E-LEARNING, MOOCS, ONLINE BASED COMPETENCY EDUCATION, and M-LEARNING: IMPLICATIONS FOR CAPACITY BUILDING[1]

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1. OVERVIEW

This paper summarizes current thinking about e-learning, massively open online courses (MOOCs), online-based competency education, m-learning, and other e-resources. I will start with the reasons for why e-learning, discuss how e-learning can succeed, and highlight the recent technologies that promise successful e-learning delivery. Then, I will share some examples of MOOCs, competency-based learning, m-learning, and other online resources, including some cases from Afghanistan. I will close with a challenge to all of us regarding transforming capacity building or building capacity to transform education by a judicious choice of ICT technologies that is balanced with pedagogy and localized content.

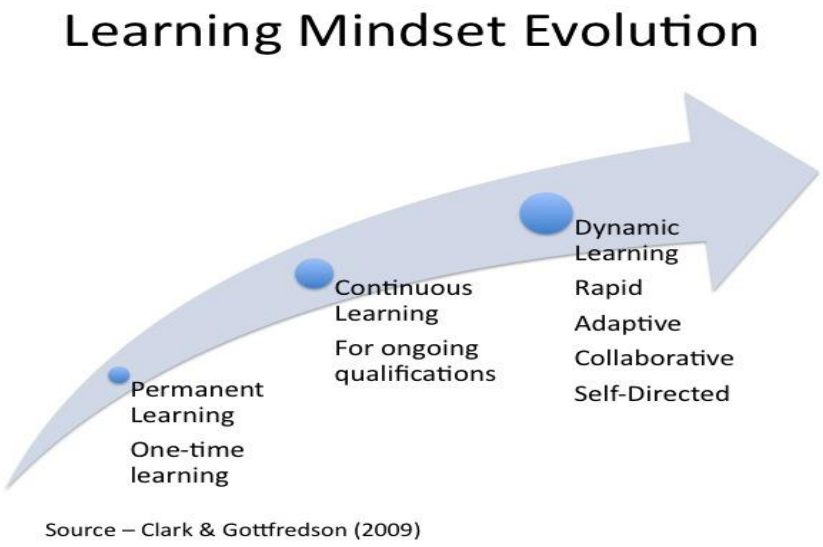
2. WHY E-LEARNING SERVICES FOR EDUCATION?

E-learning is defined as "the effective learning process created by combining digitally delivered content with (learning) support and services" (Waller, 2001). E-learning services for education respond to challenges faced by education ministries and institutions around the world along with the evolving mindset about learning. Education ministries and institutions are under pressure to: Provide education to all to meet the United Nations' Education for All Millennium Goals; Meet the increasing demand for quality education; Modernize educational systems and

[1] This is an updated version of the paper presented by the author at WSIS (2013) in Geneva while employed by Deloitte. The views expressed in this paper are solely those of the author and not necessarily those of Deloitte or WSIS.

practices that no longer serve the needs of today's students; Deliver more education for less financial resources; and, Address drop out, exclusion, underachievement, and unemployment and underemployment challenges. Alongside this pressure on education ministries and institutions, learning is evolving from permanent learning to continuous learning to remain relevant and towards dynamic learning that is rapid, adaptive, collaborative and self-directed (Clark & Gottfredson, 2009). See Figure 1.

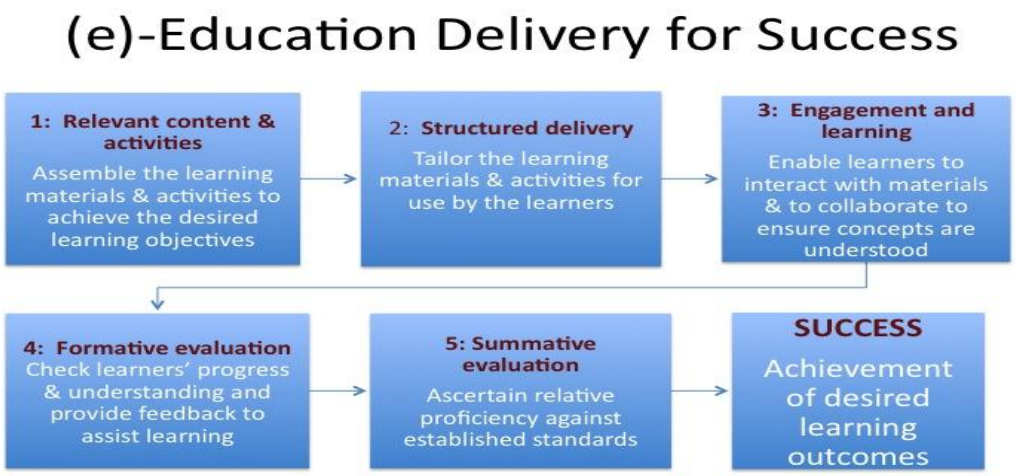
FIGURE 1: Learning Mindset Evolution



Source: Clark & Gottfredson (2009)

To be successful, e-learning delivery must demonstrate achievement of desired learning outcomes (see Figure 2). McKinsey & Company (2012) indicated that success in e-learning delivery requires 5 steps -- relevant content and activities needed to achieve the desired learning objectives, structured delivery of learning materials and activities, interaction between teachers and learners and among learners, formative evaluation to provide learners feedback while learning is in progress, and summative evaluation to ascertain relative proficiency against established standards (see Figure 2).

FIGURE 2: (E) Learning Successful Delivery



Adapted: McKinsey & Company. (2012) Transforming Learning through Education

3. TRENDING TECHNOLOGIES FOR E-LEARNING

The NMC Horizon Report: 2016 Higher Education Report highlighted the seven technologies for e-learning to watch during the next five years. These are (1) automation; (2)

augmented learning; (3) big data; (4) going for cloud; (5) gamification; (6) m-learning, and (7) personalization. Characteristics of these seven technology trends are summarized below:

1) Automation - automation will become a crucial aspect of both content creation and processing. Content providers will use an increasing number of automated solutions to create new courses and learning materials, coursework developers will use tools to scan course content, recognize what needs to be tested, and generate coursework elements, such as tests, quizzes and exercises.
2) Augmented Learning - Learners will be able to access augmented environments by means of QR codes or mobile technologies like Apple Watch or Google Glass. Learners will be able to engage with action-based functionalities in real life conducted by means of GPS tracking, as well as with courses developed by, for example, Oculus Rift.
3) Big Data - Tools made especially for big data analytics will help make sense of the user-generated information. The tools will help learning providers to be able to analyze data produced during any semester, deliver valuable conclusions about user performance or course content optimization, and better understand the learning process itself. The tools will allow better tracking of learners patterns and better feedback analysis that will help in personalizing courses and in compiling a comprehensive ROI report for learning.
4) Going for cloud - The use of cloud is on the rise. There is increased willingness to embrace the functionality, comfort and security of the cloud despite reservations about keeping data on public servers.

5) Gamification - Game dynamics will be applied onto non-gaming contexts, including e-learning. Gamification brings really good results, motivates learners to achieve their goals, and improves user engagement with learning materials.
6) mLearning – Through mobile technologies, learners will have access to knowledge at all times and places. Learners will benefit from contextual learning achieved through micro-location technologies (like QR codes, GPS and other) that will help learners contextualized learning.
7) Personalization - Personalization will grow at all levels of eLearning. The analysis of big data will address individual (and group) needs, preferences and requirements. Content developers will be able to tailor pedagogy, learning environments, learning tools and course curricula in order to motivate, engage and inspire learners to achieve better learning results with a shorter time period.

4. ILLUSTRATIVE EXAMPLES OF E-LEARNING

MOOCs (Massive Open Online Courses)

MOOCs are aimed at large-scale interactive participation and open access. Although most MOOCs provide free access to some online course materials, more and more courses are offered for a fee, and certifications, usually based on proctored examinations that are provided for a fee. Some courses are "asynchronous" and can be taken anytime, while other courses set start and end dates. Most offer interactive-user forums to build community but not necessarily interaction with the professor. A MOOC maybe taken for credit, based on participating university policies, including fees structure; it does not automatically grant a credit toward an official degree or credential although some universities accept transfer credits on some but not all

courses. Other universities and institutions have shared their courses online. These courses, along with MOOCs, could be useful as complimentary teaching and learning materials and not necessarily to do away with the in-classroom interaction. In Who's Benefiting from MOOCs, and Why in the Harvard Business Review, the authors claim there are now over 1 million people who have completed courses from Coursera alone, more than 100,000 people have certified completion from HarvardX and MITx courses. Their findings suggest that many of those who did complete courses derived career or educational benefits from the opportunity. Examples of online courses, including MOOCs are provided below. The descriptions are based on their websites.

1) Coursera <https://www.coursera.org/> is a for profit with Stanford roots. As of 3 February 2016, the Coursera website shows 1787 course offerings with 138 partners in 28 countries. According to their website, students watch short video lectures, take interactive quizzes, complete peer graded assessments, and connect with fellow learners and instructors. When students complete their course, they can apply for a Course Certificate (for a fee). Courses are open to anyone, and financial aid is available.
2) Udacity <https://www.udacity.com/> is a for-profit, also with Stanford roots but no university affiliation. Courses are offered as Nanodegree programs and credentials. Characteristics of the program include: Innovative online model that is accessible, affordable and inclusive; Intensive coursework, expert instructors, and cutting-edge curriculum; One-on-one coaching, best-in-class project review, and facilitated peer support; and Empowering and informative career support.

3) edX <https://www.edx.org/> is a nonprofit run out of M.I.T. and Harvard; with the University of California at Berkeley and the University of Texas system. Harvard offers some free online classes from Computer Science to Shakespeare for professional development, enrichment, and degree credit. Courses run in the fall, spring, or intensive January session. No application is required.
4) Stanford School of Engineering http://see.stanford.edu provides access to Stanford's most popular engineering course: the three introduction to Computer Science and seven more advanced courses in artificial engineering and electrical engineering. Stanford on iTunes University offers a collection of audio and video content from across the university < >.
5) Saylor.org http://www.saylor.org/educationlevels/university offers a full set of free Computer Science courses that lead to a degree; each course has the following information – purpose of course, course information, learning outcomes and course requirement. The courses include the following resources – readings, assessments, web media, final exam, and syllabus.
6) Khanacademy.org https://www.khanacademy.org/ provides access to videos in ten minute segments that teach K-12 math, science topics such as biology, chemistry, physics, and humanities.
7) Hippocampus.org http://www.hippocampus.org/ provides access to multimedia content--videos, animations, and simulations--on general education subjects, such as math, natural sciences, social sciences and the humanities to middle-school and high-school teachers and college professors, and their students. HippoCampus content can be projected during

classroom learning and assigned for computer labs and homework by teachers. The site can be used in the evenings for study and exam prep by students.

8) Udemy Free Courses <https://www.udemy.com/> – Udemy is an example of a site that allows anyone to build or take online courses. The site exclaims it has more than a million students enrolled in its courses. Most of the courses charge fees, with a few that are free, for example Java Tutorial for Complete Beginners.
9) UCLA Free Courses <https://www.uclaextension.edu/pages/search.aspx?c=free+courses> – Check out free courses such as their writing program that offers over 220 online writing courses each year.
10) Yale Free Courses <http://oyc.yale.edu/> – At Open Yale, the school offers "free and open access to a selection of introductory courses taught by distinguished teachers and scholars at Yale University. The aim of the project is to expand access to educational materials for all who wish to learn."
11) Carnegie Mellon Free Courses <http://oli.cmu.edu/> – Carnegie Mellon boosts "No instructors, no credits, no charge."

To summarize, while most e-learning providers offer open content, it is not all free and, faculty who wish to re-purpose the learning materials need to read the disclaimers, written permissions, and copyright statements. edX makes available Open edX, the open-source platform that powers edX courses.

Online Competency-based Education

Online competency-based education identifies explicit learning outcomes when it comes to knowledge and the application of that. According to Weise (2014), online competency-based education includes measurable learning objectives that empower students. Among the examples given by Wiese are: At the end of the course, a person can solve business problems by applying financial principles to; a person can write memos by evaluating seemingly unrelated pieces of information; or a person can create and explain big data results by using data mining skills and advanced modeling techniques. Online competency-based providers offer modules that learners can stack together for various and emergent disciplines. Examples of online competency-based education providers are:

1) College for America <http://collegeforamerica.org/about-college-for-america/> –Their competency-based degree programs help students master specific skills not just accumulate credit hours but also to achieve their degree.
2) Northern Arizona University < http://pl.nau.edu/> - offers accredited, self-paced online degrees centered on mastering competencies.
3) Western Governors University < http://www.wgu.edu/why_WGU/competency_based_approach#> - Students earn their degree through demonstration of skills and knowledge in required subject areas through a series of carefully designed assessments, such as take tests, write papers, and complete assignments.

Mobile learning (m-learning)

Figure 3: Mobile learning word cloud

The word cloud above shows the many meanings and assumptions attributed to m-learning. M-learning is referred to as a subset of e-learning; words associated with e-learning include educational technology, distance education, multimedia, interactive, hyperlinked, media-rich environment. Words associated with m-learning are spontaneous, intimate, situated, connected, informal, lightweight, private, personal etc. are used to characterize m-learning. E-learning is considered more "tethered" with lectures in classroom and in Internet labs whereas m-learning is mobile with learning occurring in the field or while mobile. E-learning is more text-based and graphics oriented, m-learning is more voice, graphics and animation based. M-learning utilizes mobile devices, including tablet computers, net-books, and digital readers, thus making communication between students and teachers, among students, and between students and experts more flexible. The mobile nature of m-learning poses the question as to whether learning on the go can in fact provide "deep learning." Current definitions of m-learning require a more systematic and more systemic approach (Laouris and Eteokleous, 2005). Moreover, Hamm and others (2013) ask us to re-imagine a pedagogy in a mobile context, that is, to use the "always-connected nature of mobile communications devices to rethink formal and informal education."

Several examples of m-learning are provided below to help to illustrate the innovative practices used in m-learning.

Tutor on Mobile is a Tata DOCOMO value added service. It provides anytime, anywhere learning in India. Anyone, any student can learn from experts. Content areas include math, physics, or chemistry lessons from the British Council. In addition, it contains content related to job preparation, personality development, interview tips, English speaking lessons, and career counseling. Experts can self-register to offer their expertise through one-to-one connections or through conferencing. The GSMA case study on Tutor on Mobile highlight the following benefits for students.

Access text, audio, and video information

- Receive alerts on short message service (SMS) and Wireless Application Protocol (WAP) for voice content on Interactive Voice Response (IVR)
- Read text-based explanations on specific topics and concepts
- Listen to recorded podcasts on various subjects
- View videos and other demonstrations on a various subject

Interact with data or with persons

- Respond to sample questions and practice tests
- Connect with subject knowledge experts through joining a live conference or through requesting approval for individual mentoring.

The Tata DOCOMO case example also demonstrates a business model where users pay to get access to knowledge created by content providers who generate revenue by the use of the service and get connected to experts who get a percent of revenue when conferencing is used.

Tata DOCOMO and its partner, Voicetap Technologies provide voice, hosting, platform and payments handling.

Paiwastoon/Ustad Mobile experimented with a literacy app on a pre-smart phone. Dawson (2013) clarified that while "it can run on smartphones, it's designed for use on simple feature phones, the kind most Afghans and most people in the developing world own." A key feature was alignment of the app to the Ministry of Education Literacy Book in Dari and in Pashto. The curriculum covered material for illiterate learners (unable to read/write) to learners at the Grade 3 literacy and math level. Chapters introduced letters, words, sentences; advancing from simple letters to reading comprehension. The Ustad mobile phone delivered: Audio/Video slideshows explaining the contents of each chapter from the book; Videos of writing letters plus words; and Questions plus exercises to test understanding. Ustad Mobile app was being offered as an open source resource. However, the experimental innovation has failed to scale-up.

Other examples are:

• Apple's 'Special Education' section in the iTunes App Store aims to reach out to over 5 million school children with cognitive or physical impairments in the US alone.

• Pearson has partnered with various colleges across the US to provide access to courses and learning materials.

• Project K-Nect in the US has claimed that mLearning has increased student proficiency rates by 30%.

Other Online Resources: Digital Libraries

Two examples of digital libraries that have been developed with Afghans in mind are the Afghan Digital Libraries <http://www.afghandigitallibraries.org/>and the Darakht – Danesh <http://www.darakhtdanesh.org/en>.

Based on the examples of MOOCs, online competency-based, m-learning, digital libraries, and other online or e-resources, the types of e- and m-learning tools can be mapped within the 5-steps framework of successful e-education framework suggested by McKinsey & Company (see Figure 2 on page 3). These include:

1. Access to relevant content: E-books, e-textbooks, e-courses, and other reference materials in text (updates and alerts), audio (podcasts) and video forms (e.g. youTube).
2. Structured delivery through a Learning Management System (LMS) and authoring tools, with data tracking tools, user generated content, forms and checklists.
3. Engagement and learning: Games and simulation based tools, collaboration tools, and Distance tutoring/mentoring/internships/social networking for performance support and on-the-job support.
4. Formative evaluation: assessment services, including quizzes, tests, surveys and polls.
5. Summative evaluation: test preparation, rubrics, and project portfolio assessment.

These different types of e- and m-learning need to be integrated and to be mutually reinforcing and need to follow universal Instructional design (UID) (see Table 2 below). For example, the equitable use principle recommends for online distance education to put content online and to provide translation when required, for m-learning the added recommendation is to deliver content in simplest possible format; the second principle, flexible use, recommends for

m-learning, packaging content in small chunks; and the third principle, simple and intuitive recommends simplify interface, keep code simple and use open source software.

Table 2. Universal Instructional Design (UID) Principles and M-Learning (Source: Villegas, 2012)

Recommendations for Inclusive M-Learning:
Source: Villegas 2012

UID PRINCIPLES	ONLINE DE Recommendations	M-learning Recommendations
1. Equitable use	*Put content online *Provide translation	*Deliver content in simplest possible format *Use cloud-computing file storage & sharing sites
2. Flexible use	*Present content & accept assignments in multiple formats *Offer choice & additional information	*Package content in small chunks *Consider unconventional assignment options *Leave it to learners to illustrate & animate courses
3. Simple & Intuitive	*Simplify interface *Offer offline & text-only options	*Keep code simple *Use open-source software
4. Perceptible information	*Add captions, descriptors & transcriptions	
5. Tolerance for error	*Allow students to edit posts *Issue warnings using sound & text	*Scaffold & support situated learning methods
6. Low physical & technical effort	*Incorporate assistive technologies *Consider issues of physical effort *Check browser capabilities	*Use available SMS readers & other mobile-specific assistive technologies
7. Community of learners & support	*Include study groups & tools *Easy to find links to support services	*Encourage multiple methods of communication *Group learners according to technological access and/or preferences
8. Instructional climate	*Make contact & stay involved	*Push regular reminders, quizzes, & questions to students

4. CONCLUSIONS AND IMPLICATIONS FOR CAPACITY BUILDING

MOOCs, m-learning and other online technologies coupled with pedagogical shifts and localized content creation have the potential to increase access, reduce costs and deliver quality education. Despite the disinclination for distance learning by Afghans, albeit pronouncements to the contrary, it might be useful to think of ways of making the resources contribute to Afghanistan's decade of transformation.

1. Openness is becoming a value -- not just for open source but also for open content, open data, and open resources, along with notions of transparency and easy access to data and

information. The Ustad case example offers the source code as a free resource so that other innovators from Afghanistan and elsewhere can build on it.

2. New models of education are competing with traditional models of higher education. Education paradigms are shifting to include online learning, hybrid learning, and collaborative models. MOOCs and m-learning are being widely explored not just as complimentary but also as alternatives and supplements to traditional university courses. Subject to disclaimers, copyright statements, and written permissions, it is possible for Afghans to re-purpose and localize these learning materials and activities to make the course more relevant to the Afghan situation while taking advantage of the up-to-date and world-class knowledge base.
3. College graduates who are entering the workforce require skills that are acquired more from informal learning experiences. The Afghan higher education institutions can design informal learning activities, including, internships, fellowships, mentorships, and service learning programs to augment the formal curriculum.
4. The role of educators is changing due to the vast resources that are accessible to students via the Internet. In some cases, the educator becomes more of a content guide. Afghan educators can help students become critical consumers of the e-resources and to add their own creation to the knowledge base.
5. Educational processes and practices limit broader uptake and faster adaption of information and communication technologies. Most faculty members are not using technologies for their teaching, their own learning, and their own research. Not all faculty members recognize the importance of e-learning as a key skill in their discipline

and profession. Students who generally adopt technologies faster than faculty will demand greater access to technology, content that is locally relevant but also recognized globally, and personalized learning.

The challenges for all of us are: How do we build capacity in order to transform? How do we scale up pockets of innovation? How do we engender partnerships and collaboration? How do we transform dependence on grants and pilots projects to commercial sustainability?

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