Enhancing Teaching and Learning through the Use of Mobile Technologies in Zimbabwean Universities

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Abstract*:* *The purpose of this study was to establish mlearning infrastructure and resources available in Zimbabwean universities, determine the level of mobile learning activities in Zimbabwean universities, identify challenges faced by Zimbabwean universities as they implement mobile learning in teaching and learning and to come up with recommendations that were possible solutions to the challenges faced by Zimbabwean universities in implementing mobile learning. The participants of this research were university lecturers, students, the ITS directors and the Librarians. The research adopted the descriptive research method and the triangulation methodology to draw conclusions from the data collected. Random sampling was used to select the respondents to the questionnaires. Tools for data collection included a questionnaire (with both open ended questions and closed questions) targeted to the lecturers and the students, as well as interviews with the ITS directors and the Librarians. The research revealed that students and lecturers have mobile technology devices to use for mlearning. There are some mobile learning activities that are already happening at universities which include uploading of material on electronic learning platform, downloading learning material, browsing the internet for research, students' online discussions and access of electronic resources from the universities' elibrary, amongst others. Network infrastructure is available at the universities but some of the equipment needs to be upgraded and some needs replacement as it has been in use for many years. There were a number of challenges highlighted by the participants of this study that were affecting the implementation of mobile learning which included access to internet, high cost of mobile devices, high broadband costs, lack of a mlearning management system, resistance to change, negative attitude of lecturers and WI-FI connectivity amongst others. The research recommended the adoption of a mobile learning management system, the upgrade of firmware of some access points that are not working, acquisition of new routers to enable fast internet speeds and training of staff amongst others so as to overcome the challenges to the implementation of mlearning in Zimbabwean universities.*

Keywords: Mobile technologies, electronic learning and mobile learning

1.   Introduction

The past decade has seen computers being adopted into the classroom from the corporate world. The education sector is transforming daily because of the adoption of information communication technologies and mobile computing in learning curriculums. Advancement in technology is making the education sector more organized and the systems are transforming for the better. Mobile phones are no longer just phones for calling and texting but are used for emailing, listening to music, playing games and for entertainment. The rate at which ownership of mobile phones is increasing just proves how much mobile computing is becoming part of our daily lives. Mobile phones ownership is also increasing on campuses as well. The year 2013 saw the increase in adoption of PC tablets, laptops, notebooks and the continued rise of smartphone ownership even in Zimbabwean universities. According to a study by the people magazine vol23 (2013), smartphone ownership in southern Africa have increased by 33 percent between 2012 and 2013 and that figure is expected to increase to 67 percent during 2014. The number of applications on mobile technologies is increasing continuously also and this calls for new ways of doing things. Zimbabwean universities are adopting new technologies also in their registration processes, payment of fees, exam venues entrance systems as well as swipe identity cards amongst others.

Teaching using mobile devices offers mobility that is not possible with desktop computers. Mobile technologies have functions that give opportunities in teaching and learning that wired connections cannot do. These opportunities will lead to many new and exciting uses of mobile devices that can be taken advantage of. Mobile communication technologies include Wi-Fi local area wireless connections, 3G and 4G mobile communications which enables internet access on mobile phones,

GPRS general packet radio service, Bluetooth a short range wireless communication technology and Worldwide Interoperability for Microwave Access (Wi-MAX). There are also related mobile computing devices such as tablets, smart phones, pocket PCs, MP3 players, laptops and various handheld devices.

2. Background of the Study

According to Chitanana et al (2008), many universities have started using Information Communication Technology systems to deliver content in teaching students. Universities are investing more in information communication technologies for administration processes, learning curriculums and teaching purposes. Based on the technological developments in tertiary institutions, the researchers noted that there is a huge reliance and dependency on IT services. Most of the administration processes are now done through computer systems, they are no longer done manually and new ways of teaching and learning are now being adopted.

According to Chitanana, et al (2008), state universities in Zimbabwe are now adopting information technologies and most of them have computerised their administrative functions and processes, such as, learning methods, registration process, student records and employee records. There is a movement in education to use of technologies in learning. Tertiary institutions are adopting electronic learning which is referred to as the use of electronic media in education. With elearning there is improved interaction between students and lecturers. Campuses today are flooded with students on cell phones, tablet PCs and laptop computers. Students use these devices for surfing the Internet, updating social network sites or downloading music and videos. The world is evolving because of mobile technologies and everything is becoming computerized therefore there is need to come up with ways to utilize this technology in the classroom.

Currently there 19 universities in Zimbabwe, 12 state owned and 7 private owned. These universities are committed to the use of Information Communication Technology and virtual classrooms in teaching, delivery and research and this has led the universities to invest in technology in the past years. Some of the universities namely Midlands State University (MSU), now have an online registration systems, online voting for student representative councils, MSU uses swipe systems in exam venues and buying food at the dining halls. The MSU bursary pastel system is now linked to the bank systems; as soon as students deposit money their accounts are automatically updated.

2.1 Problem Statement

Mobile learning is centred on the learner and mobile computing capabilities which enable anytime, anywhere learning. Mobile devices have the potential to make a huge difference in the quality of education when they are fully integrated into the teaching and learning processes. This paper examined how mobile technologies can be used to enhance teaching and learning practices and went on to look at the opportunities presented by the use of mobile devices in Zimbabwean universities. A lot of work has been done on adoption of mobile technologies in the education sector but nothing had been done yet on Zimbabwean universities. A gap existed in the body of scholarly literature regarding mlearning adoption in Zimbabwe universities.

According to Chitanana, et al (2008) universities in Zimbabwe are investing in technology for administrative purposes but they are not investing in technology for teaching and learning. Therefore there is need to determine the opportunities presented by mobile learning in enhancing teaching and learning. There was need to explore how mobile technologies are being used in Zimbabwean universities and establish the challenges faced in adopting mlearning.

A study done by UNESCO noted that information communication technology is not sufficiently exploited to allow for changes in the manner of communication and teaching in schools. There is need for teachers to change their roles and manner of work and the researchers looked at ways that this could be done as mobile technologies are incorporated in teaching and learning. The researchers examined how mobile technologies and the mobile phone in particular were being used to support and manage learning.

2.2 Research Objectives

The main objective of this research was to establish mlearning infrastructure and resources available at Zimbabwean universities. The research also determined the level of mobile learning activities at the Zimbabwean universities. The research further identified the challenges faced by Zimbabwean

universities as they implement mlearning in teaching and learning. Finally the researchers recommended possible solutions to the challenges being faced by Zimbabwean universities in implementing mlearning.

2.3 Literature Review

The researchers evaluated papers and books on the research topic so as to gain more understanding of the subject as well as come up with sound objectives for this research. Literature had to be reviewed also so that the researchers could identify the research gap and come up with a relevant study. This literature review evaluated research papers by other researchers on the research topic. The researcher explored the three dominant themes of the research objectives: mlearning infrastructure and resources, mlearning activities and challenges to mlearning. The researcher evaluated research papers covering infrastructures and resources needed for mlearning, mlearning activities being engaged by different universities and the challenges being faced in mlearning adoption.

3. Overview of Mobile Technologies

Mobile means portable or movable. It means to be able to move easily and freely from one point to another point (Wentzel et al 2005). Mobile technologies are devices that have a wireless network connection which make users able to send texts messages, make voice calls and run applications (Sharon 2001). Mobile technology devices include personal digital assistants (PDAs), laptops, netbook computers, palmtops, smart phones, MP3 players, tablet PCs and games consoles (Wentzel et al 2005). Local area wireless connections which use Wi-Fi are one of the mobile technologies available today. Mobile phone which use third Generation 3G mobile communications are being adopted most by youths between 18 and 23 years.

Mobile technologies are evolving every day and they also include worldwide Interoperability for Microwave Access (WiMAX, Personal Data Assistants (PDAs), pocket PCs and tablets (Shih and Mills 2007). Mobile technologies enable students to communicate with each other and exchange information and it enables students to communicate with their lecturers too. Information Communication Technology tools are used to enable exchange of information these may include computers, laptops and mobile phones. Information and communication tools enable teaching and learning in mlearning. Continuous evolution of mobile technologies is increasing the interaction rate between students and their lecturers.

3.1 Defination of Mobile Learning

The use of mobile technologies for learning is referred to as mobile learning. Two important aspects of m-learning are its ubiquity and mobility. Ubiquitous computing is access to computing technologies whenever and wherever they are needed while mobility is learning on the go. Mlearning involves use of handheld devices and for connectivity mlearning make use of national or international networks for example GSM, GPRS (Wentzel et al 2005). Quinn (2000) described mlearning as learning that takes place with the help of mobile devices, or the intersection of mobile computing and elearning. He went on to say that it is the application of small, portable, and wireless computing and communication devices to the learning system. Quinn also supports other researchers who say mlearning is all about anywhere, anytime learning and the resources should be accessible without restriction to geographical boundaries. The traditional classroom setup is not flexible compared to mobile learning which is giving students effective, convenience and flexibility. It enables them to learn in any place without physical boundaries and restriction of time.

The traditional classroom can be made flexible through use of mobile technologies if they are integrated into the curriculum students are able to access learning material and communicate with everyone in that learning space (Shih & Mills 2007). According to Keengwe (2013) mobile learning is the ability to obtain or provide educational content on personal pocket devices such as PDAs, smartphones and mobile phones. Educational content refers to digital learning assets which includes any form of content or media made available on a personal device. For the purpose of this research the researchers adopted this definition because it is in line with the research area. It noted the use of mobile technologies to access educational resources. From the definition we deduced that mlearning involves the whole institution that is the administration staff, students and the lecturers.

Any learning that occurs in learning environments that involves movement of people, movement of technology and movement of learners is referred to as mlearning (Osman et al 2010). Technology

devices used in mlearning should be portable; users should be able to carry them around. Learners should not be affected by location or time; they should be able to access learning material when they need to. Learning processes supported by mobile and wireless information and communication technologies are known as mobile learning. The ICT devices enable mobility of the students as they may not be in the same physical location or geographically distance. Students may also be in different formal educational spaces, such as classrooms or work places (Ferreira et al 2013). The researchers adopted this definition for the purpose of this research because it is in line with the research topic. The definition brought out that there is the provision of educational content on mobile and wireless devices.

3.2   Advantages of Mlearning

Mlearning can have positive contributions in a number of ways. It helps students improve their literacy and numeracy skills as well as help them identify the abilities they have in different areas. Students are able to identify where they are lagging behind and where they need assistance in their academic work. Resistance to the adoption of ICT use can be eliminated as everyone is now adapting to the use of mobile phones and this can also result in increased ICT literacy levels (Attewell, 2005).

3.2.1   Mlearning Adoption

In Africa there has been a widespread adoption of mobile phone usage between 2006 and 2011 and by end of 2012 there was an estimate of 735 million subscribers. These developments have caused adoption of mobile phone usage in learning including open and distance learning. Mlearning projects are being implemented in a number of regions with Uganda, South Africa and Kenya having the highest numbers of projects implemented. One of the outstanding projects was in Tanzania which enabled teachers to have digital video screening in class through use of mobile technologies. In Uganda the national examination board now releases exam results through short messaging services (SMS) since 2010. This is one of the few projects initiated by government in African countries (Isaacs 2012).

4.   Research Methodology

To fulfil the objectives of this research a number of methods were used. Both primary and secondary data were essential. Given the dynamic nature of the subject area, multiple primary research approaches were adopted, including both qualitative and quantitative methods.

This study used the descriptive research method and the research was a case study as the researcher chose a sample whose results reflected the position of Zimbabwean universities in terms of mobile learning adoption. In this research, questionnaires, interviews and document review were used as research instruments. The researchers administered questionnaires and had interviews so as to obtain data concerning mobile learning and how it would enhance teaching and learning in Zimbabwean universities.

This study used the descriptive research method. The descriptive method allowed the researchers to gather data on the present existing conditions. It obtained information concerning the current status of the situation and drew conclusions from the facts discovered (Sobh and Perry 2005). Descriptive research enabled the researchers to analyse the existing situation and explore the causes of these situations. Findings cannot be generalized to the overall population but they can provide important information for future research. It was also chosen because of its aspect of addressing particular characteristics of a specific population of subjects and it produced qualitative data since it made use of interviews and questionnaires.

The descriptive method is relatively cheap to administer because it is possible to collect data from respondents through the use of questionnaires and interviews. There are different types of descriptive research. There is case study which involves research on one person or a group of people over a specific period of time. There are Surveys these involve obtaining information from a sample of individuals. Results from a survey can be generalized to the whole population from which the sample was taken from. Under descriptive research there are also scopes. Scopes involve surveys that involve everyone in the population for example a census.

The choice of the design was influenced by the research objectives. This research was carried out through interviews, questionnaire surveys and document review to establish mlearning infrastructure and resources available in Zimbabwean universities, to determine the level of mobile learning activities in Zimbabwean universities and to identify challenges faced by Zimbabwean universities as they

implement mlearning in teaching and learning. The researchers analyzed and interpreted the findings of the study presented below so as to achieve the objectives of the research.

Questionnaires were economic in terms of time and they made the respondents free to give confidential information since the respondents were not required to disclose their identity. Also analysis of data from close-ended questions was easy.

Interviews gave assurance of immediate feedback furthermore; verbal and non-verbal cues were monitored and captured through gestures and facial expressions. Document review helped the researchers to gather information on the technological developments and future plans of the universities as well as strategic plans of the universities.

5.   Research Findings

In this study the researchers found out that:

- 81percent of the students in Zimbabwean universities own mobile devices and these include laptops, smartphones and PC tablets.
- 54 percent of the lecturers also own mobile devices like laptops, smartphones and PC tablets
- WI-FI connectivity is a problem at most Zimbabwean universities, access points are few at the moment and some are not working properly.
- Most students and lecturers did not have internet network connections at home, once they leave the university campuses they cannot access any learning material or even their elearning accounts.
- The universities do not have any mobile learning management systems at the moment
- There are some mobile learning activities already in the Zimbabwean universities which include uploading of material on electronic learning platform, downloading learning material, browsing the internet for research, students' online discussions, whatsapp group discussions, use of whatapp to convey and share information including lecture notes and access of electronic resources from the universities' elibrary amongst others.
- The universities have sufficient bandwidth for nonstop fast streaming of any mobile learning activities
- The networking infrastructure at the universities needs upgrading
- Zimbabwean universities are facing a number of challenges in implementing mlearning which include cost of the mobile devices, cost of data bundles, resistance to change, lecturers negative attitude, lack of knowledge and slow internet speed amongst others
- On the administrative side registration is done through mobile devices too. Students at Midlands State University (MSU) use their smartphones for registration, SRC elections, accessing results, exam timetable, financial statements and course work marks amongst others.

6.   Discussion

There is no doubt that mobile technologies are transforming the education sector. Results of the research show that there are some mlearning activities engaged in at the Zimbabwean universities. The students and the lecturers have the mobile technology devices to use for mlearning which include laptops, tablets PCs and smartphones. The researchers noted that there are some respondents who said they did not own smartphones but on the other questions highlighted that they use some applications which can only be used on smartphones. This implies that some respondents did not know what a smartphone is. People have the assumption that only the Samsung galaxy's and IPhones are smartphones. Some owned feature phones but because they are able to access the internet they responded that they have smartphones. The researchers also noted that students own mobile devices more than the lecturers. This could be because of social networks were students are highly active. Most lecturers have university desktop machines and for them they are good enough they do not see the need to buy laptops, tablets or any other mobile devices. In support of mobile learning heads of department that is academic deans, directors as well as principal officers are given laptops by the universities.

Bring your own devices policy is only fine to those who can afford the devices those who cannot are not able to experience the educational opportunity that others benefit from. Those who do not have

access to mobile devices have to rely on colleagues who own one to share with them the resources and learning material they access. Situations like these are all over the world whereby universities are not able to provide mobile technologies to their students. In Latin America the government has come up with a programme whereby they give each student a laptop as a way of integrating ICT into the classroom. Students as well as their lecturers were given a laptop or a netbook which they can use both in class and at home. In Columbia and Chile telecommunication companies are working together with the government to provide mobile devices to students and lecturers. A company called BridgeIT had a project where teachers were given smartphones to use to access a library with educational videos and in some cases internet services (Jara et al 2012).

The results of this study showed that both the students and the lecturers were using mobile devices for teaching and learning but the levels differ between the two groups. Most lecturers do not use their mobile devices to deliver content to students. They use their devices for browsing the internet, checking their emails, uploading material for students, researching as well as for presentations in lectures. There is need to utilize these devices and include them in the different curriculums.

Based on information gathered, most students were using their mobile devices for academic purposes. There is need to fully utilize these gadgets so that they are not just used for typing assignment and accessing the web only. Both students and lecturers should make use of web 2.0 applications, social networks and instant messaging applications. These applications can be adopted in the teaching and learning process. Lecturers can upload material for students on facebook or via whatsapp. They can communicate and get response faster because students are always logged on these sites and applications.

Results from this study also showed that students spent most of their time on social networking platforms and this was supported by a UNESCO study which showed that most of the people who use mobile devices are using them mostly for accessing social networking platforms. These social networking platforms offer mlearning opportunities that need to be exploited. In South Africa teachers and students are sharing resources and support in open discussions mostly those who are not in the same geographical areas. They are taking advantage of Mxit an application that almost all youths have on their phones for instant chat messaging to help those who are doing the mathematics subject. All those who have the application are able to access resources and exercises that help them in doing the subject (Isaacs, 2012).

Results also showed that internet connectivity is a problem for the students as Wi-Fi on most campuses is down most of the times. There is need for new networking infrastructure as most of the routers are no longer working properly. There are few access points on university campuses at the moment and this has resulted in only a limited number of students being able to connect to the Wi-Fi. From the information gathered the researchers noted that communication between students and lecturers is still bad. There is need for improved lines of communication between students and lecturers.

With mlearning students need to communicate with their lectures even when they are not on campus. According to Armataset al (2005) some tertiary institutions are using short messaging service to communicate with their students mainly for administration purposes. Most students in these universities now own smart phones hence communicating using SMS has become effective. SMSs are sent to students when their course material has been sent to them. They also receive messages reminding them of assignments due dates and also informing them when exam results are out. The students were asked the benefits of using mobile devices in learning and 90 percent of the respondents said mlearning allows them flexibility which is brought about by the mobility feature of learning anytime and anywhere without geographical boundaries.

Both students and lecturers agreed that mlearning helps in delivering learning material to wherever the students are as long as there is network connection. More than 50 percent also agreed that mlearning helps improve communication with other students and also between students and lecturers. Ultimately the students and lecturers are able to make better decisions. With mobile connectivity use in mobile phones and tablets students and lecturers are able to balance their social time, work life and their schoolwork. According to a research done by Motiwalla (2007) students said mlearning enable them to access learning material without restriction to geographical locations as there is instant connectivity and there are no restrictions to learning anymore.

There is need for mobile learning management system which enable students to access their learning material from anywhere. Students do not need to be limited to sending and receiving messages and reading PDFs on their mobile devices. They want to read all course resources, see the course

calendar, do interactive activities, undertake assessments and receive feedback, and participate in social learning. There are many mlearning platforms available these include mobl21, mEKP (Mobile Enterprise Knowledge Platform, Certpoint and Saml amongst others.

Some students said they could not afford to buy mobile devices and some students said they cannot afford to buy data bundles for them to use 3Gor 4G connectivity on their smartphones. Network connectivity was one of the big problems Zimbabwean universities are facing at the moment as access points are few on the campuses because some have been withdrawn as they are outdated and functioning properly. Lack of knowledge is another factor that the researchers noted. These mobile devices are being underutilized because both the lecturers and the students do not know how to use them to enhance teaching and learning. According to a research done by UNESCO lecturers are not aware of the positive contributions that are brought about by using mobile devices in teaching and learning. Some lecturers have a negative attitude towards using mobile technologies in the classroom. In South Africa there were a few cases that were reported by the media that showed that students were misusing these mobile devices. Some were sending bullying messages to other students; some used these mobile devices to cheat in examinations and some were accessing pornographic material (Shafika Isaacs2012).

7. Recommendations

For the Zimbabwean universities to overcome the challenges they are facing in implementing and adopting mobile learning the following recommendations should be considered by universities management as they are in line with the research findings.

Upgrade of Networking Equipment

There is need to upgrade some of the networking equipment as this is the cause of some of the internet problems the universities are experiencing. Some of the routers need to be replaced to ensure faster internet speeds. There is also need to update firmware of most of our access points. The firmware is outdated and therefore sometimes the access points are not broadcasting Wi-Fi and therefore they cannot be seen while sometimes students fail to connect on those access points. Some of this networking equipment has been in use for more than 5years now.

Adoption of Web 2.0 Applications

Lecturers should adapt to the usage of web2.0 applications as they facilitate teaching and learning. Most of the students are already using these applications for example blogs. Blogs allows both lecturers and students to collaborate, share learning material, create instructional content and be able to connect to mainstream social media sites for example YouTube and Twitter and all this can be done on a one centralized page that all can access. Students can download tutorial videos and have discussion where the lecturer can also contribute. Many applications can be used for education purposes for example dropbox where students and lecturers can share files and have discussions. They can also use instant messaging applications like whatsapp, gtalk and yahoo messenger to improve communication.

Mobile Learning Management System

The universities should acquire a mobile learning management systems, there are quite a number available. Zimbabwean universities have internal software developers, they could develop the systems since they were able to develop the electronic learning systems (e.g Changamire at Midlands State University) that the universities are using at the moment.

Training of Staff

Successful implementation of mlearning depends more on the lecturers and there is need to train the lecturers on how to use these mobile devices to enhance teaching and learning. Lecturers have the mobile devices but they do not know how to effectively use them and also do not know the applications available that they can use for academic purposes. The literacy level of the lecturers determines the pace at which they include mobile technology devices usage in their curriculums.

Allow Mobile Device Usage in Class

Students should be allowed to use their mobile technology devices in the classroom. There are a number of ways they can be helpful in teaching and learning. Students can record lectures as they are being done and later look at them during their study sessions. They could also record videos post them on their different blogs and have discussion with other classmates

Structure Mlearning in the Curriculums

Mobile learning should be integrated in the universities' learning strategy. There is need to adapt to the new ways of teaching and learning. The lecturers should include mlearning activities in their curriculum so as to ensure its implementation. Mlearning activities should be part of the module outlines. Mobile learning should complement the existing learning systems, it should not replace them.

Adopt Flipped Learning

The lecturers should adopt flipped learning whereby they upload more material so that students download and study on their own so that when they come in class there is more of discussing rather than presenting. Students can watch videos made by their lecturers before they come in class.

Promote Mobile Learning

The universities should come up with awareness techniques about mlearning. They should encourage parents to buy mobile technology devices for their children during the orientation period. Some of the parents do not know that these devices are being used for academic purposes. This could increase the number of students who own mobile devices so that more students can also experience this educational opportunity. Students should also be encouraged to use these devices more for academic purposes and adopt different ways of utilizing them in learning.

Support of the Whole Organisation

Everyone at the universities should play their part for mlearning to be a success. The non-academic staff should also understand their roles for example the I.TS staff should ensure a 99.99999 percent network up time so that students and lecturers can access learning material anytime.

Develop Mobile Applications

The universities should come up with their own mobile applications that help students in their modules. The applications should be able to run on all mobile platforms for example android and iOS so that those who have smartphones which run on android or iOS are able to install them. These applications should be able to run both online and offline. Students can download exercises they can do outside the classrooms and when they are online the application should sync the work they did while they were offline.

8.   Conclusion

Mobile technologies clearly provide opportunities in the education sector even though they are limitations to both the students and the lecturers. Results of this study showed that mobile technologies can be used to enhance teaching and learning. Adoption of mlearning fully will expand opportunities for the Zimbabwean universities, for example open and distance learning. With the use of mobile technologies universities can offer quality and effective education through virtual classrooms. Zimbabwean universities are already facing problems of scarce on-campus space, implementing open and distance learning will help make up the gap and also offers more revenue to the institutions. Challenges are there but the results of this research and projects of other institutions who have adopted mlearning showed that students, lecturers and universities management are exploring ways to effectively utilize technological devices so as to enhance teaching and learning.

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