

The Future of Mobile Learning in the Nigerian Education System

Gloria ADEDOJA¹, Adele BOTHA², Olalekan Samuel OGUNLEYE²

¹*Department of Teacher Education, University of Ibadan,*
 Tel: +2348033449803, Email: go.adedoja@mail.ui.edu.ng

²*Meraka Institute, CSIR, Pretoria, South Africa*
 Tel: +27-12-841-3265, Fax: +27-12-841-4720,
 Email: abotha@csir.co.za, oogunleye@csir.za

Abstract: Mobile phones have the potential to improve education for the millions of underprivileged users in the developing world. However, the subjects of mobile learning in the developing countries have not been largely studied. This article presents a perfect vehicle for making educational opportunities accessible to students in places and times that are more convenient than formal schooling, focusing on the Nigerian context. We conducted a study to investigate the extent to which students in the developing countries make use of mobile phones to access educational content. Our study shows a reasonable level of learning and motivation. We also report on the social context surrounding the results. The objective of this study is to examine the feasibility of mobile learning in in and out-of-school settings in the developing countries with Nigeria as the context of our study.

Keywords: Mobile phones, Mobile learning, Developing countries

1 Introduction

The impact of mobile technology and its implication on the life of ordinary people in the developing countries appear to be more far-reaching than what they were in the earlier developed countries rollouts [1, 2]. To this end, opportunities presented through mobile technology are rapidly expanding and the focus on how it can be incorporated to support learning is increasing everyday [2].

A neat definition of mobile learning that incorporates the whole of the phenomenon is unlikely, as the interaction seems to morph as it is examined from different perspectives. Furthermore, the focal point of the mobile learning interaction shifts to accommodate the context and individuality of the user. Consensus is however, that mobile learning has the potential to enhance educational environments by providing access to information and communication capacities in a personal and ubiquitous manner. Perhaps more relevant in the African context is the notion that Mlearning is perceived as successful when it appeases a pedagogical need within the complex interactions that frame the learning process, by either *removing a barrier to the interaction* or by *augmenting an interaction* [3].

The barriers to inclusion of information communication technologies in the public schools of Nigeria are still significant and the widespread access to digital content remains a key[4]. Within the context of the virtual ubiquitous access to mobile cellular technologies, the opportunities presented remain largely unexplored.

The purpose of this article is to present a first step exploration for making mobile learning opportunities accessible to Nigerian learners in ways that are meaningful within the educational community and are aligned with national priorities. This is presented by outlining some definitions, mapping out the trends, see what others are saying, talk about some examples, and providing some guidance for going forward. It is also the purpose of this article to present the initiatives being used to integrate mobile learning into the Nigerian education system.

2. Mobile Service Providers in Nigeria

The transformation of telecommunications in Nigeria since the licensing of three Global System for Mobile Communication (GSM) operators in 2001 and a fourth one in 2004 has been astounding. According to an analysis on Nigeria's mobile market by BuddeComm, Nigeria has overtaken South Africa to become the continent's largest mobile market with over 90 million subscribers and yet market penetration stands at only around 57% in mid 2011. The telecommunications companies operating in Nigeria are MTN, GLOBACOM, Bharti Airtel, Etisalat, Visafone, M-Tel, Intercellular, Multi-links, Starcomms and Reliance.

With the dramatic growth happening in the telecommunications the education sector cannot turn a blind eye to the potentials and huge benefits presented through the use of mobile devices for instructional purpose. The pervasiveness of mobile phones and the rapid advance in mobile technologies in Nigeria can help argument and support classroom learning. The key to mobile learning according to UNESCO (Institution for Information Technologies in Education policy brief) is in taking advantage of learning opportunities offered by mobile devices, and that this typically happens when learners are not at a fixed, predetermined location, so that they are able to engage in situated learning and make use of context-specific resources.

The UNESCO policy brief on Mobile learning [5] gives the devices used in mobile learning as: (a) mobile phones, (b) mp3/mp4 (personal listening device), (c) lightweight, portable computers (slates, tablets, notebooks and small laptops. The four major operators in Nigeria are MTN, GLOBACOM, Bharti Airtel, and Etisalat. They provide mobile internet services, SMS, voice call services and mms plans for handhelds, smartphones, tablets (ipad, galaxy tab etc).

2.1 ETISALAT

Etisalat provides various data packages for handhelds, smartphones, PDAs or PC via Etisalat EDGE, Etisalat Samsung Galaxy Tab, Ipad have special data packages. These packages include Easylife, Easynet, Easystarter, and Easyclick.

2.2 MTN Nigeria

MTN's mobile internet service plans for handheld includes a daily plan of 10MB, a weekly plan of 25MB and a monthly plan of 100MB. There is a I pad data plan of 6 GB data bundle (5kobo per 1 kilobyte) with one year validity.

2.3 GLOBACOM

GLOBACOM's mobile internet service plans for handheld includes a daily plan of 10MB, a weekly plan of 50MB, and a monthly plan of 200MB.

2.4 AIRTEL

Data plan for handheld, smart phones, and Ipads include a weekly plan of 25MB, a daily plan of 10MB, and a monthly plan of 100MB. For smartphones: a monthly plan 1000MB

Figure 1: Service Providers and their Blackberry Internet Plan

	MTN	ETISALAT	GLOBACOM	AIRTEL
DAILY	—	100 Naira	300Naira	200 Naira
WEEKLY	1000 Naira	500 Naira	900 Naira	1000 Naira
MONTHLY	3000 Naira	3000 Naira	2,800 Naira	3000 ra

2.5 Support for Mobile Learning

‘Mobile learning emphasizes integration of learning with life and work, so that education is no longer seen as a separate activity that has to take place in a school, university or other establishment’(IITE Policy brief)

The data plans offered by the GSM operators allows subscribers to download instructional audio materials (podcast) unto their handhelds, tablets, smartphones etc. they provide internet social plan especially for Blackberry users that allows students/subscribers to use social networks such facebook, twitter, netlog etc for instructional purposes. Through the networks social plans there is also an easy access to blog site, wikis, e-books, e-dictionary etc. The Mobile operators enables the use and participation in instant chats, this could allow students to chat with support staffs or the course instructors. These operators also provide services for the easy streaming of audio /video contents, free Short Messaging Services and Multimedia services, these allows students to receive and send contents that contain pictures, video/sounds, all these create reality and dynamism needed for effective teaching and learning.

3. Landscape for Mobile Learning

Mobile learning is not just a fashion. It is instead a transformative opportunity both for learning, and the learning institutions involved. Mobile learning can be defined as any activity that allows individuals to be more productive when consuming, interacting with, or creating information, mediated through a compact digital portable device that the individual carries on a regular basis, has reliable connectivity, and fits in a pocket or purse. Therefore, mobile learning means both amplifying formal learning, and moving to support for performance, informal, and social learning as well [6].

However, the convergence of capability, regardless of form factor, is what is driving the mobile revolution [6, 7]. The latest new devices have rich capabilities: input via touch screens with built-in or onscreen keyboards and noise-cancelling microphones; output via vibrant screens and quality audio; sensors such as GPS, cameras, compasses, and orientation sensors; and connectivity via multiple networking methods including Wi-Fi, Bluetooth, data via phone service, and cables (refer to figure 1 below).

This convergence also offers a rich basis for supporting learning [8]. For mobile devices in general, we are not talking only about documents (text and graphics) but audio inclusive. We typically have e-mail, the Web, and instant messaging, too. Video is at the state of ubiquitous now. Increasing phone capabilities, voice, text messaging (SMS), and, increasingly, multimedia messaging (MMS) have been successfully added to mobile phones. However, the only thing that provides an extra level of challenge is in developing interactivity [1], but even there are some solutions and more are still on the way. These chan-

nels (such as SMS, Voice, provide new opportunities to think about how learning should be supported through mobile devices.

3.1 Mobile Learning Channels

Mobile phone is a context-aware device that augments learning capabilities, both for formal learning, and for informal learning. However, we need to ask the question of what categories of content can be delivered to the audiences via m-learning? The essence of mobile is, to augment learners' mental capabilities wherever and whenever possible [6]. Human brains are very good at pattern-matching and also good at administrative function, but very bad at routine memorization and complex computations. Computers, conversely, are the reverse, and from a problem-solving perspective we are far more efficient when we combine the two. Mobile devices do that and more.

For practical purposes, other than when the organization provides the devices (and there are convincing business reasons for doing so), the device that is almost certain to be available is a mobile phone [6]. Mobile phones however support six channels for m-learning purpose; SMS/MMS, Voice, Document, Video, Audio, and Interactivity. However, the "application-enabled" smartphone is gaining in market share and have the most complete suite of capabilities, it is the obvious target for design with regards to m-learning unless a particular organisation or institution is already providing the devices that are m-learning enabled.

3.2 Mobile Status on Learning

The term M-learning gives the notion on the idea of taking courses over the phone or any other mobile devices. However, the proliferation of mobile technologies such as mobile phones has now turned them into important tools to complement both formal and informal learning [9]. In other words, mobile phones have been accompanied by a growing interest in the educational benefits and applications they offer [2]. Mobile devices can now be used to support learning anywhere and anytime, to support social learning and knowledge sharing, and also to visualize augmented reality applications for learning purposes. However, the development of these applications is difficult for many researchers because it requires understanding many different protocols; dealing with distributed schemas, processes, platforms, and services; learning new programming languages; and interacting with different hardware sensors and drivers [9].

3.3 Beyond Learning: A performance Support Tool

The common use of mobile learning is in performance support [9] [10], in effect augmenting learners capabilities. The objective however, is to take the digital support we have on our desktops, and make a usable version available wherever and whenever we are. It is about bringing the capabilities learners minds don't handle well to the problems they face: routine memory, complex computation, exact context capture, and distant communication [2].

Mobile technologies are used to improve the productivity and efficiency of learners by delivering information and support just-in-time and in context for their immediate priorities.

3.4 Institutional Access/Personal Access

Nigeria is considered the largest country on the African continent and additionally has the largest African economy. Nigeria with its high population of more than 130 million and with excellent mobile infrastructure and 3G connection have created a demand for an effective learning technology that can reach student with little investment in cost and high access.

The choice of mobile phones as the device to be used is born out of the characteristic advantage the mobile phone possesses over other mobile devices. The basic characteristics of mobile phones such as mobility, personal nature and lower cost of compared to computers or laptops make it easier for Nigerians to afford. Nigeria has the largest growing mobile market in Africa with more than 55% of the population having mobile phones. On the contrary, internet and PC penetration in Nigeria is very low. Having a good mobile infrastructure with the absence of the alternatives has made mobile learning a good choice for Nigerians. This will allow the disadvantaged areas to have a premier learning technology with minimum investment. A survey carried out in high schools situated in rural Nigeria revealed that only a very small percentage of students owned personal digital assistants (PDAs). In contrast, survey results indicated that every student owned and used at least one mobile phone [11].

Recent research showed that both students and lecturers in Nigeria's premier university, University of Ibadan, currently have access to smart phone and other internet enabled phones such as Black berry, Nokia, Samsung etc of different grades. Presently, the Dean of students is going into partnership with Visa Phone and Etisalat in other to provide phones at cheaper rates that can be used for mobile learning.

4. Mobile Learning in Nigeria

4.1 Jambmobile

The examination body established by law and responsible for conducting matriculation examinations into tertiary institutions in Nigeria called the Joint Admission Matriculation Board JAMB UTME. Over the years, the performance of students who enrolled in the yearly JAMB exam has been poor and this was due to poor quality instructions received by the students from the teachers. In the year 2010, 1,276,795 candidates sat for JAMB UTME in Nigeria. 501,463 (41%) Scored 200 out of a total score of 400 while 832,434 (68%) scored 180 marks and below, of which 200 and above is the level of pass. There was also a need to widen access and increase the number of willing students gaining admission into higher institutions. It was to this effect that the JAMBMOBILE initiative was designed. The Educational Advancement Centre, in collaboration with the University of Ibadan worked together to provide an intervention- a Mlearning initiative called JAMBMOBILE to alleviate the impending issues. In 2009 & 2010, Educational Advancement Centre acted as Consultants in the Assessment of Students being prepared for the Senior Secondary School Certificate Examination. The project therefore sought to find out ways of improving performance and achievement of youths seeking and gaining admission into higher institutions in Nigeria.

The versatility of the Mobile Phone endeared it as device that can be harnessed to produce the desired results. Mobile phone was adopted as the major media of the learning platform over other devices because of the following advantages it posses:

- The Mobile Phone is relatively cheaper than the Computer on the average. Although there are some expensive phones which cost as much as Desktops and lower specification Laptops/Notebooks, majority of phones cost a fraction of Computer costs
- Availability/Accessibility: Many people, including students already have mobile phones. In Nigeria for example, it is claimed that there are over 80 million Mobile phone users
- Cheaper Maintenance – In an environment of poor maintenance culture, Mobile phones are less prone to malfunctioning when compared to Computers. The Mobile

phone is much better than the Computer in terms of average cost of maintenance per annum and average effective life span

- In an environment of inadequate and erratic Power (Electricity) supply, the Mobile phones are much better than the Computer; Desktop or Laptop. The Mobile phone requires a small fraction of the power requirement of Computers and have power storing batteries that tend to store power for a longer period, when compared to Laptops
- Mobility of Mobile phones is a tremendous advantage in settings where there are traffic hold-ups and commuting. The wasted times can be utilised to advantage with the use of Mobile phones.

The advantages listed put the Mobile phone at an edge when the choice of device to be used for the project was considered. So far, the JAMB Mobile initiative has been tried and tested under the guidance of educational experts and the performance of students who subscribed to the JAMBMOBILE was significantly above the average performance in the Country.

4.2 UI Initiative

The UI Initiative is another mobile project currently been carried out in the University of Ibadan, Nigeria. This project is funded by Partnership for Higher Education in Africa-Educational Technology Initiative (PHEA-ETI). The project was developed and designed through the collaborative efforts of Research experts from different areas of interest. This was birthed out of the need to ensure distance learners have access to instructional contents and can learn at any time and any place. So far, four pilot courses have been designed on the mobile platform and can be accessed from any mobile device anywhere in the world. Hence, distance learners do not have to be physically present to access in the classroom to access information or submit assignments but can make their contributions any where they are. The Mobile platform provides learning activities such as quiz, chats, lessons, wikis, news forum and smart exercises. Via the mobile learning platform, students can have access to course tutors and other students at anytime and anywhere. The courses have been built to fit to any mobile use and students can use their mobile phones or devices without purchasing very expensive phones. To access the courses on the mobile learning platform, students can use any internet-enabled mobile telephony device such as: China phones (e.g. TechnoT9), general phones (e.g. Nokia, Samsung), blackberry, smart phones (e.g. I-phone, HTC). You may also use either of Galaxy Tab or i-PAD. Opera mini is the preferred browser for mobile view. So far the project has reached implementation stage and is currently been test run in the different faculties where the courses are being offered.

Table 1: Details of UI mobile learning initiative

S/N	COURSE CODE	COURSE TITLE	NUMBER OF STUDENTS	
			REGULAR	DISTANCE
1	TEE 353	Introduction to Instructional Technology	300	286
2	ADE 205	Primer Writing	45	20
3	LIN 241	The Production of Speech	60	250
4	POS 111	The Study of Politics	250	300

5. Other Possible Initiatives

To identify mobile learning initiatives that are successful in an African context and thus has the potential to be transferred to Nigeria, two initiatives were identified in South Africa.

5.1 *Dr Math*

Dr Math [10-12] is an online tutoring service that is aimed at helping learners with their Mathematics. It is aimed at secondary school learners and has been running since 2007 supporting 28,000 registered users.

Elements that make it transferable to Nigeria are:

- Use of available technology. Dr Math as a service does not provide mobile phones or data plans to students accessing it and uses the devices the students have access to, catering for any phone that is internet enabled.
- Low initial and running cost. To start a similar service would not require a huge capital layout. As it is text data as Instant Messages that are transferred, the cost of hosting such a service would not be very high.
- Viral Advertising. Dr Math has relied almost exclusively on viral advertising amongst learners to reach its current numbers.
- Learner initiated interactions. As a tutoring service the content being discussed are determined by learner's needs. Content design and curriculum planning is not a factor.
- Serves a National Priority.

Some challenges are that Dr Math (RSA) has made use of the institutionalisation of community service by Universities. This provides a free source of skilled tutors with a pre negotiated amount of hours that become available to the service. Nigerian universities do not have this institutionalised community service and sourcing and maintaining tutors would need to take place through alternative channels in addition to university students. In addition Nigeria has a much larger school population requiring larger numbers of tutors.

Dr Math (RSA) runs predominantly on MXit [13], a mobile social networking service that has limited uptake in Nigeria. Training and issues of negotiating zero rated access locally would additionally have to be addressed.

5.2 *Quiz Max*

Quiz Max [14] is a service aimed at secondary school learners that provide multiple choice questions with instant feedback to a mobile phone and a PC. The service had 1929 registered users in October 2010 and has grown to 65 600 registered users a year later.

Elements that make it transferable to Nigeria are:

- As the revision questions are aligned with the South African national curriculum the service is a useful tool for preparing for tests and exams.
- The feedback is not only instant, provides the learners with correct answers.
- Use of available technology. Quiz Max does not provide mobile phones or data plans to students accessing it and uses the devices the students have access to, catering for any phone that is internet enabled.
- Low initial and running cost. To start a similar service would not require a huge capital layout. As it is text data as Instant Messages that are transferred, the cost of hosting such a service would not be very high.
- The service is accessible through web and MXit and provides Educators or parents with the option of tracking a student's learning.

Some challenges are that the service would need to be aligned to the Nigerian National curriculum for all subjects offered. As the service becomes bandwidth intensive with increased numbers a sustainable business model would need to be incorporated to allow the end user to access the service free of cost.

6. Recommendation

- Jambmobile should be given extensive publicity so as to help students seeking admission into higher institution improve their performance in UTME.
- More courses should be incorporated into the UI Initiative Mobile Learning platform to give more students to access the platform.
- MXit is not very popular in Nigeria so it is suggested that Dr Math can be adapted to run on a more widely used social networking service such Myspace or foursquare.
- Quiz max should also be developed to aligned with the Nigeria national curriculum

7 Conclusions

Mobile Learning in Nigeria has an opportunity to be “the perfect storm” as elements that would enable large scale use of the technology become obvious every day. The challenge the education community in Nigeria face is the same as for many African countries - locally relevant solutions need to be harnessed for a proactive engagement. Some valuable learning has been done in the African context and many opportunities beyond the SMS have been identified as viable. Issues of localisation from within the African Continent will remain a barrier but are not considered insurmountable. Nigeria, however, needs to take its place as a trendsetter in harnessing its local talent and skill pool to be able to contribute to educating the children of Africa through a technology that is in use.

References

- [1] D. Tatar, J. Roschelle, P. Vahey, and P. W. R, "Handhelds go to school: Lessons learned," *IEEE Computer*, vol. September 2003, pp. 30-37, 2003.
- [2] A. Botha, J. Cronje, and M. Ford, "Up close and very personal-A proposed conceptual framework for mobile technology as a participant.," presented at the IST Africa Conference, Mozambique, 2007.
- [3] A. Botha, "Framework to Enhance the Mobile User Experience in an Mlearning Interaction," PhD, School of IT, Nelson Mandela Metropolitan University, Port Elizabeth, 2011.
- [4] R. A. Aderinoye, K. O. Ojokheta, and A. A. Olojede, "Integrating Mobile Learning into Nomadic Education Programmes in Nigeria: Issues and perspectives," *The International Review of Research in Open and Distance Learning*, vol. 8, 2007.
- [5] "Policy Brief: Mobile learning for quality education and social inclusion," UNESCO 2010.
- [6] N. Clark, *Mobile Learning: Landscape and Trends*. Santa Rosa, California: ELearning Guild Research, 2011.
- [7] F. Maria, D. Antonella, L. Rosa, A. Carmelo, B. Paolo, and P. Thomas, "Explore! Possibilities and Challenges of Mobile Learning," presented at the CHI, Florence, Italy, 2008.
- [8] M. Sharples, I. Arnedillo Sánchez, M. Milrad, and G. Vavoula, "Small devices, Big issues," in *Mobile Learning: Small Devices, Big Issues in Technology Enhanced Learning: Principles and Products* M. Sharples, Ed., ed: Kaleidoscope, 2007.
- [9] S. Martin, G. Diaz, I. Plaza, E. Ruiz, E. Castro, and E. Peire, "State of the art of frameworks and middleware for facilitating mobile and ubiquitous learning development.," *Journal of Systems & Software*, vol. 84, pp. 1883-1891, 2011.
- [10] A. Botha and L. Butgereit, "Dr Math as part of IMFUNDO Yami Report," CSIR Meraka Institute, Pretoria 2009.
- [11] L. Butgereit, "Title," unpublished.
- [12] Dr Math. (2011, December). *Dr Math: A mobile education initiative*. Available: <http://drmath.meraka.csir.co.za/drmath/>
- [13] (2011, February). *MXit*. Available: <http://www.mxit.co.za/web/index.htm>
- [14] I. c. D. A. f. McDougall. (2011). *Quiz Max*. Available: http://www.learningtothemax.co.za/product_quizmax.php.