

The Top 10 Global Trends in ICT and Education

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It is a pleasure to be back here. My name is Robert Hawkins. I'm with the World Bank and I had the pleasure of being at the first LINC conference, seven years ago, and it's great to be back. I have spent the interim with the World Bank in our South Africa office, working on science, technology and innovation with a focus on education and ICT. I'm going to share with you a paper that I wrote recently around ten global trends that we've seen throughout the world in ICT and education.

The first one is mobile learning. I hope everybody has their cell phones off and are not using them right now. Beyond cell phones, we also look at smart phones, iPads, netbooks -- the proliferation of devices that students and teachers can use to bring knowledge and information directly into their hands. These statistics are well-known: four billion subscribers, 2/3 in developing regions. An incredible growth in this technology, particularly in the poorest parts of the world, with a billion new cell phones produced every year. The iPhone alone already has 150,000 apps, which provide a large amount of educational content. So the question becomes: what happens when these devices get into the classroom? There are a number of pedagogical techniques and strategies for optimally using the cell phones, and let me take a look at one now.

[Watching "Angry Professor" YouTube video in which a classroom professor smashes a student's ringing cell phone]

OK, so that's one technique for integration of technology into the classroom! Perhaps there are other uses of the mobile phone for learning, and perhaps we should re-think the definition of the classroom. Indeed, probably the best examples of the use of this technology have been out of the classroom: 24/7 information access to support wherever, whenever learning; a data collection and sharing tool; and for delivery of traditional lectures over podcast. Many of these applications are not well suited for lecture-style presentation in a classroom. They are suited for a more active, out-of-classroom experience. Here are two examples of the kinds of applications being developed: (1) a walking tour through time, allowing you to download historical maps to physical locations where you happen to be and listen to an audio tour of a city; and (2) being able to send a text to a Wikipedia linked site with questions and receiving a text answer back on your cell phone. The latter is being piloted in South Africa.

The second trend that we see is around cloud computing, and again, what do we mean when we talk about cloud computing?

[Watching "Cloud Computing" YouTube video in which software engineers describe cloud computing as "magic"]

So our second trend is magic! The magic of cloud computing. Cloud computing has a number of useful applications for education. One is particularly relevant in developing countries where capacities are thin. It supports the first trend, which is the proliferation of cheaper devices for mobile learning, where less power in computing memory is needed. It also allows for third-party services and technical support, that is decentralized IT support – reducing the need for technical expertise in a specific school or location. It is device- and location-independent. In terms of developing countries, where capacities are thin in terms of technical support, being able to move that support to a third party is extremely useful and cost-efficient. The challenge is ubiquitous connectivity. You need to be able to connect in order to use the cloud. There are also the issues of privacy and control-of-content concerns.

The third trend I want to share is one-to-one computing, and when we talk about a device-- this could be, again, a smart phone, a netbook, a tablet PC, an XO-- they are becoming many and varied. One example is in Uruguay, one of the first countries to put computers in the hands of children at a massive scale in all primary schools. The program is called Plan Ceibal. There are around 380,000 XO laptops with primary kids throughout the country. They started this program not in the urban cities such as Montevideo, but in the rural areas, and moved towards the capital. They look at this program not just as an educational program, but as an opportunity for societal change. They've opened up the schools as resource centers to the community and are encouraging the sharing of the knowledge with families and parents when the students go back home.

Some of the early evidence has shown that eight-year-olds are acquiring the same level of technical literacy as eighteen-year-olds, and that it is really questioning what might be called a 'hidden curriculum of discipline.' When you put this many computers into the hands of kids in every school in a country, there is a certain amount of chaos that ensues. I think one of the main challenges that the Uruguayans are grappling with is bringing the teachers up to speed with the advances and the capacities of the students.

Obviously there is the cost issue. There is the impact. There still isn't a lot of good data around the impact of ICT in education, particularly one-to-one computing, and the down-road issues of e-waste. One of the most important things, though, is the need for a comprehensive plan-- the need to look beyond just the hardware, to look at the teacher training, the content integration, and what Uruguay is doing in terms of opening it up to the community as well.

The fourth trend I want to share is this idea of ubiquitous learning. Through the first three trends, we have opportunities for just-in-time learning, peer learning, informal learning, learning through mentors, virtual learning, deeper learning, self-paced learning and being able to go into topics at a much deeper level than possible in an ordinary forty-minute classroom. There are examples around the world. In Korea, they have developed a digital textbook geared towards helping students when they go back home. The private tutoring industry in Korea is massive, and one of the issues they want to look at is ways

to help support families to get that private tutoring after school hours on a more cost-effective basis through the use of technology.

The fifth trend I want to share is smart portfolio assessments: different ways in which to assess how we learn and how we measure learning. As I was flying over last night, I picked up a *Forbes Magazine*. This information is so just-in-time, it hasn't even happened yet. So, a *Forbes Magazine* published June 7, 2010, has the front page article, "What Schools Can Learn From Money Managers." One of the interesting quotes was: "Innovative schools collect data, look for small changes, intervene quickly, and move resources to the formulas that work." So more schools are adopting some of the techniques of businesses -- like Walmart-- to be very focused on data - understanding data, analyzing data, and using data to adjust their pedagogical methods.

The collection, management, sorting, and retrieving of data will help teachers to better understand learning gaps and customize content and pedagogical approaches. Moreover, the concept of a portfolio as a collection of your learning-- as opposed to a single examination-- provides opportunities to measure the progress of the learner. Tools are increasingly available to students to gather information in one online portfolio, and to aggregate information wherever they might create it - whether it's a Tweet, a blog post, a photo, an online service, et cetera. Then these services can be peer-reviewed, assessed by a teacher, a mentor, parents, et cetera. It is opening up the scope of people who are able to assess the students.

There is another example, in a magazine coming out this June. *Wired Magazine* has an article on Pixar. "How It's Done: Inside Pixar's Creative Magic." I think Pixar is interesting in that they are at a place where many companies would like to go. They'd like to create a company that is creative, entrepreneurial, interdisciplinary, and takes innovative ideas and creates something new. One of the interesting quotes out of this article was that Pixar's philosophy is all about failure, that screw-ups are an essential part of making something good. That is why their goal is to screw up as fast as possible. So the question is, should our schools be as draconian in our pass-fail attitude towards assessment, or should we look to help students screw up as fast as possible and fail much more often?

Assessment to accommodate this, which is a good thing, is increasingly moving toward a more frequent, formative assessment, which lends itself to this real-time data collection, analysis, and reaction, and less on the high-pressure exam as the mark of excellence. A couple of questions here: 1) Should failure be seen as essential in our schools? That is, the concept that you don't really know how much you've pushed yourself until you fail. Should this be an objective of how we try to teach our students? 2) Should failure actually be eliminated from our lexicon? If you look at some of the statistics around the world, particularly in Africa, four out of ten students don't move on to secondary education. Of that cohort, less than 25%-30% complete junior secondary education. And of that cohort, less than 15%-20% complete senior education. This is a system where the majority of the students fail, and not in a good sense. In terms of looking at our global education system, we're excluding huge numbers of minds from a formal system that

could potentially be co-opted with different thinking about assessment and ways in which to address the learning needs.

Let me move on to our **sixth trend**: personalized learning, which feeds off the fifth trend. Education systems are increasingly able (through technology) to better understand students' existing knowledge base from prior learning. Teaching can be tailored to address both learning gaps and learning styles so that teachers and schools can more adequately adjust the learning-- content, pedagogy-- to the student needs.

This focus transforms a classroom from being one that teaches to the middle -- which most of our classrooms do -- to one in which the individual, strong or weak, is the focus, teaching to his or her needs. A number of schools are beginning to look at this issue. Achievement First is a charter school in New York that looks at K through 2 students. They give them a reading comprehension test every six weeks, and individual students are given extra lessons based on that test. The School of One is a program that looks at different pedagogical methods to provide educational content choosing between computer instruction, traditional classes, remote tutoring. Some of the early scores on this program have been very positive. And then Wireless Generation is a company that helps with assessment system software to monitor student and teacher performance in Chicago, D.C., and Indiana. They are compiling information around effective pedagogies and techniques for teaching specific educational problems. We'll see more of this as school systems begin to use technology more effectively to collect and use data to tailor teaching to students and individuals.

The seventh trend is the redefinition of learning spaces. It is looking beyond the thirty chairs in a classroom, five rows of six, industrial style of learning, to a place where we open up spaces for more collaborative engagement between students and teachers-- learning environments that are collaborative, cross-disciplinary, and student-centered. We are seeing more focus on lights, colors, circular tables, individual spaces, open learning spaces, and areas that foster collaborative, project-based learning. Summarizing the challenge as: how do we make our schools less like prisons and more like art galleries?

The eighth trend is around teacher-generated open content, and MIT is one of the pioneers in opening content to the world. This trend is gaining momentum at the individual teacher level throughout the world. School systems are increasingly empowering teachers and networks of teachers to both identify and create learning resources that they've found most effective in the classroom. Being able to tailor what you know best and being able to deliver that to your students is a common theme. Also, the idea of remixing content-- there are many online texts that allow teachers to add, edit, or otherwise customize material for their own purposes, so that their students receive a tailored copy that suits the pace of the course. One company that is doing this is Flat World Knowledge, for instance. This approach is also a good service as a teacher-training tool. It provides an opportunity for teachers to collaborate, share information with each other, and learn with each other, thereby creating collaborative networks and communities of practice. Obviously, there are copyright issues that challenge our

traditional notion of copyright, and these are continuing to evolve, through Creative Commons licenses and others.

The ninth trend is the concept of teachers as managers or mentors. When the classrooms change with technology, when teachers are asked to deliver personalized training, when teachers are asked to think about the student as an individual and look at his or her own strengths and weaknesses and learning styles, when education becomes 24/7 -- then the role of the teacher goes beyond that of just a lecturer during a forty-minute classroom period. It becomes one where he or she becomes an instructional manager, helping students to find their individual learning pathways and to identify creative and relevant learning resources. The teacher's role includes creating collaborative learning opportunities with students and providing insight both during formal class and outside of this forty-minute class. This is the toughest part. Obviously the teachers are key to any successful education reform. Teachers are traditionally very conservative, and it is a challenge to change the approach of teaching and the way teachers interact with both knowledge and students. More energy and effort need to be spent on the humanware of ICT in education.

The final trend I want to share is one that we've been experimenting with over the past few months at the World Bank around the idea of gaming and how games can be used as pedagogical tools. When I introduced this to some universities in South Africa, the first reaction was, "Gaming! We don't want to bring gambling into the school!" So there was a misperception of what gaming actually was. The reality is that we are with a generation that has spent most of their lives, at least in developed countries, interacting with technology, interacting with games. Some of the statistics show individuals spending about three billion hours per week playing games, and that a young person spends around 10,000 hours playing games by the time she or he is twenty-one years of age. That is almost equivalent to the amount of time they spend in a traditional formal education system. Is there an opportunity to channel this energy into constructive thinking and learning? A genre of games called 'serious games' has emerged in attempts to address this issue.

I am going to talk about a game that we've created called Evoke. Evoke is a massive multi-player online classroom with over 19,000 students of all ages learning about social innovation with no teacher, no classrooms, and a fictional comic book set in the year 2020 as the center of the learning process. Getting this off the ground in the World Bank required some diplomatic skills! Obviously, this is something very new for the Bank, and it was an experiment that we were very interested in learning more about. But I imagine, if it's new for the Bank, it's new for other institutions as well, including your own, and it's been an interesting process. We've just finished the game last week and the evaluation and data are coming out, but I'll share some of the experience with you now. To give you a sense of the game, we start off with a trailer to kind of enthuse and engage students, which I'll play for you now.

[*EVOKE TRAILER* See 30:33 in video <http://techtv.mit.edu/collections/linc/videos/7596-the-top-10-global-trends-in-ict-and-education>]

So this project started as a response, when I was working in South Africa, to universities that had a number of service learning programs and were looking at ways to engage their students to think about community issues in a more creative, sustainable way. We began to introduce some concepts of social entrepreneurship into their curriculums. After a series of workshops and conferences, what they asked for was really an information sharing platform so that these educators -- who were working in isolation in the universities on community engagement, the forgotten third pillar behind teaching and research—would have a way to connect in a common framework, to engage their students in community issues. Instead of putting together a standard information-sharing website, we decided to create this game, which looked at a way to reach out directly to students, to get them thinking about community issues, learning about challenges around the world, and eventually coming up with an idea of how they would like to address a challenge in their community.

The numbers on the game have far exceeded our expectations. We originally expected about 5,000 students globally, or players globally, to sign up. We've had over 19,000 students, more than 2.3 million page views. The time that people spend on the site was higher than Internet averages, including the number of pages they looked at-- seven pages and about eight minutes per visit. We had around 177,000 unique visitors. And from this community, they created 25,000 blog posts and 4,000 photos, and about 1,500 videos were uploaded to the site during the ten-week learning course.

The idea of the course was that each week the students would learn about a different social issue -- whether it's energy, food security, or women's rights -- and they would engage in three missions. One would be an act, another would be a learning, and another would be an imagine mission. They would post the evidence of their work through these missions onto the site, as blogs, photos, or videos, and then the community would evaluate each of the posted contents across ten fields, from creativity to social impact to entrepreneurship.

Here are some conclusions from the game. One, they came. We wondered whether people would actually sign up for this, and again, the numbers exceeded expectations. Two, would people actually do anything? Would they work? And they did. As you can see from the amount of content that was created, they came and they worked. They also gamed. They had fun engaging in this type of platform. They also gamed the system. We had to adapt many times during the course of the ten weeks to prevent people from creating fake accounts and voting for themselves, or from putting up bogus information to get points. So there was a lot of gaming of the system.

They also helped each other. They collaborated with each other. They insulted each other. They yelled at each other. Any time you bring 19,000 people together, there is bound to be some social dissonance and discourse that is out of the realm of being polite. They

shared, they created, and they acted, which was really our ultimate objective. We wanted students not just to learn, but also to take action in the context of this game.

One interesting thing is that the players took on the game themselves and began to do activities that were outside of the original scope of the game. They created Wikis, they formed communities, and librarians donated time to help others do research in developing countries. They planted gardens. These are some of the projects that they worked on during the course of the ten weeks.

- Hope Phones donated old phones in developing countries.
- Working on Kiva – raising awareness of the benefits of microfinance
- Putting together a Wiki for EVOKE.
- An Our Farm network.
- Learning Centers for Afghan women.
- Evoke chat tests – ideas on bringing chat to EVOKE
- Seed – a sustainable living project
- Developing sustainable communities.

There are hundreds and hundreds of these projects created by the players during the course of the game. Now, what are the lessons we have learned? We wanted to look at narrative as a pedagogical device, with the concept that we remember stories and their lessons, and the importance of putting students in the frame of mind where they are heroic, capable of acting and doing incredible things. This was an interesting aspect of the project. About social networking, we learned that students who have spent a lot of time on social networks such as Facebook found this platform useful as an alternative community for talking about serious issues, things they otherwise wouldn't talk about on Facebook or MySpace.

In terms of assessment, we are looking at action-based learning, the objective to actually do something and at assessment, the effectiveness of peer assessment. These are things we're looking at in terms of the evaluation, which is under way right now. The evaluation is also looking at crowd-sourcing ideas, focusing students on real world problems and trying to leverage the community of 19,000 to find solutions.

We have found that the rule of Wikipedia applied to this game as well, the 90/9/1 rule, where 90% of the people were lurkers. They would read, they would make some comments, but they wouldn't actively engage in the game. You had about 9% that went through the missions and completed a minimal amount of the game, and then only 1% that were really heroic and completed every mission in the game. This is roughly the same as the community on Wikipedia, where you have 1% percent that are high-level contributors, 9% percent providing light contribution, and the vast majority of people reading and providing some comments.

We are also looking at the idea of redefining the notion of a teacher, looking at how the entire community can become the teacher, looking at the role of mentors to help students online, and then looking at a global community solving real world problems.

So again, to summarize some of these ten trends: decentralized, individualized, data-driven, 24/7, anywhere, empowered, multiple competencies, interdisciplinary, collaborative, learn, try, fail, review, relearn, try again, real, and global.

Thank you.