

The Role of E Learning in Integration of Basic & Clinical Medical Sciences, Complete Blood Count (CBC) E Learning Course , A Case Study From Kasr Alainy School of Medicine, Cairo University

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Abstract:

There is a great interest for integration of medical curricula because without conceptualization & unification of the separate subfields in medical education, further steps to apply medical knowledge to real life health problems are difficult. The use of e learning technology as a mode for delivery could be very effective to apply such integration. In this article, the development & implementation of complete blood count (CBC) e course is demonstrated as an integrated e learning course for first year medical students at Kasr Alainy school of Medicine.

Introduction:

Integration in modern medical curricula means abandoning the traditional discipline based discreet segmentation and isolation of teaching and learning activities within "concrete" silos. Integration seeks to break down the barriers between subject areas in order to provide students with better learning opportunities that will facilitate the development of knowledge that is relevant and meaningful to clinical practice, is deep and retrievable and which

is amenable to alteration, updating and development as a part of an ongoing process of lifelong learning [1].

Integration is described as both horizontal and vertical [2]. Horizontal integration refers to the provision of learning within the structure where individual departments/subject areas contribute to the development and delivery of learning in a meaningful, holistic manner. Vertical integration refers to combination of basic and clinical sciences in such a way that the traditional divide between preclinical and clinical studies is broken down. Therefore, basic science is represented explicitly in the curriculum within the clinical environments during all the years of undergraduate education and beyond into postgraduate training and continuing professional development.

Integrated curricula have been widely adopted, fuelled by dissatisfaction with the way basic sciences have been taught as individual disciplines with no clinical application and by growing recognition that traditional instructional modes no longer meet current demands for interdisciplinary inquiry and practice in medicine [3,4]. Cognitive theories of learning suggest that an integrated approach to education may have important benefits for learning and retention because it facilitates contextual and applied learning, and can promote development of the well organized knowledge structures that underlie effective clinical reasoning [5,6,7]. At the same time, integrating a curriculum is a complex process. It is differentially understood and experienced by students and faculty, and can refer to instructional method, content, faculty work or synthesis of knowledge in the minds of learners [8].

Although interest in integrated curricula is growing, reviewing literature has revealed that little attention has been paid to the potential role of e learning in the application of such integration. The aim of this study is to explore the experience of Kasr Alainy medical school in the adoption of e learning as a mode of delivery for integrated medical curriculum & dissertation of Complete Blood Count (CBC) e learning course as an example of such application.

National strategy & needs analysis:

After its official launch during the world economic forum in Sharm el Sheikh in May 2006, the Egyptian Education Initiative (EEI) was established as a public-private partnership between the Government of Egypt and the World Economic Forum's ICT community as a progressive model for reforming Egypt's education system. The EEI seeks to add value to the national education process in new and innovative ways, directly improving the quality of education. A major component of the EEI is increasing access to technology. Alongside equipping educational establishments with computers and related technology, the adoption of innovative teaching methods and employment of relevant ICT applications and digital content guarantee real and lasting results [9].

Online learning has gained popularity in the past decade; however, its use is highly variable among medical schools and appears to be more common in basic science courses than in the clinical clerkships [10,11]. The application of e-learning into existing medical curricula should be the result of a well-devised plan that begins with a needs assessment and concludes with the decision to use e-learning [12]. On the other hand, the use of technology in support of education is not a causal or engineered set of practices; rather, it requires creativity and adaptability in response to the specific and changing contexts in which it is used. While education, not technology, is the prime goal, outcomes can not be always predicted & risks have to be taken [13].

Kasr Alainy Medical School is one of the largest & oldest medical schools in Africa and Middle East. Established in 1827, it accepts about 1600 students annually. It provides a 6 year combined premedical-medical program leading to a Bachelor of Medicine and Surgery which is usually followed by a 1 year internship at the university hospital [14].

Based on the EEI, the policy of Kasr Alainy medical school was to integrate basic & clinical medical sciences & to get best use of

technology for medical education. The medical curriculum is divided into two parts; academic (first three years) & clinical (second three years). The academic years are concentrating on the basic medical sciences like anatomy, histology, physiology & microbiology. The clinical years include all clinical specialities, e.g. general surgery, paediatrics & internal medicine. Complete Blood Count (CBC) course is an example for such integration between basic & clinical sciences. It provides both the knowledge & the clinical application of blood elements. The students will know the different types of blood cells including their structure & function. Then they will know how to apply this knowledge in their medical practice to be able to interpret a CBC report & to predict a possible diagnosis from the findings of CBC.

Why is the course relevant for the target group? What is the motivation of the learners to take part in this course?

The course is targeting first year medical students. During first year, the students have a course about blood cells structure in histology & blood cells functions in physiology. The frequently asked question by students is "Why am I taking all this information about blood cells & how can I apply this knowledge in my practice as a medical doctor??" So, CBC course will be the way of integrating knowledge gained in histology & physiology by correlating the structure & function of each blood cell (horizontal integration) & then applying this knowledge to gain a clinical skill by interpretation of CBC report (vertical integration). First year medical students are curious to apply basic medical sciences they learn in the academic years into a clinical practice manner. Based on students' feedback, it has been the most interesting & motivating part of blood course in histology & physiology. It has increased students' motivation & retention for blood course.

The overall goals of CBC eLearning project:

The overall goal of the e learning project is to provide first year medical students the knowledge & skills of interpretation of

complete blood count (CBC) report which is a commonly used laboratory investigation in the routine daily work of physician.

The project has been started in June 2008 & ends in January 2010. The project is divided into three stages:

- Planning for 4 months (June-September 2008)
- Implementation for 14 months divided as follows:
 - a) Development for 9 months (October 2008-June 2009)
 - b) Testing of beta version of the course for 2 months (July-August 2009)
 - c) Running of the course for 3 months (September 2009-November 2009)
- Assessment for 2 months (December 2009-January 2010)

The main learning objectives for the course:

By the end of this course, each student is able to:

- 1- Recognize the parameters of CBC with the normal range values for each parameter.
- 2- Interpret the numerical values and write a conclusive comment.
- 3- Predict a provisional diagnosis

The mode of delivery:

CBC course is a blended learning course. It is a combination of face to face initial meeting for orientation with web based on line learning (WBT). This blended learning course is based mainly on e-learning with feedback & follow up through the traditional practical sections of Histology & Physiology courses. WBT was chosen as the main course format so we can ensure bidirectional interactivity, and can keep the content up to date. The learners have been supported by tutors during both face to face & online course.

The actual added value of digital learning material over traditional course material:

Actually this course is not present in the routine face to face lectures. The online course is a new course which integrates the knowledge of two separate subjects & then applying it as a clinical skill. The interactivities & communication tools are motivating for the students & help them increase perception & retention of this subject. The target group showed interest in both the mode of delivery & content. They are eager to have an e learning course as a new experience & they are motivated to learn a clinical skill in their first year of medical education. Dealing with a CBC report is a very common situation in a daily work of a medical doctor. In addition, the digital content of this course can be used as a reusable learning object (RLO) which can be used in other courses related to blood in different subjects taught during the different levels of medical education, e.g. internal medicine, surgery, paediatrics, clinical pathology, haematology, etc. The same can be applied for teaching content related courses in other health related medical faculties, e.g. oral & dental medicine, pharmacy, physiotherapy & nursing.

Interactive elements & communication tools:

The content of the course has a moderate degree of interactivity. There are animations, interactive graphics, video & automated self tests (**Fig. 1, 2, 3**). There are different types of communication tools in the form of forum, chat & e mail. The learners are supported by tutors during the whole online phase. They act as mentors & facilitators to support students in their in e learning experience. Then they are subject matter experts who support students with content related information. They are also moderators for the communicative & collaborative activities.

How progress is checked within the course?

- The students are supported by tutors who guide them & give feedback for the tasks & assignments.

- Self assessment questions are placed inside the lessons (embedded questions) & at the end of lessons to check progress.
- At the end of each module, a final quiz "official" assesses student's competence with the module.
- Individual participation & activities of students will be monitored through their tutors.

Challenges & opportunities:

Being a public institution & due to limited financial resources, most of softwares used to develop CBC e learning course were free & open source ones (FOSS) which included, exe learning authoring tool, Hotpotato for self assessment questions, Wink for animation, Photofilter for image editing & Moodle as LMS. FOSS was user friendly & the course content has been developed by medical staff who has some IT experience.

The integration of IT-Department in eLearning activities:

The IT department is responsible for the technical implementation process. After development of the course, IT technicians uploaded it in LMS (Moodle). They were also responsible for students' & tutors' enrolment, maintenance & technical trouble shooting during implementation process.

Evaluation & feedback:

Based on the evaluation of the course the following positive results were concluded:

- 1- Higher students' satisfaction & retention of subjects. They enjoyed the experience of new mode of delivery through e learning & the integration of district basic medical subjects as one course presented in the form of a clinical skill. Most of them asked for more e learning courses during different grades.
- 2- Higher level of interactivity has been achieved either between students & content, students & tutors, & students

& other students through collaborative work; hence the national problem of high population is reflected on the traditional face to face education in Egypt which represents a barrier of communication & interactivity especially between students & teaching staff.

- 3- Integration between different medical courses is easier & more applicable through e learning.
- 4- The tutors were satisfied with the experience as it allowed them to create & develop innovative teaching approaches. Time management as a teacher was more controlled than that of face to face learning. They got closer to their students & they could remedy their teaching skills based on students' feedback.

The following recommendations have been revealed:

- 1- Hiring of well trained IT specialists to develop more advanced tools & applications like simulations.
- 2- Training of a larger number of tutors to be compatible with the high student number.
- 3- Practical steps towards legal applications of e learning curricula as an official mode of delivery & assessment.
- 4- Sponsorship of research initiatives through collection of internal information about e learning, sharing ideas & innovations through internal & external forums, formation of committees with other institutions at the national, regional & global level.
- 5- Capacity building, professional development & training through offering diverse training workshops which explore interactive tools & the solutions they provide. Sharing of other case studies & success stories as consulting partners.

Conclusion:

E learning can play a major role for horizontal & vertical integration of medical curriculum but a proper needs analysis & planning is required to assure proper pedagogical use of such technology.

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Fig. 1: A screen shot from CBC course showing a short video demonstrating how to spread blood film

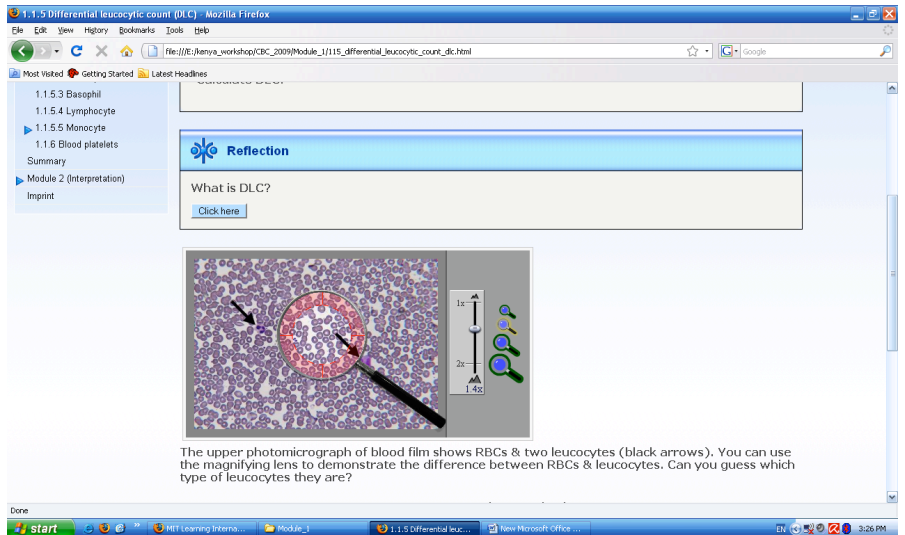


Fig. 2: A screen shot from CBC course showing interactive magnifying lens used to explore the different cell types of blood film.

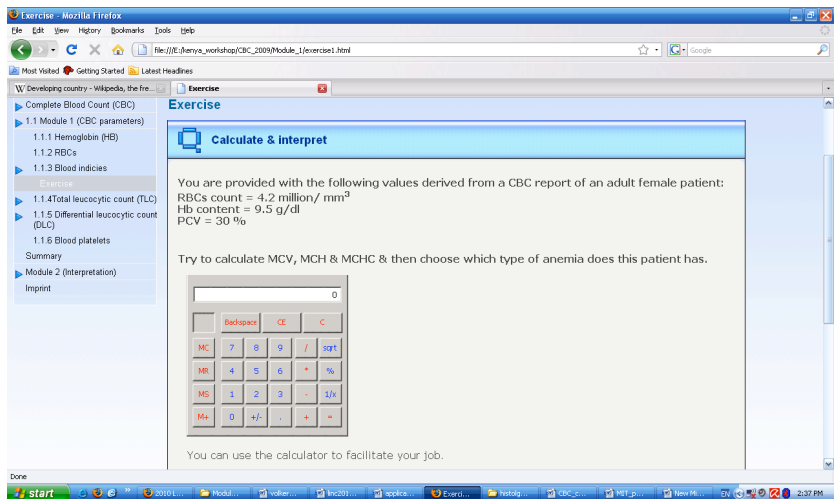


Fig. 3: A screen shot from CBC course showing interactive calculator used to calculate blood indices & then to diagnose the type of anaemia.