A Review of Challenges Militating Against Successful E-Learning And M-Learning Implementations In Developing Countries

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Abstract— **Research has shown that most of the challenges faced by tertiary institutions, in their quest for E-Learning implementations, in sub-Saharan Africa are infrastructural. High costs of limited Internet access, high costs of hardware infrastructure, and little or no implementation knowledge have been identified, amongst others, as major challenges limiting the successful implementation of E-Learning in developing countries. Therefore, there is a need to understand all challenges that have been found, and to some extent met, in developed countries as well as additional challenges, if any, that may be met in developing countries [1]. This paper, by means of an extensive and systematic review of related literature, identifies the major challenges to successful E-Learning implementations in developing countries. It identifies how M-Learning is being implemented and its propensity for widespread adoption.**

Keywords- *E-Learning, M-Learning, Learning Management*

I. INTRODUCTION

Increasingly, a number of universities worldwide including some in Africa are making positive attempts to implement E-Learning strategies in order to enhance equity, quality, share instruction technology resources, compete in the global environment of higher education and meet the rising demand for tertiary education. The main problems of Africa's tertiary education sector are compelling for the implementation of E-Learning strategies [2].

The benefits of an E-Learning system will not be maximized unless learners use the system. Frustrated by limited progress to date, educational agencies have recently sought to identify major factors impeding development [3]. Variables such as access to technology amongst others have been identified as challenges to efficient usage of E-Learning technology in developing countries. While E-Learning is not a cure for all the problems related to education in Africa, it is clearly a tool that now must be taken into serious consideration by policy makers and donors [4].

Part of the challenges facing developing countries in their quest for E-Learning implementation are infrastructure challenges. In Sub-Saharan Africa, there is still limited internet connectivity, the cost of connectivity, where available, is high, and there are intermittent power disruptions [5]. However, the emergence of mobile technology is an asset Africans can count on.

The availability of mobile and wireless devices is enabling different ways of communicating. Mobile communications are no longer restricted to companies that can afford large investment in hardware or specialised software. Individuals now have easy and inexpensive access to mobile telephony, and the cost of mobile access to the Internet is steadily reducing. Mobile technologies have enabled a new way of communicating. This is typified by young people, for whom mobile communications are part of normal daily interaction, who are 'always on' and connected to geographically-dispersed friendship groups in 'tribal' communities of interest [6].

The advent of mobile technologies has created opportunities for delivery of learning via devices such as Personal Digital Assistants (PDAs), mobile phones, laptops, and PC tablets (which are laptops designed for a handwriting rather than a keyboard interface). Collectively, this type of delivery is called M-Learning. Organizations of all sizes are using mobile devices for learning because technological advances have ensured that there is no longer the need for large infrastructure and support costs, and even small enterprises can deliver mobile learning simply by structuring learning around Web-based content that can be accessed from Web-enabled mobile devices [6].

II. REVIEW OF LITERATURE

Young people do not experience geographical place and time as barriers [7]. Reference [7]'s research found that although some older learners used their mobile phones to arrange face-to-face meetings to work on assignments or discuss learning issues, younger learners were more comfortable with the thought of using mobile phones for learning, and almost half (45%) of the research group were prepared to use Internet-enabled telephones as their only tool for learning. The challenges of creating learning to be delivered via mobile phones are not easily solved by teachers many of whom are recent 'migrants' to the digital

world [8]. Many teachers are interested and able, however, to provide M-Learning content, learning management and support.

Reference [9], in their research titled: Effectiveness of Online Learning Program: A Case Study of A Higher Education Institution, examined how Online Learning Programs can be made more effective. Using a case study methodology at a Higher Educational Institution for a period of three months, their research discovered that there is a gap in design delivery methods employed in online programs which need to be examined. Communications issue was a major source of frustration faced by users.

The research paper titled: A Conceptual Framework for E-Learning in Developing Countries: A Critical Review of Research Challenges [1], presented a critical review of research on challenges for E-Learning with a particular focus on developing countries. A comprehensive literature review of sixty papers on E-Learning challenges was undertaken in order to understand how to implement E-Learning in developing countries. The paper provided insights into what existing research identified as the major challenges for E-Learning and the differences between developing countries and developed countries in this respect.

Thirty Challenges were identified and grouped into four main categories namely: Course challenges, Individuals' characteristics challenges, Technological challenges, and Contextual challenges. The paper showed that while all challenges are relevant also for developing countries there is currently an emphasis on technology and contextual factors whereas factors pertinent to individuals' characteristics, much researched in developed countries, are not yet high on the agenda in developing countries.

Reference [10], in their research paper titled: An Analysis of E-Learning Information System Adoption in Ugandan Universities: Case of Makerere University Business School, presented an examination of E-Learning Information Systems failures and adoption problems in Ugandan Universities based on Rogers and Shoemaker's Diffusion of Technological Innovation Theory. Using a survey research design methodology where results were analyzed using descriptive statistics, the paper aimed to highlight the challenges of E-Learning adoption in Makerere University.

Their findings indicated that Assistant Lecturers and Lecturers were more willing to adopt E-Learning than their senior counterparts, the Professors. Results also indicated that although students were aware of E-Learning, many of them were not comfortable using the technology. The most serious challenges for E-Learning adoption were identified as lack of resources, knowledge and resistance to change.

The paper titled: Using Mobile Phones to Improve Educational Outcomes: An analysis of Evidence from Asia [11], reviewed the evidence of the role of mobile phone facilitated M-Learning in contributing to improved educational outcomes in the developing countries of Asia by exploring the results of six M-Learning pilot projects that took place in the Philippines, Mongolia, Thailand, India, and Bangladesh. In light of the theories as to how M-Learning should solve access problems as well as facilitate new learning, the authors sought to examine the existing evidence so as to confirm, or refute, the purported benefits advanced by the literature.

Analysis of these projects indicated that while there is important evidence in the developing world that mobile phones impact educational outcomes by facilitating increased access, much less evidence exists as to how they impact educational outcomes by promoting new learning. Regarding increased access, feedback from participants in the projects indicated the convenience of greater flexibility of schedule that M-Learning affords. Of greatest significance, however, is the fact that mobile phones can reduce barriers to education while attaining educational outcomes that are, at minimum, comparable to those of traditional educational methods.

The paper, Viewing Mobile Learning from a Pedagogical Perspective [12], presented a pedagogical perspective of mobile learning which highlights three central features of mobile learning: authenticity, collaboration and personalization, embedded in the unique time-space contexts of mobile learning. The paper proposed a succinct framework highlighting a unique combination of distinctive characteristics of current mobile pedagogy to bring socio-cultural insights to the literature on M-Learning. The framework was developed through an iterative design-test-analyze-refine cycle.

The table below gives a summary of their findings after analyzing six different scenarios.

TABLE I   Brief description of examples of M-Learning scenarios [12].

Source/scenario	Brief description
A Ebner (2009). Use of Twitter at a conference	Delegates used a Twitter "back-channel" at a professional learning conference. During keynote presentations, delegates tweeted brief comments and questions in reaction to the speakers (or other tweeters). Twitter posts were projected in a cascading fashion on a screen behind the speaker. From the perspective of the delegates in this formal conference venue (rather than the "lurkers" online), time was bounded by temporal parameters of the keynote speech. Use of Time-Space: fixed/scheduled/formal.
B Tangney et al. (2010). Geometry in the field	A second-level Mathematics class studying trigonometry who were working in teams of four students, using their smart-phone's "angle tool" to measure the heights of three structures in their school grounds. Follow-up discussion of concepts occurred in the classroom.
C Tangney et al. (2010). Fractions Smartphone "apps"	Mathematics students studying fractions use a Cuisenaire Rod "app" on their smart-phone, allowing them to manipulate coloured cuisenaire-like rods on screen within a virtual "unit space". Small groups were organised by configuring the allocation of rods such that learners "trade" or "swap" with peers to solve problems. The teacher controls level of difficulty and to avoid students guessing, both time taken to complete various

Source/scenario	Brief description
	challenges and number of moves made are recorded by the applications.
	Use of Time-Space (B and C above): These Mathematics learning activities take place "out-of-class" but nevertheless in a structured, teacher-mediated setting and are organised within fixed schedule of school temporal parameters. Use of Time-Space: fixed/scheduled/formal.
D Buhagiar, Montebello, and Camilleri (2010)Augmented learning in an Art Museum	Learners use an augmented reality application on their mobile devices that reacts to a user's location in the display area of an Art gallery. Students' augmented view consists of virtual information on their device screens, superimposed over the "real" object they are focused on. This learning activity takes place in an informal, albeit bounded setting but organised to a relatively unfixed schedule and pacing. Use of Time-Space: "In Between" fixed/scheduled/formal and malleable/negotiated/informal.
E Gwee, Chee, and Tan (2010)Games-based m-learning	Year 9 social studies students studying governorship using the game Statecraft X on their iPhones. In this multi-layer strategy game, students and teachers get involved in multiple role-play scenarios that "move" from the real world to the game world. Other integral activities included online forums, reflective blogs, debates and whole-class discussions. This learning activity takes place in a hybrid of formal (school) and informal settings and is organised to a relatively unfixed schedule and pacing. Use of Time-Space: malleable/negotiated/informal.
F Ng'ambi et al. (2010) Podcasts of lectures	Recording device was used for lecture casting to an existing institutional LMS. Students download resources, including podcasts to low cost playback devices (MP3 players and/or mobile phones). Queries that arose from listening to podcasts were sent as SMS to an anonymous Q&A tool within the LMS. This learning activity takes place in an informal setting to a relatively unfixed schedule and pacing. Use of Time-Space: malleable/negotiated/informal.

Another paper titled Switching Gears: Moving from E-Learning to M-Learning [13], examined institutional practice regarding integration of mobile technologies into electronic teaching that has previously depended on computers alone. More specifically, this study explored challenges, opportunities and constraints reflected in efforts to move from reliance on formal learning management systems for course development and delivery, toward the infusion of media targeted to students' mobile devices. The paper also explored the integration of mobile devices into teaching practice.

By exploring the experiences and views of three instructors on mobile device integration into their teaching, this paper revealed that there were both opportunities and challenges involved with such integration. While the instructors viewed M-Learning optimistically, issues needed to be addressed to enable effective institutional diffusion of mobile devices into teaching and learning. These issues include training, professional development and technical support.
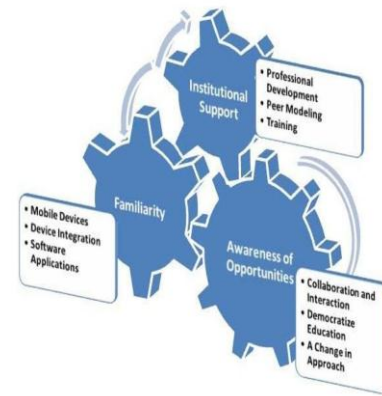

Figure 1.   Criteria necessary for switching gears from E-Learning to M-Learning [13],

One of the main obstacles of web-based learning is technology rather than the design of learning material. Examples of poor technology would be poor access, slow downloading and software errors which could frustrate learners and may militate against further use of E-Learning [14]. There are, however, potentials to M-Learning implementations. The research, Promising Potentials of M-Learning [15], identified three important drivers as the main reasons why many educators think that M-Learning has tremendous potentials. The three important drivers are:

- Widespread adoption
- Ubiquitous access
- Support for individualized, multi-modal learning

III.   METHODOLOGY

An extensive literature review was conducted on existing E-Learning and M-Learning technologies using journal materials and resources from the University of Jos Institutional Repository, Journal Storage (JSTOR), National Academies Press (NAP), and the Google Scholar Repository.

The scholarly articles, journal publications and conference proceedings reviewed were summarized and categorized in the following format: Introduction, Problem Solved, Methodology Used, Evaluation/Results and Expected Future Direction.

A systematic review of the literature was then carried out to answer the following research question:

- Under what circumstances is M-Learning adoption feasible in Developing Countries?
- What are the major challenges militating successful E-Learning Implementations in Developing countries?
- How is M-Learning currently being implemented?

IV.   FINDINGS AND OBSERVATIONS

From the review of the literature, it was observed that a strong case has been made for M-Learning adoption. Pilot

studies have been conducted as to ascertain its capabilities to enhance learning. Although M-Learning has not significantly shown any ability to promote new learning, it has shown that it can improve learning management by providing the opportunity for ubiquitous learning from the students and allow the teachers to focus on learning management.

Challenges facing E-Learning and M-Learning in developing countries are mostly technological, infrastructural and contextual while those in developed countries are centered around individuals' characteristics and comprehension abilities. Research has shown that access to the Internet and the high costs associated with it are strong limitations to efficient E-Learning and M-Learning implementations. Teachers and students alike have shown a remarkable willingness to adopt the technology but the high cost of infrastructures required for full implementation of E-Learning has been the major limiting factor.

M-Learning is implemented as independent learning systems with its own unique pedagogy. Situations where M-Learning have been implemented are mostly in primary and secondary institutions and focus primarily on the mobile device itself and not necessarily the environment in which the mobile device can be used. The M-Learning implementations consist of learning by means of a mobile device alone and not as part of a suite of options available to the learner to improve his learning capabilities. In situations where there are other available learning methods, M-Learning is still viewed as an independent method amongst the others.

There are certain issues that need to be addressed for effective diffusion of mobile devices into teaching and learning. These issues include, and are not limited to, proper training on the part of the facilitators, professional development and provision of technical support. There are identified gaps in current delivery methods employed in teaching of online programs and there is a need to proffer and implement solutions to address these gaps.

V.   CONCLUSION

Although mobile devices ease access to some types of learning, we can see that they have the potential to deliver the kind of learning that usually could only be done in the traditional classroom environment. It is evident that informal learning, leveraging on mobile technologies, is already embedded in our daily lives. Millions of Web-enabled phones are being used by learners, who may or may not be enrolled in formal learning courses, to seek information and carry out research.

Full adoption and implementation of mobile learning may still be a few years ahead, but there is no doubt that the potential abounds in the technology to redefine traditional learning pedagogies and be an effective tool in the quest to align learning's goals and outcomes with current trends in technologically aided educational delivery.

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