

Student now will be ready to register the course(s) needed according to his major. He could invoke the ES to register the course sing EC software. The ES system will immediately perform an authentication and authorization process. During the student registration process student's profile will be checked from the students' database.

When students first time register and paid fees, the EC software will be send to him using his e-mail. Student now has to install this software into his computer. During the installation, a public key-pair is generated. A hardware profile copy the hardware configuration of the student's computer is also generated. The public key of the key-pair and this hardware profile are both stored inside a file called student PC's License (SPCL). Besides, some personal information about the student is also stored in this SPCL. This makes the SPCL unique to each computer. This SPCL is then sent to the ES. The ES will verify this SPCL, assign to it an expiry date, sign it digitally, and send the student invocation of the ES system. This SPCL will be checked when the student request the e-course material for viewing. All communication between EC and ES will be performing using encryption techniques to guarantee secure transferring of information between the two sides.

# 3.2.3 Requesting and Viewing e-Course

When a student (EC) invokes the e-learning Platform (ES) for viewing the e-course material, the student PC's License (SPCL) will first be examined and checked if this invocation is valid. The student will be allowed to access and have a copy of the e-course material if and only if the following conditions are satisfied:

- 1. The student PC's license file has not been expired yet.
- 2. The student PC's license file had properly signed by the e-learning server.
- 3. The software is invoked on the computer on which it was originally installed

# During the invocation, a hardware configuration profile of the student's PC (HCPS) will be generated to test the saved copy of the HCPS. This

# current HCPS is compared with the saved copy of the HCPS that had been stored in the student PC's License (SPCL). The third condition will only be satisfied if the two hardware profiles files are matched.

In addition, the SPCL is designed to have an expiry date. The average lifetime of the SPCL is six months. Before SPCL expires, the ES will keep track of SPCL, and make sure that there is only one valid SPCL for each student. In a case where a student cheats and request for re-issuing SPCL, or the student's private key is compromised, the old SPCL will be cancel, however, the student have to pay the registration fees once time again if he want to have another copy of the e-course material.

To guarantee the security of the system, and to ensure the e-Course is well protected, these two processes will go through a special authentication process to mutually authenticate each other. When this authentication process is done, the Voucher Store will use the computer's private key to decrypt the Course Voucher, which was previously encrypted by the ES using the computer's public key. Eventually, the Voucher Store will release the decrypted Course Voucher in the student's computer where it will be used for decrypting the Course Package.



Figure 4: Entity Client-Side (EC) Architecture



From all explanation above we can summarize the steps needed to operate the proposal *SmEs* model as follows: see **figure** 5

1. The entity server should be prepared to configure all infrastructure needed related to databases for courses, keys (see scheme  $\mathbf{0}, \mathbf{0}$  and  $\mathbf{0}$ ) and students' profile.

2. Entity Student registers, fills the required information (Student Profile), pays fees and sends this information to the system (see **figure** 4 and 5).

3. The entity server builds the entity student profile, store in the student database in the entity server (see **figure** 3, 4, 5).

4. The entity server captures the hardware configuration of the entity student's PC and stores in the student profile file in the student's database (see **figure** 4).

5. a copy of the student profile will be stored in some place in the entity student's PC(see **figure** 4, 5).

6. the entity student now able to register course(s).

7. The entity server will now perform a checking process of the student profile which has been stored in his PC, and add to the entity student profile : DS-Student, Private Key and Assign Expire Date (see scheme ① and ②)

8. The entity server updates the student profile in both the database and the entity student's PC.
10. The entity server will now do a checking to confirm authentication (see scheme  $\mathbf{2}$ )

11. If all condition are met (entity student's digital signature, Expired Date, Hardware configuration), then an encrypted document E(cV, cP) will be sent to the entity student otherwise the entity server will sent nothing (see scheme **2** and **figure** 5).

12. The entity student then will do the decryption procedure (see scheme **2** and **figure** 2 and 4.

13. The entity Student now is able to view the content of the material (see **figure** 4). But cannot make any illegal copies of the e-course materials.

# 3.3 Schemes description

Authentication Scheme is the core of the entire SmEs. The idea of this scheme is relevant to the security issue and to the system functioning because the authentication can allow or can not allow entity student to perform any task such as requesting the course materials. Entity authentication is achieved in various manners but for the suitability of this scheme we employ a challenge-response authentication scheme in which relied on public key encryption scheme that gives robust authentication. This denotes that each entity student should own two keys one for public key and the second one for private key.

In our proposal scheme the authentication scheme will be based on the famous RSA scheme. The RSA scheme will be used as a scheme for generating public keys and will also used as a digital signature for each entity student (EC).

# 3.4 The RSA Public-Key Encryption Algorithm

The RSA cryptosystem is a public-key cryptosystem that presents both encryption and digital signatures (authentication). Ronald Rivest, Adi Shamir, and Leonard Adleman developed the RSA system in 1977 [47]. RSA stands for the first letter in each of its discoverers' last names.

The RSA algorithm workings as follows: take two large primes, p and q, and compute their product n = pq; n is called the modulus. Choose a number, e, less than n and relatively prime to (p-1)(q-1), which means e and (p - 1)(q - 1) have no common factors except 1. Find another number d such that (ed -1) is divisible by (p - 1)(q - 1). The values e and d are called the public and private exponents, correspondingly. The public key is the pair (n; e); the private key is (n; d). The factors p and q might be destroyed or kept with the private key.

It is now hard to obtain the private key d from the public key (n; e). However if one could factor n into p and q, then one could obtain the private key d. Thus the security of the RSA system is based on the assumption that factoring is difficult. The detection of a simple technique of factoring would break RSA.

To generate a public key for entity student, a session will be established between the entity server and the entity student. During this session the entity student will be granted a public key which can be used to decrypt the course voucher to get another private key that can be used to decrypt the course materials.

As mentioned before in the course voucher section, the course voucher (cV), and course package (cP) will be encrypted using the private key of the specific course ( $K_{pr}$ ). The authorized entity student can download the course voucher decrypt it using his public key ( $k_{pu}$ ) to get the private key ( $K_{pr}$ ), which can be used to decrypt the course package and eventually view the course materials, see **figure** 2.

 $\rightarrow$  Course Package = D(cP)<sub>Knr</sub>  $Kpr = E(cV)_{Knu}$ The whole previous scheme illustrated as below: **Suppose**: ES= entity server, EC= entity student (client), cV = Course Voucher, cP = Course Package GCD =Greatest Common Division,  $K_{pr}$  = Private key,  $K_{pup}$  = Public key HWC= Hardware Configuration of entity Student's PC Iff = if and only if , ESL = entity student license /public key/  $ES : \{e, n\}$  $\triangleright$ n = p \* q, (n) = (p-1) \* (q-1)1 < c < (n) and GCD ((n), e) = 1  $C= (\mathbf{M}^{e} \mod n)$ / RSA /  $\succ$  C= IP (M) / Simple DES / scheme **①**  $ES\_EC: E_{kpup} \{ cV \_Key \}, E_{key} \{ cP \}$ (2)RSA Simple DES CE:  $K_{pr} = \{ d, n \}$ /private key/ (3) $(d * e) 1 \mod (n)$  $\geq$ CE:  $D_{kpr}(cV_Key) = D_{key}(cP)$  iff (4) $\triangleright$ Date is ok ECL is ok  $\succ$  $\triangleright$ HWC is ok CE:  $D_{kpr}(cV_Key)$  \_ course content + key (5)scheme 2  $\mathbf{M} = \mathbf{C}^{d} \mod \mathbf{n}$  $\triangleright$ 

CE: D<sub>key</sub>(cP) \_ course material (Lecture notes)

 $\blacktriangleright$  M = IP<sup>-1</sup> (C) (simple DES algorithm)

**3.5 The symmetric key algorithm used in the proposal** The DES (Data Encryption Algorithm) is used to transmit data between tow parties. It has the advantages of being very fast and reasonably secure. The DES is a block cipher; it breaks the plaintext into blocks of 64 bits, and encrypts each block separately. In this proposal a simple DES will be used to encrypt and decrypts courses materials and any other sensitive information that send between the entity server and the entity student. Only one layer of the DES will be used. This layer is the initial permutation (IP). For Encryption process IP will be used, and IP inverse will be used for decryption.

The algorithm for the encryption process is as follows:

- Select a plaintext M of 32 bits
- Perform initial permutation on m to obtain C

C = IP(M) using a key of permutation such that even bits goes to left half and odd bits to right half of M

The algorithm for the decryption process is as follows:

- Select a cipher text C of 16 bits
- Perform inverse of initial permutation (IP-1) on C to obtain M

 $M = IP^{-1}(C)$  using a key of permutation such that even bits goes to right half and odd bits goes to left half of C.

## 3.6 Digital signature for student

## • Public Key Signature

Each entity student will be granted a digital signature that he must use to sign every document he sends to the entity server. This digital signature will be based on the modified RSA (public key signature). Since entity student will be given two keys public and private key. Using these two keys entity student will encrypt a word that is only known to him. This encrypted word will be sent to the entity server and store in the student database to be checked and compared when entity student send each signed document.

The following steps will illustrate the public key signature scheme used in the SmEs :

Suppose ES: entity server, EC: entity student, M: message

EC:  $(d_{EC}, n) = Private key for Entity student (scheme <math>\mathbf{0}$ ) (1)

: (word 1) / entity student will select any word only known to him/

EC\_ES: C= Kpr (word)

EC sent to ES encrypted password using his private key  $d_{\text{EC}}$  /

(2)

: store in student database

ES store in student database the encrypted word (3)

# • Public Key Signature Explanation:

(1) the RSA public key encryption explain in scheme ① will be used to generate a private key for the entity student ( $n_{EC}$ ,  $d_{EC}$ ). now student assume to recall a secret word that is only known to him.

(2) Entity student send to entity server the secret word encrypted using his private key ( $d_{EC}$ ) so as to be used for verifying signature and for decryption documents or messages send by entity student.

(3) Entity server will decrypt the secret word (XXX) using the entity server public key ( $c_{ES}$ ) and store it the student database.

# **Future Work**

Many systems apply a "random gathering device ", which try to use environmental noise such as, keyboard data, system timers, disk characteristics, etc., to build a cryptographically secure source of random bits [24]. The SmEs model application used only a quite simple (most likely not secure enough) seeding process concerning the clock and a few other sources. Therefore, a more classy solution is necessary.

# Conclusion

In this paper, we proposed a new model to make all e-learning process more secure and more trusted. The SmEs model is a comprehensive security framework design to present solution to copyright protection, communication and interaction by both parties the student sand the e-institute.

In order to provide effective support and protection for e-learning facilities, the SmEs model proposed to be used in the e-learning management system. In this model encryption is the solution to protect the contents and all files or messages from reading, copying or stealing. In the proposed solution, asymmetric encryption-based techniques to satisfy the authentication and non-repudiatory security needs, and use symmetric encryption to meet confidentiality needs.

This research recommends the use of SmEs for the e-learning management system an entity to provide security management features within a system approach. A framework for utilizing such an approach in a distributed computing environment has been implemented and fully tested successfully using vb.net.

We finally can conclude that, evolving risks and technology will force e-educational institute to think deeply to use adequate protecting Internet security. Many organizations have produced various methods, strategies, tools, and standards to improve security. Unfortunately they still subsequently can be compromised by brute-force analysis.

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# Virtual Expeditions as Means for the Preservation and Exploration of Cultural Heritage

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#### Abstract:

As part of the European Commission 6<sup>th</sup> Framework Program, we collaborated with colleagues from eight European countries in order to develop a system named MOSAICA - a Web-based portal dedicated to the preservation of Jewish cultural heritage in Europe. The project's main goal is to set forth the vision of multicultural societies through learning experiences that may enhance pluralistic views and open-mindedness among users. This paper focuses on MOSAICA's Virtual Expedition - a thematically-organized succession of virtual heritage items in the form of web-based resources. The Virtual Expeditions are designed to allow interactive exploration of semantically related content through alternative story-telling templates. Our paper describes MOSAICA's pedagogical framework and the Virtual Expeditions methodology, designed for engaging users in authentic and situated learning. It also presents a pilot study that investigated how people conceptualize the term "cultural heritage", and their attitudes about a pluralistic society.

#### 1. Introduction

In the past few decades advanced technologies have enabled better and faster communication and transportation, changing our world to one big "global village". Due to world-wide migration flows, people are now more exposed to diverse cultures and traditions. Therefore, rather than using the power of computer technologies to just disseminate information, computers and the Internet should be used for engaging people in reflective, critical thinking about what they are been taught and the way they perceive life, society, and culture [1, 2]. Indeed, in our ever-changing and challenging world, people are required to go beyond the ability to retrieve information. They should be able to apply critical thinking and maintain pluralistic and open-minded views. People should consider ideas and opinions that are new or different to their own, but at the same time, they also should make a true effort to preserve their own cultural heritage.

Leveraging Web-based technologies to enhance critical thinking, and more so openmindedness, requires the designing of new platforms. One way of doing so is integrating virtual learning environments [3]. In this paper we present MOSAICA project - a Web-based portal dedicated to the preservation and portrayal of the Jewish cultural heritage in Europe. The project's main goal is to set forth the vision of multicultural societies through learning experiences that may enhance critical thinking in the form of open-mindedness among users. This paper focuses on MOSAICA's Virtual Expeditions, designed to serve as a prominent tool for engaging users in authentic and situated learning.

The European Jewish cultural heritage was selected as a test case for MOSAICA. Indeed, anti-Semitism is an archetypal case of racial and religious intolerance, and therefore constitutes an adequate starting point for a research project aimed at fostering tolerance. Our paper starts with a theoretical review that includes two learning theories that were the basis of MOSAICA's pedagogical framework. We then discuss the design of MOSAICA as both a portal and a generic tool box, focusing on one of the tools: the Virtual Expeditions. We discuss the importance of storytelling as means for communicating cultural heritage knowledge and values. Finally we present results of a pilot study and our recommendations for future research.

## 2. Theoretical underpinning

MOSAICA's pedagogical framework and its Virtual Expeditions theoretical underpinning emerge from two learning theories: the Constructivist Theory [4] and Mayer's Cognitive Theory [5]. The first theory, the constructivism, puts the construction of knowledge in one's mind as the centrepiece of the educational effort. The basic assumption according to the constructivist learning approach is that knowledge cannot simply be transmitted; therefore learners must be engaged in constructing their own knowledge [6, 4]. Knowledge construction can occur when learners are actively engaged in learning, during which they are exposed to different experiences and practices [6,7, 8]. Indeed, studies on technology embedded active leaning, has shown to improve users' learning and cognitive abilities such as higher order thinking [3, 9,10,11].

The second theory, Mayer's cognitive theory [5] offers three assumptions on how people learn. The first maintains that knowledge is represented and manipulated through two cognitive channels: the visual-pictorial and the auditory-verbal. The second, limited capacity assumption, stipulates that these cognitive channels can become overloaded by too much text or spoken word, or by complex pictures. The third assumption, active processing, which correlates with the constructivist theory, maintains that meaningful learning occurs when students engage in active learning. This assumption was corroborated and demonstrated in various educational studies [10, 11, 12]. MOSAICA's Virtual Expeditions draw on both theories by facilitating constructivist learning environment through the use of different modes of knowledge representation and the exploration of cultural heritage stories.

The Virtual Expeditions are designed to combine visual, auditory and textual information. Its pedagogical framework is based on the premise that multiculturalism is not a problem, but rather an asset, and that exposing learners to the stories of people, artefacts, and customs will ultimately lead to a shift towards a more tolerant society.

## 3. MOSAICA system

As part of the European Commission 6<sup>th</sup> Framework Program, we collaborated with colleagues from eight European countries on the development of a Web-based portal called MOSAICA for the preservation and exploration of Jewish cultural heritage in Europe. MOSAICA is being developed as a suite of generic technologies packaged in a usability-oriented fashion as a toolbox for knowledge-based discovery, interactive, and creative educational experience. MOSAICA's multifaceted interfaces include: a) GIS (Geographical Information System) maps - designed to allow semantic references between various information and data that are displayed on a map, b) Semantic directory - designed to allow conceptual navigation by following additional, complex semantic relations, c) Semantic search engine - designed to allow logical reasoning and semantic inference, d) Virtual Expedition – designed to allow interactive exploration through alternative trails, or through examination of the thematically pre-selected semantically related content.

MOSAICA is designed to incorporate visual, auditory and textual information. Its pedagogical framework is based on the belief that multiculturalism is not a problem, but rather an asset, and that exposing learners to cultural diversity, and allowing them to educate themselves about diverse heritages and traditions, will ultimately lead to a shift towards a more tolerant society.

The European Jewish cultural heritage was selected as a test case for MOSAICA. Indeed, anti-Semitism is an archetypal case of racial and religious intolerance, and therefore a good starting point for a research project. The Jewish cultural heritage and the stories of the Jewish people were selected as a showcase for the system's usability and its effectiveness in portraying diversified cultural content and educational benefits.

MOSAICA's multiple interfaces are designed to be entertaining as well as educational. They are designed to provide users with the experience of discovering new and ancient worlds at the tip of their fingers. MOSAICA has three educational traits. First it is an open system that allows free access to a variety of cultural heritage items. Second, it is an educating system, designed to enhance meaningful learning and critical thinking through exploration. Third, it encourages collaborative authoring while enabling learners to share their own heritage items and knowledge.

Indeed, MOSAICA serves as a cognitive tool in three modes:

1. Explorative mode - enabling users to visit places and/or explore stories that evoke their interest and motivation, by merely zooming-in on a particular area on MOSAICA's geographical maps of Europe, by exploring MOSAICA's semantic directory, or by submitting a query. This way, users can choose a topic of interest and learn about Jewish heritage in their own pace.

2. Guided mode - offering users a variety of recommended Virtual Expeditions thematically organized by people, artefacts and customs. Each Virtual Expedition includes the display of selected heritage items that are considered to be "must" within a certain learning theme. Our first expeditions, for example, explore the contribution of Jewish women to science.

3. Collaborative mode – Enabling users to share their cultural assets including photos, documents, and videos they own which otherwise could not be publicly exposed. Users will be able to upload digitized objects and tell their personal stories by generating a Virtual Expedition.

MOSAICA draws on two cutting-edge technologies: (1) the Semantic Web together with ontology engineering will be used to integrate semantically-based cultural objects of varying complexity, while (2) distributed content management will facilitate seamless aggregation of highly distributed, diversified content.

The project includes three components:

A unifying framework for the ontology-based representation of cultural objects and resources, combining domain expertise with ontology engineering,

Tools and utilities for online communities to become actively engaged in the publishing process while contributing their knowledge and experience to creating new approaches for enhancing the presentation and accessibility of cultural resources, and

Interactive knowledge-driven, user-friendly interfaces that provides simplified means of searching and accessing distributed digital content through a multifaceted portal.

MOSAICA adopted OWL as the standard for knowledge representation, and selected OWL-DL as most suitable for its purposes, since it is a payoff between relative simplicity and reliability and the ability to apply logical inference. Nevertheless, it also uses RDF N-Triple format as an intermediary output within the ontology maintenance lifecycle. N-Triple is simple for understanding and editing, and has been used by domain experts developing or improving ontologies. However, N-Triple is not used by the system. Rather, the editing output provided by the domain experts is transformed into the OWL-DL format. Finally, an innovative methodology was developed for designing Virtual Expeditions, introducing a thematically-organized succession of virtual objects in the form of web-based resources. As a result, interactive exploration made use of selection of alternative trails or was realized by examining content pre-selected through semantically based pathways.

#### 4. Virtual expeditions

MOSAICA's Virtual Expeditions can be conceptualized as a path to the past via exploration of cultural heritage stories. Throughout the history, stories have been an important trait and asset of humankind. They are accounts of experience bounded by a narrator's particular observations, feelings, knowledge and relations with the stories' theme. Through stories, cultural knowledge and values have been understood, maintained and communicated from generation to generation. Stories have the power to bind people together across families, communities and countries [13, 14].

Today, people are surrounded by stories told with animations, pictures, and music, particularly on television and in movies. MOSAICA takes the advantage of this familiarity and place the power to create stories in the users' hands. Indeed, when stories are told from different perspectives, they facilitate a better understanding of the past, and may enhance the development of a better vision of the future [13].

When many stories are woven together they form a shared narrative and help better understand a certain community, its values, sense of place, and aspirations. The notion of shared narratives is integrated in the Virtual Expeditions methodology. In fact, MOSAICA's Virtual Expeditions are designed as a powerful tool for sharing and understanding the diverse cultural heritage stories about people, places, artefacts, and customs. The Virtual Expeditions allow people not only to explore stories of others, but also to create their one narrative, thus generate and sustain a sense of identity, belonging, and cohesion.

Through Virtual Expeditions, different communities can learn about each other's customs, history, and traditions. Therefore, Virtual Expeditions can serve as a powerful vehicle for reconciliation among differing communities, realizing that all people are linked by the same concerns, problems, and interests. MOSAICA's Virtual Expeditions are a thematically-organized succession of virtual heritage items in the form of webbased resources bound together via story-telling templates. The Virtual Expedition can be designed to present cultural heritage stories using one or more of the following five templates: The Story, Timeline, Map, Family tree, Gallery. *The Story* template is designed as a journey book, that is, HTML pages that allow users to read continues text with relevant pictures. *Timeline* template presents a chronological display of a story. *Map* template shows the story in the context of related geographical or political maps. *Family Tree* template displays the family genealogy. *Gallery* template shows a number of pictures or photos (a room, a synagogue, outdoor location, etc.) each reveals a certain element of the story.

Virtual Expeditions are not virtual tours - a popular WWW epithet for websites visually presenting a particular physical location, ranging from the NASA Visitors Center, to real estate properties. Virtual tours focuses specifically on a particular place or location. Virtual Expeditions expands this scope to include a coherent merger of historical events, narratives, timelines, and locations, all embedded to allow users to explore untold stories, or more so, discover new cultural 'frontiers'. A screenshot of the Virtual Expedition on Rosalind Franklin is presented in Figure 1.



# Figure 1. The home page of the Virtual Expedition on Rosalind Franklin

#### 4.1 Heritage items and storytelling

As presented above, Virtual Expeditions are conceptualized as a thematically-organized succession of virtual 'Heritage Items' in the form of web-based resources. Each virtual expedition is a story that was divided into short events ('knowledge fragments'). Each event if defined as a Heritage Item. Thus, the collection of all Heritage Items forms a complete story.

Heritage Items are used to present the information on a cultural heritage resource. They consist of text (one or two paragraphs long) and one adjunct resource file retrieved from the semantic annotator tool. The resource file can be a picture, video, scanned document, audio etc. The text can be either a short event or a description of the resource file that is attached to it. Heritage Items can include hyperlinks connecting it to a specific and relevant file on the Web.

In order to ensure that the Virtual Expeditions will not become just another digitized photo album, content contributors are encourage to create interesting and exciting cultural heritage stories. In line with Murray [15], who claimed that technology enabled stories should assign an active role to the user, the Heritage Items are not automatically presented to the user. They will appear as 'resource balloons' on the screen only after the user clicks on a certain active button or a hotspot. In fact, the Heritage Items are hidden until the user acts to reveal it, thus creating the "feeling of knowledge exploration".

Users who wish to create their own Virtual Expeditions can present their cultural heritage stories by using one or more of the following story-telling formats:

A. Memorial stories - aiming at to honouring people who are still alive (including the contributor) or remembering people who passed away. Memorial stories present a description of the person, focusing on events that best capture the person's character. While generating a memorial story it is important to focus on the person's contribution to his family and society, her/his goals in life, impact on other people, achievements, struggles, and the lessons learned from her/his actions.

B. Adventure/places stories - aiming at portraying ones own journey to sacred places or back to her/his ancestors' birthplace. The photos taken, possible interviews, and the personal journey can be uploaded to MOSAICA as an adventure story. This experience is usually an invitation to challenge the users, to change their perspective about our ancestor's heritage, lives, and the places they lived and came from.

C. Artefact stories - In many cases, an artefact's value is not in its original functions, but in its story. Many objects have a story to go with them, and, good record keeping is the key for their preservation. It is important that artefacts are presented in the context of interesting historical events and with relation to people who owned them, and not just as a collection of lifeless things.

D. Custom/tradition stories - Just as every person and artefact has a unique and

important story to tell, custom and tradition stories are important and meaningful to the preservation of cultural heritage. Custom stories lend themselves particularly well to tradition preservation efforts. They can include unique holiday celebrations, as well as special rituals, songs, dances, and prayer. Well designed custom stories may generate and sustain a sense of identity and belonging to a certain community.

#### 4.2 The Virtual Expeditions conceptual model

MOSAICA's Virtual Expeditions are an important educational instrument designed specifically for learning through exploration of virtual stories. Each virtual expedition can be triggered by a driving question that is gradually solved as the user continues to explore the Virtual Expedition. Built into the virtual expedition process are the strategies of cognitive psychology and constructivism (von Glaserfeld, 1987). In order to engage students in meaningful learning, the stories are divided into significant events, named 'Heritage Items' that steer students through inquiry learning.

The innovative concept of Virtual Expeditions is based on the idea that meaningful usage of heritage items cannot be based on a simple display of individual resources, but rather requires conceptually driven structuring of individual resources into a meaningful whole. Virtual Expeditions are therefore based on five conceptual pillars:

*Multimedia*- Multimedia represents the presentation of instruction that involves more than one presentation mode, delivery media, and/or sensory modality. The basis for the use of multimedia is the assumption that when the user interacts within these various modes, they are motivated and learn more meaningfully. As part of the Virtual Expeditions, multimedia is used to address the needs of a variety of users as both learners and content contributors. Users are encouraged to upload resources (as content contributors) and/or explore stories (as end-users) via diverse media types, such as: text, photo, audio, video, graphics and animations. The virtual expeditions harness the effectiveness of multimedia in addressing the learning styles typically neglected by traditional instruction.

*Coherency* - Heritage Items are fully and coherently integrated to produce a seamless Virtual Expedition. The Heritage items are mutually supportive and consistent with each other to construct a full and detailed cultural heritage story on a person, artifact, or custom. As part of the Virtual Expeditions, the cultural heritage stories are perceived as logical consistencies that formulate a systematically coherent truth of the past.

*Nonlinearity* – the users are able to choose the order in which to see and read the Heritage Items. Scholars, for example, can choose to focus on, and read about academic heritage items which include in depth descriptions of a certain theme. Children would probably choose to focus on heritage items that include pictures with little and simple descriptions. Exposing users to a nonlinear type of learning and allowing them to choose what to read and learn motivates them as to the importance of the themes and concepts that are being explored.

Active learning and interactivity – the users experience active learning as end-users and interactivity with MOSAICA system as the creators of their own virtual expeditions. As end-users, they explore an existing virtual expedition, answer questions, receive feedback, and write an expedition diary. In this mode, users are involved in knowledge acquisition and comprehension that are considered as low order thinking skills. On the other hand, as creators of their own virtual expedition they are active in gathering and uploading resources, analyzing them and then synthesizing them into a complete story.

*Hypertextuality* – the Virtual Expeditions leverage the potential of hypertextuality to encourage non-linear explorations and constructivist approaches to learning. Hypertextuality allows inter-connectedness of different concepts and themes to related websites and other Virtual Expeditions. Hypertextuality encourages users to better understand and interpret the concepts that construct the cultural heritage story.

MOSAIC's Virtual Expeditions tool consists of two usage modes: exploration and creation. Users can choose to learn about a certain Jewish person, object or tradition by merely exploring the Virtual expeditions or by creating/developing their own online story.

#### Exploring a Virtual Expedition

Each Virtual Expedition consists of Help manual and additional screens: 'Home' screen and one or more of five storytelling templates (Figure 2). By using MOSAICA's search engine, users can search for a certain name, topic, or concept in a pool of Virtual Expeditions, choose a Virtual Expedition that evokes their interest, and explore it. MOSAICA via Virtual Expeditions invites users to learn about Jewish people, customs, symbols, and artefacts, by exploring one or more of the storytelling templates screens. They can do it on their own time and as often as they wish.

As described earlier, Virtual Expeditions can be composed of



Figure 2. Virtual Expedition consists of Help manual and additional screens

In general, each of the five storytelling templates include a menu bar that consist of the following options: connections to external links, connections to other related Virtual Expeditions, search MOSAICA, play video, and play music. All controls support hotspots and hyperlinks. Each hotspot displays one Heritage Items. The hyperlinks open a default browser in an additional window.

#### Creating a Virtual Expedition

In this mode users can design and record their own Virtual Expeditions and suggest them to other users by storing them in a specific repository. These resources are thematically organized allowing users to select the topic of interest by theme or contributor, and gain access to all relevant material.

The creation of a Virtual Expedition is carried out in three stages: designing the cultural heritage story, uploading and tagging the resources, using the Virtual Expedition creation mode.

Stage 1: Designing the cultural heritage story.

In this stage users prepare their resources, think about a story and process it into short segments of textual events and related media resources and websites. The sub-stages include:

1) Selecting a historical event or theme, a cultural object (artefact), a place, or a person.

2) Selecting relevant and related resources, such as: websites, pictures, documents, videos, etc. The resources should have a URI and should be downloaded from the web, or scanned and saved in ones own computer.

3) Breaking the story down to a sequence of 'Heritage Items' that consists of:

- A title a short description of the event, the person or the object.
- A detailed description of the event or the resource.
- An adjunct media file picture, video, document, audio, etc.
- A place where the event took place.
- A date when the event took place.
- Hyperlinks to a relevant website, another Virtual Expedition or another template within the same Virtual Expedition.

Stage 2: Uploading and tagging the resources.

In this stage MOSAICA's Semantic Annotator is used. The sub-stages include:

1) Uploading the resources using MOSAICA's Semantic Annotator.

2) Entering metadata information that includes: target audience, resource type, language, owner, and copyrights. The "Title" and the "Description" fields in the optional

metadata fields allow users to provide more details, and thus better annotate their resources.

3) Selecting relevant concepts (instances) for annotation from MOSIACA's ontology list.

4) Viewing the annotated resource and approving or modifying it.

Stage 3: Using the Virtual Expedition creation mode.

This stage is the final stage for the creation of a Virtual Expedition. The sub-stages include:

1) Clicking the Editing control to allow the creation of a Virtual Expedition.

2) Editing the 'Home screen' by changing the Virtual Expedition's title and adding a graphic file, a music file and/or a video file. Writing the contributor's name and a short abstract in text boxes designed for these purposes.

3) Choosing one or more of the five storytelling templates that can best present the story.

4) Inserting resources in the form of Heritage Items from the pool of resources that were uploaded and tagged via the semantic annotator tool in an orderly sequence.

# 5. The pilot study and initial findings

The Virtual Expedition's pedagogical framework was based on the premise that multiculturalism is not a problem, but rather an asset, and that exposing learners to the stories of foreign people and unfamiliar customs may lead to a shift towards more tolerant views. Experts in education and computerized systems were interviewed in order to investigate how they conceptualize the term "cultural heritage" and their views about the use of advanced technologies for the preservation of cultural heritage. The interviews were open interviews, about 30 minutes long, structured as informal conversations between the researchers and the participants. The results of the interviews helped us to finalize the Virtual Expeditions' pedagogical framework and methodology.

The content analysis of the interviews that were conducted among experts in education and computerized systems resulted in categories that present answers to the following questions: What is cultural heritage? Why should we learn about diverse cultural heritages? And Why should use advanced technologies for that matter? Examples for the participants' citations and associated categories are presented in Table 1.

As presented in Table 1, there is a great understanding for the need to preserve cultural heritage and legacy from the past. This does not contradict the fact that each society, parallel to its effort to preserve its unique characteristics, should also strive to promote open-mindedness and enhance tolerance. The findings indicate the importance of employing advanced technologies for the preservation of cultural heritage. It was

indicated that Web-based technologies can be used as platforms for knowledge sharing and can enable interactive and creative educational experience. The thematic questions that were debated and their emerged categories assisted in shaping MOSAICA's pedagogical framework and the Virtual Expedition's conceptual model.

Thematic questions	Selected citations	Categories
What is cultural heritage?	Cultural heritage encompasses places, documents, books, works of arts and all artifacts that existed in the past and arrived to our days.	1. Legacy from the past
	We should adopt UNESCO's definition: culture is regarded as the set of distinctive spiritual, material, intellectual, and emotional features of a society or a social group.	2. A set of distinctive features of society
Why should we learn about diverse	We need to learn about different cultures and traditions in order to acquire a better knowledge of our past and to add new values to our future.	1. Acquire knowledge and values
cultural heritages?	I believe that introducing the history of the great religions by teaching our children may enhance open-mindedness and tolerance.	2. Enhancing tolerance
Why should use advanced technologies for that	Many people and school teachers lack knowledge and will not be able to deliver stories in an interesting way without the use of advanced technologies.	1. Lack of knowledge among teachers
matter'?	Since the web has become a prominent tool for teaching and learning, I believe it is important to develop a system that would enhance collaboration and knowledge sharing.	2. Collaboration & Knowledge sharing
	An intelligent Web-based system with the use of multimedia (colors, animations and sound) can enable interactive and creative educational experience.	3. Interactive & creative experience

Table 1. Analysis of the discourse on cultural heritage and its educational aspects

## 6. Discussion and further investigation

Although still in its first stages, MOSAICA and the Virtual Expedition tool already shows promise. It has been well established that education and learning is a function of the activity, context and culture in which it occurs [12, 15]. For meaningful learning, knowledge needs to be presented in an authentic context, i.e. settings and applications that would normally involve that knowledge. This assumption is at the heart of the conceptualisation of MOSAICA's Virtual Expeditions, and it sharply contrasts with most classroom learning activities, which are abstract, and sometimes out of context. The Virtual Expeditions bring the "world" to the classroom, and, in fact, to every home, by allowing users to engage in the authentic and situated exploration of cultural heritage items and their unique stories.

Although the real world offers true sensory immersion, real field observations and field trips to museums, praying places, or cemeteries, are limited for reasons of distance, time, expense, scale, or safety. Experiencing the world first-hand, while exploiting places and stories provide MOSAICA's visitors with the opportunity to develop practical and observational skills akin to those developed while interacting with the "real thing". MOSAICA serves as a cognitive tool enabling users to acquire, develop, and actively manipulate mental models in an authentic way.

Future research tied to MOSAICA and online sharing of heritage items will follow three tracks: usability, pedagogical, and studies of communities from different cultures. There are pedagogical and educational implications of large scale heritage items available online, alongside implications related to the classification of data (via semantic web). Research into the opportunities, advantages and problems of online, web-based preservation of cultural heritage, is already in action. Questions such as: how can online preservation of cultural heritage be done best? Who are the potential users and how will they interact with the system?

Indeed, the success of a system such as MOSAICA and its Virtual Expeditions depends on a deeper understanding of the process, motivations and rewards in sharing information. What are the incentives to contribute heritage items? What will be the preferred story-telling template? Can a web-based system enhance pluralism and openmindedness among users? We believe that the Study of these important questions will promote the growing body of knowledge on web-based environments for learning, knowledge sharing, and might shed light on the enhancement of pluralism and openmindedness.

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# New Quantitative Models and Tools for Quality Management in Banking Educational Institutions and Departments

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#### Abstract

According to Quality criteria, the definition of learning offer usually follows needs analysis and interpretation of the map of profiles and competences in relation to company processes. In banking educational institutions/departments, this interpretation implies different analyses for the identification of the links between the variables that characterize the logical-functional plan, the knowledge area, the standards, and the strategic objectives. In this context, the training administrator should produce an output, in which various methodological options and organizational needs converge, and always sponsor and/or justify the economic investments.

The paper describes a new functional model for Quality Management and macro/micro-design of learning activities. It has been widely tested and applied in several organizational contexts with very good results. Characterized by rules and standardized instructions, it integrates an engineering view of learning design with an approach oriented both to the Risk Management and to the direct control of the quantitative variables related to the process. It introduces two innovative tools to measure and increase training programme effectiveness, with a strong emphasis on the role of assessment and meta-evaluation: (1) a scientific method for Item Analysis, and (2) a neural network for non-Effectiveness Risk management (particularly useful for the calculation of R.O.I.).

## 1. A Macro-Model for Quality Management

The HR management, the competence model, the map of business processes and the changes in the organizational structure constantly influence the design and implementation of courses in the banking sector. Moreover, after Basel II, a Risk management logic (i.e. operative risk, generic risk, compliance risk, etc.) should also be integrated in the learning design activities. A standardization of processes and procedures is then necessary to define a set of criteria for quality control of different learning plans.

The Research & Development Division of ABIFormazione (Training Division of Italian Banking Association) answered to these needs and introduced a new macro-model composed of the following 4 phases and steps.

## Phase 1. Preliminary Analysis

• Step 1. Calculation of the learning needs in relation to target and company objectives.

- Step 2. Definition of the general learning objective of the course.
- Step 3. Analysis of the system variables.
- Step 4. Calculation of predicted learning time and budget.

## Phase 2. Instructional design

- Macro-design
- Step 1. Content analysis and creation of a concept map.

• Step 2. Design of the "tree of learning objectives" and analysis of complexity level and semantic density.

- Step 3. Definition of the general structure of didactic activities and identification of the actors involved in the process (instructional designers, tutors, mentors, teachers, didactic managers, etc.).
- Step 4. Definition of the assessment architecture.
- Micro-design
- Step 5. Design of each didactic unit.
- Step 6. Design of assessment tools.
- Step 7. Design of didactic activities.

## Phase 3. Development and implementation

- Step 1. Creation of the didactic materials (slides .PPT, WBT, .PDF, etc.).
- Step 2. Selection of a sample of users for the beta version test.
- Step 3. Analysis of the beta version results.

• Step 4. Redesign of the course and solution of the problems highlighted by the beta version analysis.

• Step 5. Implementation of the course for the whole population of users.

#### Phase 4. Evaluation

- Step 1. Analysis of the general results of the training programme.
- Step 2. Calculation of the Effectiveness Index.
- Step 3. Calculation of ROI.
- Step 4. Meta-evaluation of the system.

Among the several examples of application of this model, the redesign of the Banking & Financial Diploma, a training programme for future quality managers, is the most significant one. For its 8<sup>th</sup> edition, the course underwent several changes that led to a blended structure, composed of 7 different units. Each unit is characterized by an alternation of online learning, face-to-face classroom and tests.

Start	Self lear	ning		Self learn		Review	Third	
Online diagnostic test	6 D.U. E-learning Object Assessment in itinere	Online Exercise	First classroom meeting	6 D.U. E-learning Object Assessment in itinere	Online Exercise	Second classroom meeting		Final test
1 week	3 weeks	1 week		3 weeks	1 week		2 weeks	

The course lasts 18 months and it is attended by 300-400 participants per edition. Every year two editions are organized.

## 2. Two meta-evaluation "tools" for Quality Management

For the development of a business corporation, training programmes for employees are very important, but much more important is to appraise the Return on Investment made on them. It is then necessary not only to calculate learning effectiveness of the whole process, but also to run a meta-evaluation. In fact, meta-evaluation can evaluate the learning assessment system and calculate its effectiveness: it checks the validity of the employed assessment tools and their correspondence to the related learning objectives and contents.

The model described in this article includes some new theoretical tools that allow to validate processes and redesign training programmes: (1) a quantitative model of metaevaluation, a scientific schema of docimological analysis of assessment, and (2) a complex neural network to evaluate and manage the *non-Effectiveness Risk*.

## A docimological quantitative model

Each unit of the B&F Diploma is characterised by an initial and a final test that are developed on the contents and learning objectives of the course. The initial test measures the initial students' knowledge system and provides useful advices on the best use of the

didactic resources. On the other hand, the final test checks if the student reached the learning objectives of the course. To ensure isomorphism between the tests, the items are designed in direct relation to the "map of learning objectives": therefore, the target knowledge system is translated into a hierarchical list of observable behaviours. In this map, the main objective is declined into a set of more specific sub-objectives that describe what learners should be able to do at the end of the training programme.

In the B&F Diploma units, the initial<sup>19</sup> and final tests are composed of 45 multiple choice items (4 options, 1 correct) designed on the same objectives.

The meta-evaluation process starts when the map of objectives and its related assessment tools are submitted to one or more **content experts**: if the items result appropriate, both tests can be administered to the same random sample<sup>20</sup> and then, rigorously analysed in order to certify their validity, reliability and isomorphism.

The results gained by the learners in initial and final tests are compared: the following table shows the **means** and **standard deviations** of the scores gained by a random sample of 253 bank clerks (not attending the course) in Unit 2.

			Std.	Std. Error
	N	Mean	Deviation	Mean
VAR00001	253	11,6759	2,6988	,1697
VAR00002	253	12,3083	3,9681	,2495

Variable 1= initial test Variable 2= final test

Moreover, a **Paired Sample T-test** allows the comparison of means and standard deviations.



T-test (252)= -2,343 p<0.05

The results show a significant difference between the means. A lack of isomorphism between the tests is, hence, highlighted: maybe, some items need to be checked.

Before redesigning them, isomorphism is also checked by calculating the **Bravais-Pearsons r correlation coefficient**.

<sup>&</sup>lt;sup>19</sup> The whole initial test is composed of 60 items: 15 items are designed on introductory objectives and related to support materials. <sup>20</sup> The selected sample must be representative of target, but not attend the course in order to keep the "training effect" variable under restraint.

	Correlations						
		VAR00001	VAR00002				
VAR00001	Pearson Correlation	1,000	,214**				
	Sig. (2-tailed)	,	,001				
	Ν	253	253				
VAR00002	Pearson Correlation	,214**	1,000				
	Sig. (2-tailed)	,001	,				
	Ν	253	253				

\*\*. Correlation is significant at the 0.01 level (2-tailed).

There is a significant but very low correlation (r = 0,21) between the tests: this confirms the presence of some critical items.

At this point, the **Cronbach Alfa Coefficient** is estimated to check the measurement reliability. Low values are expected, because data come from the random sample who has not attended the course yet.

Reliability Coefficier	nts
N of Cases =253,0	N of Items = 45
Alpha diag. test = $,08$	85
Alpha sum. test = $,09$ :	56

Values are < .20 and, therefore, dramatically low. A classical item analysis must be run: the difficulty and discrimination indexes need to be calculated and items characteristic curves require to be checked.

The **difficulty index** is the proportion between the number of people not passing the item and the number of uncorrected answers given by the entire group of people. Its values can range from 0 to 1: a value close to 0 represents a simple item, while a value close to 1 a difficult one. The acceptable range is between 0,2 and 0,8. The easiest items must be deleted or rewritten.

Furthermore, a **weighted difficulty index** allows to check if the learners answered by chance to the items. It is calculated by computing the difference between the number of correct answers and the ratio between the number of uncorrected answers and the number of answers options, and dividing it by the number of learners.

The table below shows the three simplest items of the Unit 2 initial test: without attending the course, the random sample of bank clerks answered correctly in a very high percentage.

index diagnostic test
0,23 = 77% right
0,16 = 84% right
0,15 = 85 % right

The **discrimination index** shows how well the item discriminates between low and high scorers. It represents the correlation between the performance on one item and the performance in the test as a whole. It can be estimated in many different ways: by simply computing the difference between the proportion passing the item in subjects ranking in the top half on the total score, and the proportion passing the item among subjects in the bottom half, or by calculating the Point-Biserial Correlation with the help of statistical package. Its values range from +1 to -1. The acceptable range is between 0,2 and 1.

In the table below, the item discrimination index is calculated through the **Point-Biserial Correlation**: a dichotomous variable (only 1 correct option) is correlated with a continuous variable (total scores vary from 0 to the number of items in the test).

ITEM	MEAN	VARIANCE	Pt.Bis. Correlation
1	0.988	0.012	-0.0145
5	0.340	0.225	0.3708
44	0.090	0.082	0.2560
37	0.242	0.184	0.3185
35	0.156	0.132	0.2874
4	0.283	0.204	0.3124
9	0.393	0.240	0.3757

If the correlation is negative, high scorers are more likely to have missed the item and lower scorers likely to have answered correctly.

A further analysis consists in checking the **Item Characteristic Curve** of the critical items. It shows the probability that the item will be answered correctly according to the learner's ability. The Item Response Theory assumes, in fact, that the score gained by learners in one item/test is correlated to their overall ability on the latent trait, which underlies test performance.

The shape of the ICC reflects the influence of the three following factors:

• an increase of an item difficulty makes the curve shift right - subjects need to learn more in order to have the same chance of passing the item;

• an increase of the item discrimination makes the gradient of the curve raise subjects below a given ability are less likely to answer correctly, while subjects above a given ability are more likely to answer correctly;

• an increase of the chances raises the baseline of the curve.

The following examples show the ICC of the three easiest items of Unit 2 initial test.



ITEM 33 initial Test = 85 % right answers in the random sample



ITEM 18 initial Test = 84 % right answers in the random sample



ITEM 2 initial Test = 77 % right answers in the random sample

In the meta-evaluation process, the above mentioned procedures (content validity, comparison of means and correlation, reliability test analysis, item analysis) should be repeated until the results are acceptable. For the B&F Diploma, the meta-evaluation is run for each unit assessment system.

The above mentioned performance tests are, then, administered to another random sample of 218 bank clerks who did not attend the course, after the redesign of the critical items. Here follows their means, standard deviations and T-test.



The difference between the means is not significant. The tests measure the same construct and are isomorphic: they are now ready to be administered to learners.

In order to check each unit efficacy, scores from initial and final tests are compared. Here follows a Paired Sample T- test run on the scores of a sample of 200 bank clerks who attended the course.



The difference between the means is highly significant: the training was, then, effective.

Test reliability can be also checked by calculating the Cronbach Alpha Coefficient on the scores of the final test. This time a high value of this index is expected, because data come from learners who attended the course.

Reliability Coefficients Alpha (Final Perform	nance Test)
N of Cases = $200,0$	Alpha =
N of Items $= 45$	,7558

If the result is good, like in this example, there is no need to go forward with further item analysis. On the other hand, a value < 0.70 would underline the necessity of another item analysis to define the critical items left.

#### A meta-evaluative neural network for non-Effectiveness Risk management

To manage the *non-Effectiveness Risk* of blended training programmes, ABIFormazione designed a neural network capable of forecasting the final results of the course in relation to the initial test.

For every course, students' data (scores, learning time, activities in platform, mails to the tutor, participation to forums, etc.) are stored.

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VLD Adda	11 M03E08		51,1	60	97,8	B	278	254	0	24
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A0003	21 MOGEOD	100015	60,9	59	97,0	0	0.1	84	0	0
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40003	22 1403608		62.2	16,7	97.8	0	261	725	0	28
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TRN AGEOD	20 MOLEOO	100022	59,6	30,0	100	0	220	99	72	49
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VLD IACOCC	36 M04E00		31.1	60	04.4	8	177	62	12	13

These data are analyzed and normalized in order to create the input data of the neural network.

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The neural architecture and the control algorithm are based on the data set structure.



At this point, the neural network training can start.



After training, the neural network can elaborate forecasts in relation to the input data set representing the starting scenario of each user.

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This innovative tool allows an analytic control and management of learning processes and enhances the planning of *in itinere* activities to mitigate the non-effectiveness Risk.

#### 3. Results

The application of this model to the B&F Diploma has produced optimal results in terms of quality control and increase of learning effectiveness. In particular, the model was used to analyze the results of its 8<sup>th</sup> edition and to redesign the first unit. In 8<sup>th</sup> edition the final effectiveness index of unit 1 was 0,65.



In 9<sup>th</sup> edition the effectiveness index was 0,72.



In 10th edition, the index reached 0,74.



The increase of the effectiveness index demonstrates that these tools are very useful for instructional architecture redesign and upgrade.

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#### A Proposed Framework for using Mobile Agents in Learning and Diagnosing Medical Data

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#### Abstract

Mobile Agents nowadays attract the attention in both sides the academic and the IT industry. Many mobile agent applications have been started covering many fields like e-learning, emails, auctions...etc. Medical application due to its importance and urgent advices in rare medical fields began to start also.

In this paper we present a proposed framework for mobile agents that can help patients for finding the accurate diagnosis at the appropriate time and with less effort. The proposed framework named Persona\_Medica. Persona indicates the human interaction between the patient, the machines and the quick response of agents. Data retrieval and its integration is one of the major problems that face large and complex health organizations. In this paper, we describe and discuss the use of agent technologies for the retrieval, integration of electronic clinical records, and availability of clinical reports that can help in providing an up-to-date overview of a patient medical history at all points of care. The proposed framework is java agent development framework, where agents can easily manage and deployed.

The proposed framework presents many security challenges namely the need to provide protection to patient's sensitive information. The implementation of security mechanisms was thought from the beginning of the framework, allowing for its better integration and acceptability. This subject was tackled according to the three main security characteristics: integrity, availability and confidentiality.

**Keywords:** mobile agent, medical applications, intelligent systems, electronic medical record, clinical data systems, Java-based applications.

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# 1. INTRODUCTION

Each country has its hospitals that hire number of junior doctors. Those doctors may be faced with a patient that they cannot diagnose his illness or write for him the accurate medicine.

At the same time those junior doctors are in need to job training. They are in need to transfer skills and learn a specific lecture from famous doctors in the medical field, so they must not stay with bound hands waiting for the appropriate time and place to attend the lecture that they need, but they can crossover all time and place obstacles by using the recent technologies at the medical field.

In this paper we present a proposed framework for a network of hospitals worldwide. Agent plays an important role in this framework for checking the appropriate hospital and expert doctor in the medical field. The patient data will be transferred within the system for either diagnosis or checking for the appropriate recent medicine with fewer side effects.

# Also the framework contains other types of agent that help junior doctors to investigate and register themselves to the system and attend and previews the lectures, watch surgeries in their specific domain.

# 2. CLASSIFICATION AND TYPES OF AGENTS

# **Classification by application type**

Franklin and Graesser[1996] use a taxonomic tree to classify autonomous agents.

# Organizational and personal agents



Fig. (1) S.Franklin and A. Graesser, Institute of Intelligent systems

According to Lee et al.[1997], truly intelligent agents "level 3 of intelligence" must be able to learn and exhibit autonomy. However most internet and electronic commerce agents do not exhibit these characteristics yet, therefore, they are often called software agents "level 2 of intelligence". The second generation of Internet and electronic commerce includes some learning capabilities.

Another classification by Wooldridge[2002] includes the following different applications:

- Agents for workflow and business process management.
- Agents for distributed sensing
- Agents for retrieval and management
- Agents for electronic commerce
- Agents for human-computer interaction
- Agents for virtual environments
- Agents for social simulation

#### **Classification by characteristics**

According to characteristics of agents, three are of special importance: agency, intelligence, and mobility. According to IBM[1995], agents can be classified in terms of a space defined by these three dimensions.

## Other classifications

King[1995] classifies agents into interface, tutors, scheduling assistants, search agents, report agents, presentation agents, navigation agents and role-playing agents. Murch and Johnson[1999] use the following categories: personal use, network management, information and Internet access, mobility management, e-commerce, user interface, application development, and military applications. Gilbert and Janca[1997] classify Internet agents into nine categories based on the area of application.

- Assistance in workflow and administrative management.
- Collaboration with other agents and people
- Support of electronic commerce
- Support desktop applications
- Assisting in information access and management, including searching and FAQs
- Processing of e-mail and messages
- Controlling and managing network access

- Managing systems and networks
- Creating user interface, including navigation.

## **3. THE PROPOSED FRAMEWORK**

The proposed secure framework consists of number agents that are serving for getting the appropriate hospital for the patient without leaving his place, which help in reducing the costs of traveling and also the effort that will be done from the patient for traveling and registering at the hospital, checking for doctors specialists and schedules.



Fig. (2) Representation of Medical Agents via WAN of Hospitals

The proposed framework came to be a solution to many problems for example rare of specific doctors in specified fields and lack of skills and knowledge for junior doctors that been needed in field of work and research.

# 4. THE SCENARIO

- Step 1: The patient creates an account and one or more persona
- Step 2: The patient takes on a persona
- Step 3: The persona initiates a curing session by submitting a query to the Med\_A
- Step 4: The Med\_A stores the patient's request in the database
- Step 5: The Med\_A uses Hospitals plug-ins to send requests to Hospitals
- Step 6: Results from Hospitals are parsed through the Hospitals plug-ins
- Step 7: IS stores the result in the database
- Step 8: The Med\_A uses the persona profile to rank the hits

Step 9: The Med\_A presents the results to the personaStep 10: The P\_A forwards the results to the patientStep 11: The patient can further interact with the Med\_A

#### **Glossary:**

- Med\_A: Medical Agent
- P\_A: Patient Agent



Fig. (3) Curing agent within the system

The proposed framework consists of a number of agents and an animated persona, which is implemented as a web-based Java.

The system adapts the presentation of the material as needed monitors patient's progress provides feedback, hints and rationales to guide patient re-actions references relevant material evaluates patient as shown in Fig.(3).



Fig. (4) Life Time of Medical Intelligent Agent

The life time of the intelligent agent starts from receiving the patient request, archiving report in medical record, medical record delivering, and periodically checking for reports availability.

As an example of development for diagnostic skill for junior doctors

- 1. Patient history must be included
- 2. Results of exams
- 3. Lab tests, x-rays, CT scans and other diagnostic imaging methods.

By questioning and examining the virtual "patient" and studying clinical data, the junior doctor will be able to practice diagnostic skills well.

## 5. SECURITY ISSUES

The proposed framework covers the three main security characteristics: integrity, availability and confidentiality.

## Integrity

Is the trust put into the information withheld by the stored patient reports? Digital signatures are security mechanisms that provide the integrity of a report by enabling the detection of unauthorized

If the digital signature does not match with report contents then this report is marked as not valid.

## Availability:

The availability of patient information and easily accessing to this information for registered users within the system must be covered. On case of system failures the system can be easily recovered through restore points, backups.

The system is monitored by number of reports provided with detailed repository. The number of reports daily retrieved and compared to what is expected and the number of sessions of different users is monitored. Any deviation from expected values triggers an alert message to the system administrator.

# Confidentiality:

Sensitive information stored or transferred within the system must be confident. This confidentially is obtained by controlling access to information and by protecting it through the network communications.

# 6. CONCLUSION AND PERSPECTIVE WORK

Knowing that mobile agent played an important role in many fields in the past few years. But the salient and urgent need in the next few years must concentrate to the medical applications.

The proposed framework allows patient to navigate and reach the appropriate hospital. Also the system provides a user friendly and uniform view of clinical data at the appropriate time and with less effort.

The proposed framework provides the ease of integration with existing recent technologies.
# This solution is greatly feasible for operation. As this solution present volatile store for agents so that an agent can restart after a machine failure.

The proposed framework suggests in addition to the presented functions in this paper the following items to be added on perspective work.

# **Trace mobile transaction:**

By adding the following:

-Network sensing-tools.

-Resource Manager ... with graphical user Interface.

-Guard the access for Screen, Network & Disk.

-Decide which actions an agent can perform based on the authenticated identity of the agent's owner.

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#### A Blended Learning Concept for Guided Self-Instruction Using e-MINDMAPS

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**Key words:** Blended Learning, Self-Instruction, Collaborative Learning, e-MINDMAP, learning styles.

#### Abstract

Learning models are evolving from instructor centred, over learner centred to learning team-centred approach. Learning is evolving to guide individual and collaborative selfpaced web-based learning. In this paper, a supervised and guided individual self-paced web-based learning concept including collaborative learning in a virtual class is adapted. Blended learning is set forward as the solution. We focus on the requirements of the blended learning concept to be a good solution for this learning model. We identified the following requirements: 1.Online Delivery of Additional and Actual Information and the Access to Applications in the Learning Domain of the Course, 2. Guiding the Learner, 3. Presentation of the Learning Content fitting the learning styles, 4. Collaborative Learning The main characteristic of e-learning course following the e-MINDMAP learning concept is the graphical design and the e-learning styles. The e-MINDMAP e-learning courses meet also the other requirements.

#### Introduction

Often self-instruction is limited to the delivery of some basic theory of the learning topics. Usually, the teacher structures that basic course content in a number of topics and delivers it as electronic content, composed of text, graphics, sound, images or video fragments. Afterwards, the student will either individually or as a member of a team, assimilates the subject of the course. It has, however, become a challenge for all occupied with the organization of education and training to re-engineer the learning process and to implement advanced ICT in order to enhance learning through technology. Learning objectives are evolving from information transfer over skill acquisition to the creation of mental change. The supporting learning models are evolving from instructor centred, over learner centred to learning team-centred approach. It partly consists of classroom activities and partly of guided self-instruction. In particular, learning is evolving to guide individual and collaborative self-paced web-based learning.

# Supervised and Guided Self-Paced Learning

A new approach, based on a learning-team centered, is proposed where the students are learning in co-operative groups and have demonstrated an ability to generate higher-level reasoning strategies, greater diversity of ideas, more critical thinking and increased creative responses. An important second order benefit is the fact that it fosters the growth of effective teamwork, the development of interpersonal communication and listening skills.

In this learning concept of supervised and guided self-instruction, the learning process of a course is planned by the teacher. Some of the teacher-central activities are organized as classroom activities under supervision of the teacher, while other activities are organized by the teacher as self-paced activities. The learners can organise the completion of it independently. But specific dates to start and to end assignments are fixed. Books and tools are selected in advance by the teacher.

The self-instruction can be organised as an e-learning activity. In most cases, this type of self-instruction is limited to the learning of the basic theory of the learning topics. The teacher structures that basic course content in a number of topics and delivers it as electronic content, composed of text, graphics, sound, images or video fragments. The student will, either individually or as a member of a team, assimilate the subject of the course.

The information about the organization of the learning process can be found in the learning path [1]. Besides the practical information about the course, the learning equipment and the evaluation methods, it also contains information about the contents such as summaries, case studies, slides, internet links, and links to the course content documents themselves. The learning process, therefore, consists of a mix of different learning activities, which limits the number of lectures. However, their role is to introduce the learning topic and to explain some complex issues. Practical sessions are organized and scheduled by the teacher too.

The total of these contact hours are limited to less than 30% of the students learning time. As self-instruction the student will afterwards assimilate the learning content individually in the study rooms or at home. Instructed assignments, which may also take the form of real projects in which enterprises are co-operating, will be solved in teams. Students can ask for help and for advice.

In this new concept of guided self-instruction, blended learning is set forward as an elearning concept. The challenge is to find the right blend. It is dependent on the type of content, the type of student and the availability of the ICT solution. In case of informational content, self-learning is the optimal solution. Procedural content will be assimilated by making exercises and by repeating it again and again. The learning of behavioral content has to be organized as a team discussion or a role-playing session. From a conceptual content viewpoint, the most effective way is to confront the students with business case studies and to participate in business projects. If the student is only reviewing a course, or if the student is following only partly the course, or if students have different learning background it is advisable to organize asynchronous and selflearning. *E-learning courses may be implemented in this new approach. Such courses may include integrated links to other more detailed multimedia documents and hypertext links to interesting websites, or to other courses on the internet. Well-chosen illustrations are resulting in attractive reading. In addition, self tests are integrated in the text and interactivity is built in by Question and Answer facility about the content of the course.* 

It is believed that the proposed approach encourages the student to find additional information, to share with other students and to expand own knowledge. At the end of the course an overview self assessment is supplemented. Students have to deliver assignments in the virtual classroom, reporting of their personal homework by papers, solved exercises, and so on. Discussions are organized as a classroom session or can be induced by the instructor, during the course. The student can be partly responsible for the course content too. The students co-operate with the teacher in creating some parts of the course text based on an individual study of books and periodicals in the course domain. Students can add some personal information documents to the course to share with colleagues.

#### **Blended Learning Concept Solution**

Blended learning is a solution which may take full advantage of ICT based learning combined with some traditional classroom activities [2]. As traditional classroom sessions we distinguish lectures, exercises organized in the classroom and as homework, discussion session, individual reading of some courses text, team assignment and tests.

As e-learning activities we distinguish self-paced learning using online documents and databases, online tests, online exercises, participation in an asynchronous discussion forum, individual search for learning materials, sharing online knowledge with other students, synchronous live-session, video-conferencing, online interactive discussion and chatting, and application sharing. The challenge in blended learning is to find the right blend. It is dependent on the type of content, the type of student and the availability of the ICT solution. T he types of content should include the following:• Informational content: self-learning is the optimal solution. • Procedural content will be assimilated by making exercises and by repeating it again and again. • The learning of behavioral content has to be organized as a team discussion or a role-playing session. • From a conceptual content viewpoint, the most effective way is to confront the students with business case studies and to participate in business projects. • If the student is only reviewing a course, or if the student is following only partly the course, or if students have different learning background it is advisable to organize asynchronous and self-learning.

The proposed Blended Learning partly consists of classroom activities and partly of guided individual and collaborative self-paced web-based learning activities. We adapted the blended learning concept. All the activities, which are guided and controlled by the teacher, are planned for the individual learner or for the team of learners. The number of lectures may be limited and replaced by some self-learning ones and the total of the contact hours are reduced to less than 30% of the students learning time. The contact learning sessions include - traditional classroom, practice, - response sessions, as well as meetings to co-ordinate the student projects The self-learning activities on the other hand include individual e-learning course learning, assignments, exercises in the virtual

classroom, project teamwork, business simulation/ management games, writing papers reporting about self-study of literature, self assessment, discussions induced by the instructor during the course as a synchronic or a-synchronic activity.

# **Special System Requirements**

The requirements for the proposed blended learning concept focus on the following [3]:

1. Online delivery of additional and actual information and the access to applications in the learning domain of the course;

- 2. Guidance of the learner;
- 3. Presentation of the learning content taking care of the learning styles of the learner;
- 4. Collaborative learning;
- 5. The need for a learner e-learning portal.

# Online Delivery of Information and the Access to Applications in the Learning Domain of the Course

A first characteristic of the proposed approach is the online delivery of additional and actual information and the access to applications in the course of the learning process. A high degree of practical relevance in the learning process and the provision of up to date information on point of theory and best practices have become a high priority. In addition, advanced and actual learning content has to make accessible in the course of the learning process. Additional dynamic information can be collected by web-search agents and will also be integrated into each learning module. Web-search agents will gather information on the relevant know-how topics and other areas of interest specified by individual users. Intelligent agents implemented in the e-learning solution will provide the information retrieval from several (internet) sources, information filtering according to the personal characteristics of and delivered by the user and coaching of the students throughout their learning process.

The system supporting the fundamental theory-example-exercise triangle is further enhanced by the opportunity of access to commercial computer application programs and, to various databases and to up-to-ate information on the Internet.

In case of learning of business applications, the integration of benchmarking models will also be a key element of the learning/teaching modules, in the sense that, on the one hand, an "ideal" virtual enterprise is created and, on the other hand, "real" business processes are provided to enable students in their role of business managers, to derive solutions for the problem.

Simulation and problem solving via benchmarking cases have to be implemented in a simulation tool and must be linked with the learning-portal. In case of learning in the technology domain the integration of laboratory based sessions can be key element in the learning module. Virtual labs allow experiments to be executed within web-interfaces and are integrated in the learning of the underlying theory. The learner can login through the

internet onto the distance website and connect to the server and will be able to access and operate various virtual instruments and electronic apparatus or direct a robot.

# **Guiding the Learner**

A second characteristic is the special care to be taken in the guidance of the learner or the tutoring of the course. The learner enjoys excellent support by having the opportunity to become tutoring in the form of valuable advice and solving out any issues or problems. In tutor-led e-learning, learners enjoy higher levels of tutoring and classroom interaction. Tutoring can also be embedded in the e-learning course. In that case a computer tutor guides the students throughout the solution of an exercise providing explanations, hints and help.

In self-directed e-learning most of the information the learner needs will be available online, and he/she can start the course and work through at one own pace. But the learner will still enjoy excellent support by having the opportunity to become tutoring in the form of valuable advice and solving out any issues or problems. The tutor can help to select modules to study and can provide support during the course. The tutor is the subject specialist and guides the learner in learning the subject. The teacher is monitoring the students input and makes small corrections to it. Also a student regularly asks for advice. A Question and Answer facility is available in an "e-contact" application linked with the course

Tutor-led e-learning implies that learners take interactive courses which are of a classroom style but are attended virtually. Specific dates to start and to end assignments are fixed. Books and tools are needed that would normally need to take into classroom. This type of e-learning is less flexible but is nevertheless a very convenient and effective way of learning if the learner needs extra motivation and a little more structure in order to stick to the course. Learners enjoy higher levels of tutor and classroom interaction and can expect excellent support facilities.

The future of the emerging e-learning technology however consists of integrating instructional material (lectures, learning activities, ect) with real intelligent tutoring features, such as functionalities which can track user's learning processes and react to his/her actions as a human tutor would. A computer tutor guides the students throughout the solution of an exercise providing explanations, hints and help. Tutoring can therefore be embedded in the e-learning course and the presentation of the learning content can be setup including opportunities for the learner to support in learning.

# Presentation of the Learning Content Fitting the Learning Styles

A third characteristic is the need to present the learning content in a way to take care of the learning styles of the learner. Just as every person is unique, so is every learner. But how much this uniqueness matters is a great debate among educators, trainers, and psychologists. The VAK (visual, auditory, kinesthetic) style is a style that is especially applicable in the presentation of e-learning content for the organization of a self-paced e-learning course. Learners use all three types of styles to receive information. However,

one or more of these is normally dominant [4]. This dominant style defines the best way for a person to learn new information by filtering what is to be learned.

Trainers/authors need to present information fitting aspects of all three styles. This allows all learners, no matter what their preferred style is the opportunity to become involved. In the e-MINDMAP concept, the e-learning content has been presented in a way that it is fitting aspects of all three popular VAK styles [5].

# **Collaborative Learning**

A fourth characteristic of the proposed approach is collaborative learning. On a first level, computer mediated communication has to be facilitated and its use must be integrated within the learning materials. Collaboration of a team of students is being viewed as co-operating on an assignment and/or joining discussions about relevant or current topics. On a second level the learners will deliver additional content him/herself and share it with other learners in their team. Synchronous communication could be conducted via the chat facility and conference systems, and asynchronous communication may be facilitated through the discussion groups and via email. It is now widely recognized that many e-learners benefit from these kinds of peer relationships and online communications.

Learners should however be encouraged to use the discussion group facilities. That is why the instructor/author has to embed some discussion in a learning activity. The authors can create some activities which involves learners posting a viewpoint or a response to a discussion board, for which authors had prepared an example to get the discussion underway. Content delivery by students and sharing with other students of the team is an essential characteristic of collaboration and must be a built-in facility.

Learning the delivered content by the instructor must be a starting point in the learning process of the learners. They must expand their received knowledge by adding some other viewpoints, examples, applications, on the topic learnt. All learners of the team will bring their new knowledge in a knowledge pool of the e-learning course. They share their knowledge with the other learners

# e-MINDMAP Concept of e-Learning

In the e-MINDMAP concept, the learning content will be provided in a graphical way [6-7]. The e-learning process will be built as a sequence of MINDMAPS. An e-MINDMAP represents a small story of learning content. An e-MINDMAP corresponding to a course module consists of a number of blocks representing learning content elements. The learning process on this level is defined as a sequence of a number of steps, corresponding to those blocks. The blocks are composed of some atomic learning-elements, being the short text or audio document, the full text, some additional text or graphical presentations, or pictures, some questions and answers, some tests, some mouse-over animations, ect.



Fig. (1) A View of an e-MINDMAP Course.

# Learning Styles in e-Learning

The VAK style is a style that is especially applicable in the presentation of e-learning content for the organisation of a self-paced e-learning course [5]. This style is derived from the accelerated learning world and seems to be about the most popular model nowadays. Its main strength is that it is quite simple, which appeals to a lot of people.

It uses the three main sensory receivers, vision, auditory, and kinaesthetic (movement) to determine the dominant learning style. Auditory learners may have difficulty with reading and writing tasks. They often do better talking to a colleague or a tape recorder and hearing what was said.

Visual learners can be differentiated into two sub-channels: *linguistic* and *spatial*. Learners being visual-linguistic like to learn through written language, such as reading and writing tasks. They like to write down directions and pay better attention to lectures if they watch them. Learners who are *visual-spatial* usually have difficulty with written language and do better with charts, demonstrations, videos, and other visual materials.

Kinaesthetic learners do best while touching and moving. It also has two sub-channels, the kinaesthetic (movement) and the tactile (touch). They tend to lose concentration if there is little or no external stimulation or movement. When listening to lectures they may want to take notes. When reading, they like to scan the material first, and then focus in on the details (get the big picture first). They typically use colour highlighters and take notes by drawing pictures, diagrams, or doodling. In the following table some examples of activities can be found.

# e-MINDMAP Concept, Supporting a Combination of More Learning Styles

The e-MINDMAP scenario is combining the V.A.K. learning styles. To benefit fully of the advantages of the MINDMAP, it's important for the instructors to try to combine the visual, the auditory and the kinesthetic components in the e-learning content [5].E-MINDMAP can capture the auditory component with for example an audio document. The visual component is obvious since the E-mindmap is a graphical presentation of the content and contains text as well as pictures. The kinesthetic component can be built in using animations, video fragments, questions and answers.

The learner can decide on his/her own learning path. On point of the content, the learner can take a first draft reading through the summary and the short texts. Later on he/she can drill down in the detailed content delivered as full text and supplementary content documents. On point of structure, the learner can follow the sequence as has been set forward by the instructor, or he/she can opt to learn the topics in a different way.

# Conclusions

In this paper, a supervised and guided individual self-paced web-based learning concept including collaborative learning in a virtual class is adapted. Blended learning is set forward as the solution. We have focused on the requirements of the blended learning concept to be a good solution for this learning model which includes tutoring facilities. Special care for the learners personal learning styles is important. It is an opportunity of extending the learning content in the course of the learning process. And at last even if the learner a distance learner, collaboration can be realized.

The main characteristic of e-learning course following the e-MINDMAP learning concept is the graphical design and the elearning content has been presented in a way to create the opportunity of fitting different learning styles. The e-MINDMAP e-learning courses meet also the other requirements.

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# **Designing Interaction Media**

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#### Abstract

This paper contains three parts :First part; the important media at open and distance learning such as: Printed Material, Video – conferencing Computer- mediated – communication...etc. Second part; discuss some aspect (activity, collaboration, feedback ,interactions, communication, flexibility) of the important media. Final part; using(Sims, 1999) definition of pedagogical interaction to discus the open and distance learning media which type of pedagogical interaction support.

#### 1. Introduction:

Open and distance learning playing important roll for development Knowledge community and knowledge economic. At last ten years, Many of classic and distance learning transform to virtual learning or to E-Learning. At this paper we try to answer the following two questions related to open and distance learning media:

First ; What is the aspect of learning media at open and distance learning?

Second ; What is the pedagogical interaction at open and distance learning media?

Open and distance learning uses different types of media, such as: printed material, television, video, video conferencing and computer mediated-communications, but all these types of technology has different communications and interactions properties and effects.

Hawkins describes the distance learning as: "electronically mediated activity between students, teachers, and information sources that are separated by significant geographical distances." (Hawkins, 1991)

Bates defines the media as: A generic forms of communication associated with particular ways of representing and organize knowledge. Where the technology are closely associated with each medium. (Bates, 1993)

This paper aims at a comparison between printed and electronic media.

# 2. Media

# 2.1 Printed Material

Printed is a first medium at open and distance learning (Taylor,1995). The printed word, in almost all societies carries authority and is fundamental to open and distance learning (Hawkridge, block 4). Printed material take many forms such as: books, magazines, newspapers, blackboard, with board, and many other different forms. Here, we want to use types of printed material: first type, any material designed for classical education or

consumer. Second type, material designed for open and distance learning, this type of printed material is similar to the first type plus have the following aspects: learning objectives, activities, feedback for such activity. (Rowntree, 1994)

# **2.2 Video – conferencing :**

Video – conferencing is similar to the Audio – conferencing , but in video conferencing participants are able to see each other (Rowntree, 1992).the advantage of video conferencing is using the exploitation of visual communication (Mason , )

# 2.3 Computer- mediated – communication:

(Robson, 99), (Rowntree, 1992), (Collis, 96), (Bates, 1995) discussed computer- mediated – communication (CMC), CMC contains : e-mails, electronic bulletin boards, data-bases, chats, and using computer conferencing for learner-learner and learner-tutors interaction.

# 2.4 Multimedia:

Multimedia contains large quantity of date in a variety of formats, such as: video, audio, animation, text (Gajarg Phanarajan, 2002). There are many types of multimedia such as: simulation, games and virtual reality (Boyle, 1997)

# 2.5 E-mail :

Mediation for transmit massage between human. E-mail using to transmit massage between tutor - learner and learner- tutor (Phanarajan, 2002).

# 2.6 Television :

The typical educational television programs is around half an hour in length (Rowntree 1992). There are two ways for using television at open and distance learning, first using the television to deliver courses. Second, using the television to enrich resources on comps studies (collis, 96).

# 2.7 Video

Videotape contains a number of separate clubs\* sequences, segments. Each club takes few minutes, designed to some kinds of activity from the learners (Rowntree, 1992)

# 2.8 Interactive Video

This form of presentation uses special equipments to give learners random access to thousands of still and moving pictures (Rowntree, 1992)

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# 2.9 Practical work

Practical work is an essential medium , especially for practical subjects. (Rowntree, 1992)

# 2.10 Audio

It refers here to record and radio sound, which take more form such as : Human voice, music, learner's use of different instruments. There are three ways of using audio in an open and distance learning:

1-just listening

2- listening and looking

3-Listening, looking and doing (Rowntree, 1992).

# 2.11 Face-to-Face Lecturing

There are two types of lectures at open and distance learning, first type, Face- to- Face lecture, tutor using printed and digital media. Second type, distributed setting where the learners at distance tutors, present lecture via television, internet and communication with learner with using e- mail or telephone.

# 3. Choosing Media:

Choice of media must enhance the subjects and it should be easy to use by students. There are many factors affecting using media such as: learner support, economical situation....etc().

There are many types of challenge facing the users, when applying digital media :

1- Technical problems such as: Network, computer hardware and software ....etc.

2- Coordinated courses involve many collaborators from different zone with using synchronous media.

3- Cost affected institutions such as introduce digital media as computer lab (hardware and software), and affected the learner.

# 4. Media Aspects

# 4.1 Activity:

The activities were perceived as contributing to their understanding of the course material (Lockwood, 1995). Open and distance learning activity has many forms such as: contribution to computer conferencing, collaboration with other learner to responding to some questions, answers the questions from assignment....etc

# 4.2 Collaboration

Ted Panitz present a collaborative learning as:

Collaborative learning (CL) is a personal philosophy, not just a classroom technique. In all situations where people come together in groups, it suggests a way of dealing with people which respects and highlights individual group members' abilities and contributions. There is a sharing of authority and acceptance of responsibility among group members for the groups actions. (Panitz, 1996).

Here are two types of using collaborative learning: on comps and at distance.

# 4.3 Feedback

Feedback refers to any information that permits learners to judge the quality of their performance (Wagner, 94:p12).

# **4.4 Interactions**

Interactions are reciprocal events that require at least two objects and two actions. Here, are three types of interactive user: learner-learner, learner-tutor, learner-content(wagner, 94). More advanced of interaction we can disused it in a letter.

# 4.5 Communication:

Communication as transmission message (Fiske , 1990 ). One-way and two-ways communication will be defined for different types of media. Sometimes there are only appropriate media for communicating a particular message (Shedroff, ).

# 4.6 Flexibility

Collis defined many flexibility dimensions, We are concerned in two types of flexibility: time (moments of studying within courses), place (where support available) (Collis, 1996). Rowntree (1994) present the aspect of some possible of open and distance learning media . At table (1) present supporting the open and distance learning media the following aspect: communication, activity, feed back, interactivity, collaboration, flexibility.

Flexibility	Collabora tion	Interactivity	Feed back	Activity	Communicati on	
Time and place	On comps collabora tion	Learner content interactivity	There are action and question	Every section has activity and	Two-way Communicati on	Open destine learning print

Table(1)

				questions		
Time and place	On comps collabora tion	Learner content interactivity is weakly	No feed back	Questions exist at the end of every chapter	One-way Communicati on	Other print
Time and place	Does not support collabora tion	Interactivity does not exits	There is no answer for activity there is no feedback	Support activity	One-way Communicati on	Video
Time and place	Does not support collabora tion	Learner contents interactivity	Feedback exits	Support activity	Two-way Communicati on	Inter Video
Time and place	On comps and outside comp collabora tion	Learner -tutor and learner -learner -interactivit y	Feedback exits	Support activity	Two-way Communicati on	Practical work
Time and place	On comps and outside comp collabora tion	Learner -tutor and learner -learner -interactivit y	Learner get feedback	Support activity	Two-way Communicati on	e-mail
Time and place	Does not support collabora tion	Learner content interactivity	Learner get feedback	Support activity	Two-way Communicati on	Multi media
Time and place	On comps and outside comp collabora	Learner -tutor and learner -learner -interactivit y	Learner get feedback	Support activity	Two-way Communicati on	Video countering

	tion					
Time and place	On comps and outside comp collabora tion	Learner -tutor and learner -learner -interactivit y	Learner get feedback	Support activity	Two-way Communicati on	C.M.M
No flexpility	On comps collabora tion	Learner -tutor and learner -learner -interactivit y	Learner get feedback	Support activity	Two-way Communicati on	Face to face
Time and place	outside comp collabora tion	Learner -tutor and learner -learner -interactivit y	Learner get feedback	Support activity	Two-way Communicati on	Telephone Tattering

# 5. Interaction:

All pedagogical theory discuss the Interaction ,and many authors discuss the interaction from different angel. wagner (1994) defined the interaction as: Interactions are reciprocal events that require at least two objects and two actions. Interaction as a detailed communication process between two a few individuals (Hawkridge and Ediyisingha, blank). An instructional interaction is an event that takes place between a learner and learner environment (wagner , 1994). (Taylor, 1995) verify the social and individual interaction in distance learning. (Bates, 1995) present synchronous or real-time interaction, where at asynchronous interactions teachers and learner stored and access when teacher and learner are ready. Computer is interaction if it has two aspects: First, control the process, second, communication with content (Sims, 1999).

# Interactive media learning has the following properties:

1- support human –human interaction or creates a shared environment for interpersonal communication.

2- provide tools and experience that enhance the co-operative learning for the people involved.

3- the human participants interaction is spontaneous (Ded, 1991).

# 6. Media Interaction

Each media supported different types of interaction ; (Sims, 2000) discusses interaction from different dimensions such as: learners, context, pedagoical, context.

# 6.1 Interactive as control

Control interaction has three stages:

First stage: reactive is a limited control of structure and content, second stage; coactive: a mixture of limited and intended; third stage; proactive; extended control of structure and content (Sims, 1999).

# 6.2 Interaction as adoption:

This type of interaction is a combination of the learner response and feedback (Sims, 1999).

# 6.3 Interactive as participation: Interactive participation has the following options:

- 1- active participation in simulation or educational game (Sims, 1999).
- 2- building in current knowledge and experience (Sims, 1999).
- 3- learners control races and sequences (Sims, 1999).
- 4- student's comments and annotations (Sims, 1999).
- 5- learners' modifications by including their own material (Sims, 1999).

6- thought provoking questions to enable the user to mentally process information (Sims, 1999).

# 6.4 Interactivity for meaningful learning

Any media support the following functions:

Fault the questions, queries, real time responding note-taking, predicting, hypothesizing, hypothesizing, hypothesizing are meaningful interactive media(Sims, 1999).

# 6.5 Interactive and communication

Interactivity as communications has the following: human-human communication, learner –contents interaction (Sims, 1999). At table(2); we want to discuss the open and distance learning media which type of interaction support.

Table (2)

Communication	Meaningful question real time responding not taking hypotheses hypertext	Participation control pace and sequence comment modification	Adoption help information Expiation	Control reactive coactive proactive	
learner contents	Predicting	Control comments knowledge balding question	Feed back	No control	Open destine learning print
learner –contents	Predicting	Control comments	Weakley feed back	No control	Other print
No Communication	Queries predicating	No control	Learner response	Reactive	Video
No Communication	Queries predicating	Question control comments	Learner response	Coactive	Inter Video
Human Human	Queries predicting cooperative dialog	Question , control comments	Learner response and feed back	Proactive	Practical work
Human Human	Queries predicting hypertext	Comments, knowledge building, question	Learner response and feed back	Coactive	e-mail
Learner Computer	R e a l t i m e responding predicting hypertext	Questions simulation and games knowledge control comments	Learner response and computer feed back	Proactive	Multi media
Human Human	Queries real time responding predicting hypertext and cooperative dialog	Question control comments	Learner response and feed back	Coactive	Video countering
Human Human and Learner	Queries predicting hypertext and cooperative dialog	Questions simulation and games knowledge control	Learner response and computer feed back	Proactive	C.M.C

Computer		comments	feed back		
Human	Queries predicting	Question	Learner	Proactive	Face to
Human	real time responding	knowledge balding	response and feed		face
	cooperative dialog	control comments	back		
Human	Queries predicting	Question	Learner	Reactive	Telephone
Human	real time responding	comments	response and feed back		Tattering

# 7. Conclusion:

Each media support different mod of interaction, and different pedagogical aspects, this variation of interaction and pedagogical aspects sustain designer to the accomplishment of meaningful plan depends on the situation and strategy of institution and learning support.

We conclude that there are a difference between using printed and electronic media at open and distance learning. These differences can be summarized as follows:

1- electronic media has more interaction than printed material.

2- sometimes, at electronic media such as web page the other electronic media are updated and distributed quickly than printed material.

3- the printed material is portable ( , ). Ten years ago electronic media is not a portable media but now with the evolution at electronic media specially, at hot point, laptop and PDA the electronic media become a portable media.

4- with using printed material we can present information with word, illustrations and diagrams, where with using electronic media we can added motion to make animation and piece of video.

5- at printed material telling story with using word, illustrations and diagrams, where with using electronic media we can use audio and visual, as well.

There are many differences between printed material and electronic media, but the best way lies in making balance between printed material and electronic media to containing deferent type of media such as: audio cassette, printed material, CD Rom and using CMC program or video conferencing for discussion of the content and social interaction with using chat.

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#### **Technology and Education: The Constructivist Perspective**

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#### Abstract

In today's business and academic environments, students are expected to learn and master many new skills in short time periods of time and to cross cultures without leaving their desks. The change in education and the way in which people learn via technology has been rapid. In addition, there has been a prompt explosion of instructional computing tools. The as the standard of technology changes so does the need for electronic classrooms and the ability to connect to others becomes more and more the norm. For example, even outside of the business and academic arenas the medium of "cyber-communities", "bloggs" and "e-communities have surfaced. As innovated technology develops, the rise of "open-source" and lower costs, training on their use is essential for effective implementation and the maximum use of the new technology that is available to enhance learning and build cultural bridges. The question no longer exists weather the Internet and instructional technology can be used to transform or upgrade current human knowledge about a particular subject matter or if students can learn by employing technology but rather how can new "learning opportunities" via the medium of technology best be assimilated into existing curriculums. What are the best practices to heighten quality, efficiently and instructional design to enhance learning? Although, the price of technology has come down and in some cases the global standard of technology has grown and developed rapidly the concept of training within the sphere of technology itself is still lacking. The variable of authentic learning surfacing within the environment of an e-classroom is bona fide several factors such as what is outlined below should be implemented. This paper focuses on the assertion that the above-mentioned components are key in the birth of learning within the environment of the e-classroom. *Keywords: Learning, constructivism, e-learning, pedagogy technology and education.* 

#### INSTRUCTIONAL TECHNOLOGY & THE FUTURE OF THE CLASSROOM.

The intention of this paper is to examine what is required to introduce successfully new instructional technology in the arena of the development of learning. While many traditional educational training programs are experimenting with educational technology to meet both training and educational needs, many are also failing because they are not fully examining the range of educational perspectives when applying educational technology as a teaching or training tool. The need for the successful implementation of any educational program, especially the innovations within e-learning environments, must include a genuine pedagogy in order for authentic learning to flourish (Dede, 1999). Given the evolution of learning via technology the struggle to accomplish a legitimate "learning" perspective from the initial implementation of any educational technology as the primary teaching or training tool becomes fundamentally obvious. Without any bonafide educational pedagogy in place for an educational environment, the idea that authentic learning can occur is dismantled (Bruner, 1963, Brooks, 1997 & Dede, 2004). As the demand of educational technology is growing as market pressures drive the need

for more effective learning solutions. In addition, the increasing popularity of e-learning presents significant new challenges. One of the most important challenges is the fundamental creditability of authentic learning. Although the field of educational technology, presents rich and expanding tapestries, the launch of more and more technology rich educational environments, initiatives and the understanding of best "educational" practices are evolving even more slowly. As educational technology is rapidly integrated into the fundamental educational domain, many educators are experiencing a transformation in the ideology of "best-practices", as they once knew it (Dede, 1999; Brookfield 1996; Daniel, 1998; Davis, 2000; Dobbs, 2000 & Eastmond, 1995). Although technology has influenced methods and practices in almost alleducational institutions (Balestri, Ehrmann & Ferguson, 1992), traditional pedagogy should still be used as the foundation for all educational practices (Bopry, 1999). Educational pedagogy can and should be employed in order to ensure educational technology programs to be both creditable and successful.

The concept of utilizing technology in an educational environment is not a new. For example, in Jerome Bruner's book, entitled The Process of Education, technology is defined as "aids to teaching." Bruner develops many ideas that can be directly applied to implementation of authentic e-learning. Although written in 1963 (which to many intertwined in educational technology specialists seems a lifetime ago), one chapter out of six in one of Bruner's classic books on educational theory is dedicated to the concept of learning through implementing aids to teaching. Bruner claims that if implemented correctly, powerful teaching aids in the form of any technology can be a robust asset to any educational process (Bruner, 1963). This can certainly be applied to the case for e learning; if implemented correctly and successfully by educators; online technology can be acknowledged as a valuable component in the planning and delivery of teaching and learning (Papert & Turkle, 1993 & Dede, 1999). In its broadest and most general definition, educational technology (i.e., Internet, Intranet, Blackboard, Outlook, and an array of others) is simply a set of tools that educators can utilize to collect information, influence learning and communicate ideas with colleagues and students (Dede, 1999). In its most narrow definition, educational technology can be used in classrooms to provide educators with technology to successfully accommodate the current high tech demands upon a classroom (Papert & Turkle, 1993 & Dede, 1999). Where it is defined most specifically, both the private and the public sectors alike are still rapidly embracing educational technology. Yet, in between, one may find concepts and models of educational technology that suit the needs and philosophies of a wide range of program planners, educators, and students. Upon thorough examination of each definition, the concepts that educational technology is simply a tool or an aid to learning is readily apparent (Papert & Turkle, 1993 & Dede, 1999).

Nonetheless, those educators, which adopt the constructivist philosophy, can easily be assured that educational technology is helping to reach the educational goals that must be achieved by teaching them through instruction that encompasses cognitive learning theories (Brooks, 1997). Although, some educators query the relative effectiveness of different technologies, including educational technologies, using the constructivist learning process—whether at a distance or in a traditional environment—one can

successfully apply the "no significant difference phenomena" when questioning and implementing technology. According to Thomas Russell's "no significant difference phenomena," the learning process is stable or heightened when technology is implemented in the process of education. Russell has compiled a bibliography of over 355 research papers – dating from 1928 to 2005 – that claim there is no difference in the learning process, no matter what technology is used, including the Internet. In other words, "remote mediated learning," when combined with appropriate contact from live instructors and peers, can be at least as effective – and significantly less costly per unit – than traditional lecture and research models (Robertson, 1998 & Sammons, 1998). Evidence and best practices in educational technology confirm that the mode of delivery is not itself the major issue (Russell, 1996). Success hinges on individual motivation.

# THE SUCCESS OF THE CONSTRUCTIVIST THEORY IN PRACTICE.

The most important factor in achieving success in learning via educational technology has been the degree to which educators and support staff are able, by providing structured activities that utilize technology well, to encourage students to undertake responsibility for their own learning (Russell, 1996). This may mean simply determining whether educators have been satisfied with the learning experiences of their students (Robertson, 1998; Sammons, 1998), or if educational technology has established greater understanding or mutual understanding among classrooms — if the links that are created are maintained. In addition, it may also mean determining how educational technology can become a prevailing teaching aid for educators in the process of acquiring an education. Thus, society that uses Internet technology to train and develop human capital via educational technology has become extremely intertwined (Brooks, 1997). The hope and desire of corporations, government, educational institutions, and educators has been to implement and create learning through educational technology (Bopry, 1999; Cobb, 1999; Dede, 2004 & Dobbs, 2000). Because there is such a powerful push to implement this technology, the constructivist theory, one of the most traditional educational theories, can be implemented concurrently with many recent emerging Internet technologies (Brookfield 1996 & Brooks, 1997). This is largely due to the fact that three main themes are the foundation of the constructivism theory. One contends that that learning and instruction must encompass teaching and learning that is concerned with experiences and convictions, and that learning is built upon knowledge that the learner already possesses. Another state that interaction is structured so that it can be easily understood and modified by the learner. The remaining theory holds that instruction is designed to facilitate exploration and elaboration (Bruner, 1963). Whatever obstacles educators find when dealing with Internet technology, evidence that resources and efforts are causing a change in the foundation of education is in abundance (Brooks, 1997).

# VIEWS FROM THE CONSTRUCTIVIST.

The need to view educational tools through the guise of the most traditional educational theories, such as constructivism in current Internet implementation is justified and will be the scope of this research. Without this kind of "traditional inspection," implementing technology in any learning environment will fail to produce a successful environment where education takes place and learning is the priority (Cobb, 1999). As educational technologies become increasingly important and the number of users continues to grow at

a quickening pace, with educational organizations setting necessary and proper standards for all students to achieve, the constructivist foundation that many educators already adhere to can be excised.

Historically, the most common characteristic of the constructivist theory is that students should not sit passively in a chair and absorb the wisdom of others. Instead, according to the constructivist foundation, all members of the classroom are using complex and highly personal processes of analysis and synthesis, replete with trial and error, as they work to create a product (Maddux & Cummings, 1999). They are also attending to such subtle issues as the expectations of their intended audiences and an internal sense of satisfaction or closure. They are being challenged to ask thought-provoking questions, such as "What is my goal?" and "How do I achieve it?" Students need a special type of guidance that informs them without dictating what they should create. Furthermore, faculty members who already exercise the constructivism theory can easily make a commitment to design and implement Internet technology in the classroom (Brooks, 1997 & Cobb, 1999).

Through classroom use of Internet technology, students acquire skills they can use later in work and life (Brooks, 1997 & Cobbs, 1999). One may develop mastery of tools and processes, such as laboratory procedures for chemists, writing strategies for lawyers and journalists, or construction principles for civil engineers-all from utilizing the Internet. When students learn writing, artistic, and other skills in general education courses, they are developing habits and practices for use in later life (Balestri, Ehrmann & Ferguson, 1992). However, the Internet helps students to understand broad ideas and brings the world to their fingertips. For example, a student in a literature class may write her own poetry to gain a concrete understanding of language and expression. When this same student posts her poems to an Internet audience, her understanding of human nature may also be enriched through the ensuing critiques and conversations that occur via the Internet. In addition, educators may ask a student to post information on the Internet in a variety of ways, energizing the student and engaging him more fully in other elements of the course and with classmates. This effect comes from at least two sources: the empowerment that students feel when they create something personal and meaningful, and the pleasure of working on a team, which maintains the goal of engagement and collaborative learning, both of which are fundamental tenets in the constructivist theory.

Furthermore, even some of the most traditionalist educational icons such as John Dewey might have supported this type of constructivist foundation in e-classroom environment. Dewey's fundamental philosophy continues to suggest new ways to conceptualize education. This is because the backbone of his educational theory maintains the idea that the value of "experience" as a learning tool must be fostered in every learning process. In particular, his insistence on "trying" or "undergoing" as the source of knowledge can help guide educators towards more scientific thinking about, and evaluation of, the uses of instructional technology (Chung & Hoffman 1998; Davis, 2000; Gillette, 1996 & Hanna, 1998). For example, manufactures and software developers are already following the constructivist theory lead. They don't even bother in many situations to provide detailed instructions for their products. Users are already expected to learn by doing. If the user gets stuck and cannot solve the problem on his or her own he or she is simply

Learning how to learn does not occur simply as a result of knowing how to use a computer to access information; open-ended searches are a useful and necessary tool (Brooks, 1997; Cobb, 1999; Robb, 2000 & Sammons, 1998). Because the technology is nonlinear, and its contents evolve all the time, the logical thinking that helped previous generations solve problems doesn't work well in the electronic environment. Logic is only one limited tool for finding answers; intuition and experience play a critical role as well. Needless to say, technology can be supplemented to produce clarity and concrete embodiment in learning, while it can simultaneously serve as a variety of rich educational tools. Bruner (1963) finds that the common purpose of technology, regardless of its design, is to ensure that learning takes place. In order for learning to take place successfully, Bruner's theory emphasizes that there must exist a process of education that creates and implements a conceptual environment.

Constructivist models have emerged from the works of developmental theorists such as Bruner, Piaget, and Vygotsky. There are, however, two major strands of the constructivist perspective. One is called the "cognitive" constructivist; it adopts the works and conclusions of Bruner and Piaget as the foundations of its principles. In this theory, students construct their knowledge of the world through assimilation and accommodation. Within the field of educational computing, the best-known cognitive constructivist theoretician is Papert (1993), who characterizes behavioral approaches as "clean" teaching, and constructivist approaches as "dirty" teaching. The contrast emphasizes the difference between perspectives that isolate and break down knowledge to be learned (clean) versus approaches that are holistic and integrative (dirty) (Papert & Turkle, 1993). Intertwined together, at some level both "clean" and "dirty" approaches serve as the authentic foundations of the constructivist theory. By considering these approaches together, we get a clearer understanding of how Internet technology, when integrated into any classroom, can be used to create successful learning environments.

For example, because students must construct or build their own realities, they need multiple representations or views of a concept or issue. A computer simulation of life in a particular culture, for example, might provide multiple representations by allowing students to take different roles, such as that of a worker, aristocrat, or ruler. A study of meteorology might involve trying to predict the weather as a meteorologist and playing other roles, such as that of a farmer, or other people who rely upon weather predications. All are examples of technology being used through the foundation of the cognitive theory to improve learning.

Moreover, there are many examples in which the constructivist theory has successfully been implemented with or around both learning and technology. Within the model constructed by Egbert, Thomas, and Fischer (2000), the Tigerlake Public School simulation is assessed through substantial research. The model mimics the following concept: if the constructivist theory is successfully implemented with and around technology, students learn authentically. In this situation, student-educators who are the

participants in this simulation learn by doing. This simulation offers a way to integrate field experience and alternative technology-based instruction, which combined can help to improve almost any type of student to achieve high levels of competence in technology. The Tigerlake simulation allows the 29 student-educators to interact in a learning environment where "rich" experiences could be achieved. The richer the experience, the richer and more indelible learning takes place. By presenting related practices in learning environments that are simulated, the participants are provided with a set of "experiences" to compare to the current problem or issue. The participants are able to simplify concepts in order to make them understandable, in order to build upon existing understandings of theory and apply it to practice. Again, even among student-educators, the constructivist theory, intertwined with technology, is successful in allowing the participants to gain a better grasp of applying theory to practice (Egbert, Thomas & Fischer, 2000).

Although the Internet is a great source of information, its incredible potential as an environment to support constructive learning is generally overlooked. The example of the Internet alone as a powerful constructive high-tech tool highlights the foundation of the constructivist theory. This is because the Internet enables students to immerse themselves in stimulating, challenging, motivating, vibrant learning environments that provide a context in which computer literacy develops, not as a goal, but as a requirement, which enables students to achieve much higher goals. The skills and attributes of successful professionals of the future include, but are not limited to, creativity, problem solving, global awareness, respectful skepticism, cooperation, responsibility, independence, self disciple, ethics, systems thinking, and conventional and technological literacy (Lewis, Orton, 2000). Each of these attributes is a trademark of the constructivist perspective at work. Although the Internet is presently in its infant stage, if used to engage students in meaningful learning, it has the potential to transform education, as we now know it.

Progress in the field of technology and education, as evidenced by the literature, has been accomplished in stages. During the rapid growth in technology in 1980s and 1990s, a considerable amount of work has been dedicated towards the integration of technology into the classroom. However, much of the work has revolved around the conceptualized models of constructivist pedagogues. Furthermore, Papert & Turkle, (1993) points out that a great deal has been written about the use of technology in the classroom via constructivist methodology. It is Bruner, however, who believes that, regardless of the manner in which technology or "educator aids" are implemented, and they must be done in a way that allows educators to implement a successful learning environment. This premise is echoed by many, including Balestri, Ehrmann, and Ferguson (1992), Brooks, (1997), Byhman (1996), and Grabe and Grabe (1998).

As a result of this research, as well as the utility of the Internet, many new pieces of educational software based on behavioral theories of teaching and learning are announced each year. However, the end of the 1990s based a significant percentage of the more innovative educational computer programs based upon constructivist theories. The face of educational software changed dramatically. For example, PI\_ style software is linear

(Balestri, Ehrmann, and Ferguson, 1992), which means that students begin at the starting point of a lesson and progress, systematically, to its conclusion. In the late 1980s, linear instruction with the capability to correct errors, by constructing frames that divide information into hundreds of small bits, tell and test sequences, and long lists of behavior objects, lost its luster and usefulness (Balestri, Ehrmann, and Ferguson, 1992). Many innovative programs today are nonlinear. Students make many choices about what they will explore and in what sequence different aspects of a topic will be studied, all of which follow the constructivist learning theory. With the implementation of technology in education, as long as it is in the guise of the constructivist learning theory, better, more successful, and more enriching learning can take place.

Although many educators think that implementing the most high tech tools is the way to maintain successful educational practices, others bow to traditional theories. What is obvious is that many of the constructivist theories can be successfully implemented when intertwined with current Internet technologies. What seems to be needed currently is an understanding that the constructivist approach to learning can be implemented with the Internet, and if done so properly can be highly successful, taking educators and students where they have not been able to go in the past. For example, when students are actively engaging in Internet technology and implementing projects in such a domain, they are simultaneously actively engaging in the learning of knowledge, within that domain. Students building artifacts on the web are creating creditable sharable externalizations of their knowledge, which provides both motivation and opportunity to exercise metacognitive skills. As a result, students gain the ability to learn simply by applying the constructivist theory to their success factors when using the Internet.

A passive view of integrating the Internet into education may only support instructions and techno-centrism (Papert & Turkle, 1993). Educational Internet resources will change this approach by allowing students some degree of autonomy in choosing their path of learning via computers. The Internet alone cannot produce "good" learning, however "good" learning can occur through successful implementation of the Internet (Papert & Turkle, 1993). Educational institutions are the gatekeepers when it comes to implementing ways in which authentic thinking and learning are fostered. For the successful integration of technology in education to take place, these institutions must provide the environment and framework, in addition to the resources and hardware. For instance, educational institutions have the ability and power to communicate a piece of instruction about fractions by using the Internet as a channel through which students engage with fractions by constructing something personal. This said, Internet use would sometimes, perhaps often overlap educational techniques that use materials such as Cuisenaire rods, fraction bars, or pattern blocks.

Two key elements of constructivism can be implemented. The first is the emphasis on developing new kinds of activities in which students can exercise by doing, learning, and thinking. The second is the special emphasis on project activity that is self-directed by the student within a cultural and social context that offers support and help in unobtrusive ways. Therefore, in nearly every Internet practice, the constructivist theory can be

applied successfully. Regardless of the fact that the theory itself was born before the Internet, the constructivist idea can be implemented using it.

# THE CONSTRUCTIVIST CONCLUSION.

When technologies are used as constructivist tools, it is often assumed that the educational process must and therefore will change. This might mean that schools or even individual classrooms will need to reform the educational processes they traditionally practice in order to enable the use of technology. Educators are coming to realize that, in order to evaluate authentic learning, the use of authentic assessments must be implemented. Thus, the method in which educators improve performance through the implementation of technology must adhere to certain conditions and conform to practices that will yield success. In order for students to learn through the use of technology, educators must accept a new model of learning. Traditionally, educators' primary responsibilities and activities have been focused upon direct instruction of students, where educators are the purveyors of knowledge and students the recipients. In other words, educators teach students based upon what they know and how they interpret the world, according to textbooks, experiences, and other resources to which they have been privy. Educators are ideally hired and rewarded for their content expertise. This assumes that they know the world in which they teach, they are accurate in their teaching, and should be emulated by students. Students take notes on what educators tell them and try to comprehend the world as their educators do (Sprague & Dede, 1999).

Learners will not be able to construct their own meaning and manage their own learning if their educators do it for them. Likewise, misinformed educators will disrupt the learning process. As the demand for online learning is growing, market pressures drive the need for more effective learning solutions. The increasing popularity of educational technology presents significant new channels in which students will need to learn. However, the challenge of fostering and implementing a "well-designed" educational technology program will continue to be an objective. The constructivist pedagogy, if implemented authentically in an educational technology rich environment, has the unique ability to create an atmosphere where students can learn genuinely. This is because students can and will learn by practice, from mistakes, through trail and error, and through feedback from their educators and peers, all of which represent the fundamental backbone of the constructivist theory.

The representative issues and online learning concepts of this literature review are derived in a large part from the theoretical constructs and practical applications of online learning as it has evolved, and as it continues to evolve. This literature review provides documented evidence that there is a need for an authentic pedagogy in the foundation of educational technology arena to allow students to learn in both effective and ineffective educational technology environments. The intention of this research is to fill that void.

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