CAPABILITIES OF USING MOBILE PHONE TECHNOLOGY IN SECONDARY SCHOOLS: ADAPTABLE POSSIBILITIES FOR BOTSWANA

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Abstract

The purpose of the study was to investigate how mobile phone technology could enhance teaching and learning, and also how developed countries have adopted the use of this contemporary technology in their secondary school systems. The paper shows a variety of effective ways of using mobile phone technology in the classroom environments. The assertion in this paper is that mobile phone learning technologies can be enhanced through stakeholder development, visionary leadership, robust technology capacity and policy changes. The paper also proposes an Activity Theory Framework that is specific to mobile phone technology integration in settings where teaching and learning are purposive and controlled, such as school settings.

1.0 Introduction

It is widely acknowledged that implementing mobile learning via mobile phones may lead to great opportunities in teaching and learning (UNESCO, 2012a). Despite this finding from a number of research studies, these innovative educational technologies and approaches are not widely practiced, more especially in developing countries (UNESCO, 2012b). The UNESCO (2012b) paper states that if mobile phones – by far the most ubiquitous interactive Information and Communications Technology (ICT) on Earth – can be used to deliver and improve education, then they carry a tremendous potential to assist the learning of people everywhere (p. 6). However, DeWitte (2010) contests that learning with mobile devices has not been thoroughly researched while Domitrek & Raby (2008) cited in DeWitte (2010) state that students wish to carry their cell phones at school, and be allowed to use them for learning purposes. Using cell phone technology as a tool to research, organize, evaluate and communicate has become a 21st century skill (Birch, 2012). Birch (2012) also states that mobile learning, integrating cell phone technology into the classroom, would increase student achievement and engagement as well as revolutionize instruction (p. 1). The intent of this paper is to examine how mobile/cell phones could possibly benefit students in secondary schools.

Mobile learning in this paper refers to the provision of education through the use of smart phone sometimes referred to as cell phones. The focus is on mobility. Yu & Conway (2012), state that mobile learning is realized with mobile devices and wireless communication (p. 834). Due to the constantly evolving nature of mobile phone technology, the term mobile phone in this paper refers to a device popularly referred to as cell phone currently known as 'smart phones'. A smart phone runs an open

operating system and is permanently connected to the internet (Litchfield, 2010). In Montessori, DeWitt (2010) observed that the ubiquitous spread of cell phone ownership among teens has spurred the

conversation concerning m-learning; however, little is known regarding the phenomenon of m-learning at the high school level (p. 18).

Mobile learning technologies have been piloted in a number of African countries through Nokia and UNESCO projects. Mobile ubiquity in Africa has been found to be a great platform for education as their affordances can be exploited for the benefit of teaching and learning. Several studies have revealed that mobile technology can improve education as exemplified by Malaysia where they are planning to intensify the innovation by 2015 (Mahamad and Woollards, 2012). The authors have observed little use of mobile technology in the Botswana school system despite the promising capabilities of these technologies and the incidence of ubiquitous interactive ICT via mobile phones in Africa (UNESCO, 2012c). Integrating mobile phone technology in government secondary schools in Botswana seems far-fetched as students are prohibited to bring these devices to school. No literature exist on the use of mobile phone technologies in Botswana, however, some literature exists on the use of this form of technology in educational settings in South Africa and other African countries (UNESCO, 2012a).

Botswana is a landlocked country situated in the Southern part of Africa, officially called the Republic of Botswana. She has a population of just above two million and covers an area of about 580, 000 square kilometres of land (the size of Texas or France). In 1966, she gained independence from the United Kingdom. At the time of gaining independence, Botswana was among the poorest countries in Africa. Currently, she is one of the fastest growing economies in the World. Botswana has outstanding economic credentials that can be tapped and explored for the development of the use of ICT in general and in the education environment (Boitshwarelo, 2009). Currently there are three mobile phone companies or providers namely BeMobile, Mascom and Orange. The Government of Botswana through the Ministry of Infrastructure, Science and Technology has shown commitment to the widespread adoption of ICTs in all sectors of society, including education by approving a National ICT Policy referred to as Maitlamo (Boitswarelo, 2009, p. 4). This policy is geared at bridging the digital divide by envisioning growth in the digital age. The country's ICT Policy Statement aims to provide: Efficient delivery of research outputs through effective use of Information and Communication Technology (ICT); and Appropriate ICT infrastructure in place to support research collaboration (p. 35).

This paper provides some insight regarding the perceptions on mobile phones and their capabilities. It also contributes ideas towards the integration of strategies for mobile phone technology into the classroom. It is concerned with the following: a) mobile phones availability in classrooms; b) useful features or application of mobile phones for education purposes; c) challenges facing integration of mobile phones in schools and; d) how the innovation could be enhanced in secondary education.

2.0 Methodology

This paper is framed within a qualitative literature review methodology. Evidence on the literature related to the use of mobile phones in secondary schools, more especially in the developed world is in existence. Google Scholar produced about 365 results on the search on 'smart phones use in secondary schools' during 2012, 536 results since 2011 and 729 results since 2008. While using the main search terms 'mobile phones' and 'secondary schools' with other phrases, stated below, various databases also showed

large results of work done in the area while Education Research Information Centre (ERIC) produced only 6 results for the search 'mobile phone learning in Africa'.

The search for relevant literature was done through revising articles found in the University of Sydney electronic database. A number of keyword searches used include 'mobile technology', 'mobile learning', 'mobile phones in education', smart phones in education' and 'mobile phones and secondary schools'. Databases used were ProQuest, International Encyclopaedia of Education, ERIC and the Library. Google scholar was also used as a reliable search engine to locate some articles. A total of 22 articles were reviewed and the criteria used to select appropriate or relevant articles included: the use of mobile phones in secondary schools as the context; relevance to mobile phone technology in Africa; and implementation and usage of mobile phones for educational purposes. Currency of publications was also a high priority; few articles were published during 2005, 2008 and the rest were from 2009 to 2012. The articles served as unit of analysis. Summarizing and making reflections on the data was the main method of analysis of reviews. Most of the articles reviewed were based on empirical evidence and provided insight if not answers to the questions asked. Three UNESCO working paper series on mobile learning published in 2012 were used as the core articles of this paper. The paper titled Mobile learning for teachers in Africa and the Middle East (UNESC0, 2012a) is teacher focused, and explored how teachers have appropriated and used mobile phones in the education setting and also provides an overview of mobile learning programmes that seek to improve teacher development and support. The second paper, Turning on mobile learning in Africa and the Middle East (UNESCO, 2012b) is an overview of mobile learning initiatives in the Africa and the Middle East (AME) region. These initiatives include, mobile learning projects, analysis of the learning initiatives, factors that influence mobile learning and policy context and implications. The last paper Turning on Mobile learning (UNESCO, 2012c) provided key findings such as the stigma surrounding mobile phones, adopting policies that embrace mobile learning technologies, improving education systems in marginalized populations and cooperation or partnership in sustaining mobile learning technology initiative.

3.0 Mobile Leaning Theoretical Framework

A first step in postulating a theory of mobile learning is to distinguish what is special about mobile learning compared to other types of learning activity. An obvious, yet essential, difference is that in mobile learning, learners learn across space as they take ideas and learning resources gained in one location and apply or develop them in another. They also move in and out of engagement with technology, for example as they enter and leave cell phone coverage. To portray learning as a mobile activity is not to separate it from other forms of educational activity, since some aspects of informal and workplace learning are fundamentally mobile in the ways outlined above (Sharples, Taylor and Vavoula, 2005). Secondly, a theory of mobile learning must therefore embrace the considerable learning that occurs outside classrooms and lecture halls as people initiate and structure their activities to enable educational processes and outcomes. Thirdly, to be of value, a theory of learning must be based on contemporary accounts of practices that enable successful learning. Lastly, a theory of mobile learning must take account of the ubiquitous use of personal and shared technology. In the tradition of Activity Theory learning is analyzed as a cultural-historical activity system, mediated by tools that both constrain and support the learners in their goals of transforming their knowledge and skills. Activity Theory can be employed to identify tensions and contradictions in activity systems which typically inhibit the subject from achieving the object of the activity (Engeström, 1987). Figure 1 provides an activity theory framework for analyzing mobile learning.
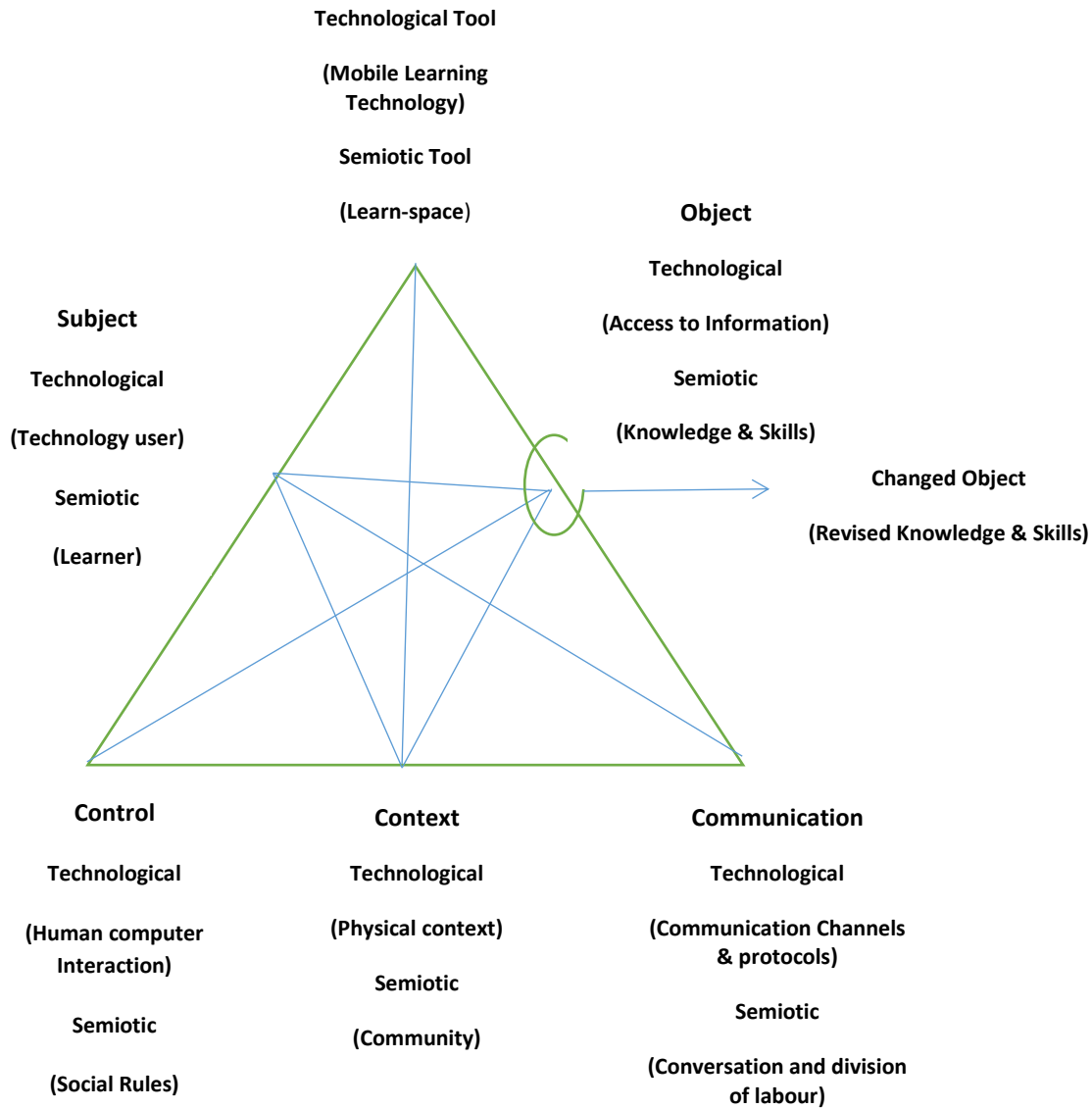
Technological Tool

(Mobile Learning Technology)

Semiotic Tool

(Learn-space)

Object

Technological

(Access to Information)

Semiotic

(Knowledge & Skills)

Subject

Technological

(Technology user)

Semiotic

(Learner)

Changed Object

(Revised Knowledge & Skills)

Control

Technological

(Human computer Interaction)

Semiotic

(Social Rules)

Context

Technological

(Physical context)

Semiotic

(Community)

Communication

Technological

(Communication Channels & protocols)

Semiotic

(Conversation and division of labour)

Figure 1: A Framework for analysing mobile learning (Engeström, 1987)

4.0 Instructional media

Continuous expansion of Information and Communication Technology (ICT) boundaries has extended well into education environments. This expansion has reached the 'anywhere/anytime' experiences in teaching and learning through the affordance of wireless or mobile technologies (Wentzel, 2005). According to Johnson, Adams, & Haywood (2011) mobile device applications and tablet computing sit at the top of the list of potential innovations waiting to enter into education systems. They also state that an advisory board of forty-six (46) technology experts has agreed on the significant impact of these technologies on education practice on both primary and secondary schools in the next five years. The development and adoption rate of mobile technologies has left educators with no choice but to explore the innovations in teaching and learning environments (Brown, 2005). Mobile learning or m-learning is now a new genre of learning that Hsinyi, Yi-Ju, Cheien, & Chin-Chung (2009) refer to as a revolution in education settings. Emerging from mobile technology, m-learning is anticipated as the next stage after e-learning, and is also considered to be an educational milestone in the classroom for instructional purposes (Hsinyi, Yi-Ju, Chien, & Chin-Chung, 2009). Brown (2005) sees the ability of mobile technology as a way of transmitting information or educational data 'on-the-go'. He also finds the success and impact of m-learning on the educators' ability to design and develop pedagogical sound m-learning opportunities and environments that enhance learning as imperative (p. 299).

It is very important to consider the challenges of technology adoption in the education system. The New Media Consortium Horizon Report acknowledges a number of barriers to technology and places its focus on K-12 community challenges (Johnson, Adams & Cummins, 2012). The United Nations Educational Scientific and Cultural Organization - UNESCO (2012c) states that planning, persistence, and a healthy dose of trial and error is a solid ground of practice (p. 6). While the report has identified stigma as one of the barriers of m-learning in which many parents, teachers and even students tend to view mobile technology as out of place in education and potentially harmful to students… (p. 7), Brown (2005) argues that the understanding of contemporary theory and identification of mobile technologies should contribute to the optimization of teaching and learning in the new environment (p. 299). According to the UNESCO (2012a) report, various pilot projects have been put in place to support teachers, teaching and teacher development through the use of mobile technologies. These initiatives include Overcoming Technophobia project which is taking place in South Africa through a subject called Life Orientation and Life Skills (UNESCO, 2012a). Another project called Extending Education to Remote Areas was piloted in Mozambique through the use of SMS and SMS interactive services (UNESCO, 2012a). In Mali, a project known as Road to Reading has also been piloted using mobile phone technologies (UNESCO, 2012a). Although some of these projects are not specifically designed for secondary education, they relate to the usage of mobile technology (mobile phones) at different levels and contexts of teaching and learning.

5.0 Capabilities of mobile phone technologies

According to the UNESCO Working Paper series (2012c) on mobile learning in Africa and Middle East (AME), there are about seven billion people on the planet and more than five billion have mobile phone subscriptions. The developing world constitutes 70% of these subscriptions. According to UNESCO (2012c) the decline of mobile phone prices is expected to increase mobile phone ownership in Africa leading to mobile phone technology as the most ubiquitous ICT innovation that can assist and extend education opportunities. The attempts made by teachers, schools and countries that implement mobile

learning have been characterized by both successes and failures. From the lessons learnt, UNESCO has identified three successes of using mobile technology: (1) mobile devices are well-situated to improve and extend learning, (2) they can provide rich educational opportunities to students who have traditionally lacked access to high-quality schooling (p. 7), and (3) the wide range of multimedia and interactive capabilities may in some instances and contexts be superior to paper-and-ink resources (p. 8). The potential for mobile technology to make contributions to education are estimated as high with the ability to offer more versatility and convergence (Wallace, 2012). Firstly, a mobile phone is so small, making it easy to carry at all times. Other devices such as laptops will require a backpack and probably the physical ability to carry it for a sustainable period of time. These light weight gadgets (cell phones) are therefore stress-free, making their affordances of usage to be anywhere and at time slots such as while on the bus, between classes, in a queue or the playground. Most of these areas may be found to be awkward for learning, more especially when a device such as a laptop is used.   It is found that most students, especially teenagers, have developed personal attachment to their mobile phones and this attachment is found to boost or enhance students' interests in using mobile phones for learning (Wallace, 2012).

A study by Hartnell-Young and Heym (2008) has identified a number of important potential benefits for mobile phone use in teaching and learning. Their study was conducted in three different areas, one secondary school in Cambridgeshire, one secondary school in West Berkshire and a cluster of three secondary schools in Nottingham. Though the approaches were different per school, all students had access to a mobile phone. The research showed that even before the project started, students were already using their phones in class, Maths (27%), Science (15%), English and Geography (11%) (p. 7). According to the project, students were using mobile phones for visuals, audio, and the stopwatch was used to time Science experiments. The make-up of mobile phones such as built-in cameras and audio recording abilities were used to record and capture class events or activities in a wide range of subjects. Even though some students could not afford expensive and more compatible phones, a fundamental difference between them and other devices such as laptops is that students already owned mobile phones; therefore, they already knew how to use them and there was no need for training and personal digital assistance (Hartnell-Young & Heym, 2008). In the same study, students used mobile phones to do fifteen useful things: (1) timing experiments, (2) photographing apparatus and results of experiments, (3) photographing development of design models for E-portfolios, (4) photographing texts/whiteboards for future review, (this saves a lot of time as compared to copying down notes and diagrams), (5) bluetoothing project material between group member, (an element of sharing learning experiences collaboratively), (6) receiving short message service (SMS) and email reminders from teachers, (7) synchronizing calendar/timetable and setting reminders, (8) connecting remotely to school learning platform, (9) recording a teacher reading a poem for revision,   (10) accessing revision sites on the internet, (11) creating short narrative movies, (12) downloading and listening to foreign language podcasts, (13) logging into the school email system, (14) using GPS to identify locations and (15) transferring files between home and school (p. 9).

At the end of the project, students were reported to have built positive attitudes towards the use of mobile phones for learning. High motivation for learning was also recorded as students reported the joy they had during the project. Some students who were seen to be lacking confidence used the phones successfully and blossomed in learning and socially (Hartnell-Young, 2008). Even though mobile phones are not suitable for every aspect of learning technologies in the classroom, they could be linked up with other tools such as printers and personal computers. As stated in number 15 above, files can be shared

through the use of mobile phones, for example, downloading photographs. During a discussion between students and teachers at the end of the project, one student was recorded saying "if you're allowed to take your phone in school, I think that they should say you're allowed to use it if your teacher says, for an experiment or something like that. But you shouldn't be allowed to just have them out to text your friends" (Hartnell-Young & Heym, 2008 p. 20).

In Malaysia, Short Message Service (SMS) technology has become the most preferred mode of learning to be applied in mobile learning curriculum in Malaysian secondary schools (Mahamad and Woollards, 2012, p.1). The use of smart phones is expected to be implemented in secondary schools between the year 2016 and 2020. Seven signs of promise have been established to deploy mobile phones in Malaysian schools after an educational research and development study was applied. The study gathered the following key points: (1) mobile phones as viable teaching and learning tools to support English subject, (2) mobile phones as an affordable tool, (3) mobile phone as a common device among students, (4) mobile phones as a tool to be used in mainstream education in the future, (5) mobile phones as an engaging and motivating tool, (6) mobile phones as a tool to support various learning activities and (7) mobile phones as a tool to prepare students for the future (Mahamad and Woollards, 2012, p. 1).

In addition, the Ministry of Education (Malaysia) sees the deployment of mobile phones in secondary schools as: added value; alternative technology; complementing the government's vision (Mahamad and Woollards, 2012 p. 2). After introducing a number of various programmes aimed at improving English language in Malaysian schools, the Ministry of Education has embraced the affordances of mobile phones. Students will exploit SMS technology to practice English. The expenses of computers for all schools are substituted with mobile phones which will cost less. The South Korean initiative to shift from paper to digital textbooks has also been launched nationwide and is expected to reach schools by the year 2015. It is the Government of Koreas' intention to have textbook content displayed on a wide range of mobile devices (Mahamad and Woollards, 2012).

6.0 Challenges for mobile phone learning technologies

This part of the review will concentrate on challenges for employing mobile phones in secondary schools. Wallace (2012) has identified three concerns for mobile learning: (1) technical challenges (2) usability issues and (3) multitasking, distractions and inappropriate use. This author posits that technical challenges may start with a very competitive mobile phone operating system that varies considerably. A certain choice of a platform to create mobile learning applications may have to be made. According to UNESCO (2012c) report, mobile telephony is not universal. Even though some countries in the Middle East have exceeded a 100% mark in mobile penetration, some part of the sub-Saharan Africa is still experiencing low mobile penetration. Using small screen and tiny keypads may be one of the challenges for usability. Access of smart phones in the AME region is reported to be low, more especially in Africa. It is expected that large screen, increased functionality and easy navigating smart phone prices will drop to be affordable for most people.

Ringing phones may distract class and consequently student performance while listening to music and texting during study is found to be another challenge. Research has indicated that heavy multi-taskers perform badly as compared to students who do not often engage in multitasks (UNESCO, 2012c).

Cyberbullying, where students capture embarrassing pictures and videos of classmates and posting them on the internet is another concern to educators. Some students may develop habits of accessing inappropriate web sites and this may likely take place outside the control of the school's filtering software (Wallace, 2012). Students currently own mobile phones and they use them whenever regardless of whether they are allowed or prohibited in schools. In other words, the risks associated with mobile phones may not vanish. All these concerns are valid and educators will need to establish solutions that will support and protect mobile learning through to the margins of education. It is these schools that are well positioned to teach students how to use mobile technologies responsibly (UNESCO, 2012b).

According to research by Mahamad and Woollards (2012), some respondents argue that it will be a waste if mobile phone technology is not considered to be used in education and find it inappropriate to discourage students from using mobile phones in learning activities. It is worth mentioning that some educators have argued that mobile learning is the next stage in technology enhanced learning while others remained sceptical and wondering whether mobile phones will make any fundamental impact (Wallace, 2012). ICT policy could be a major barrier in this educational innovation, but in this paper, it is discussed as a potential driver and enabler of mobile learning. Mahamad and Woollards (2012), Wallace (2012), Hartnell-Young and Heym (2008) and Kukulska-Hulme, Sharples, Mildred, Arnedillo-Sanchez & Vavoula (2011) advocate for the introduction of new policy to deploy mobile phone ICT in schools. The Malaysian schools' ICT policy through the use of mobile phones is an effort to enhance learning as well as to reduce the digital divide among schools (Mahamad and Woollards, 2012). In Malaysia, mobile phones are included under ICT, therefore, they may be used as ICT tools to support teaching and learning. The ICT in education policies in Africa and Middle East reflect a significant vacuum because they rarely address mobile learning (UNESCO, 2012b). The report put the blame on limited involvement of governments in the region, however, a project named Dr Math in South Africa (UNESCO, 2012b) has "developed acceptable use of policies to steer the use of mobile phones in education" (p. 30). While shifting the focus from the devices, a number of solutions must be the focus of the policies that are expected to deal with a number of challenges stated earlier such as appropriate behaviour, privacy, distractions and inappropriate use. Hartnell-Young & Heym (2008) recommends that:

*while the eventual aim could be to replace policies that involve blanket bans on devices, we do not recommend whole-school change at the outset, rather a gradual adoption as attitudes and behaviours align with purposeful learning until the school (and the community) reaches the tipping point, and mobile phone use is as natural as using any other technology in school (*p. 3).

7.0 Enhancing mobile learning technologies

It is important to consider professional development (teachers, school administrators and other stakeholder) reform as a possible strategy if not a driver for enhancing mobile learning. It is worth mentioning that reform is needed at all levels and contexts of learning. With regard to mobile learning in school settings, future success will depend on the preparedness of teachers to adopt mobile technologies in and beyond the classroom (Kukulska-Hulme, 2011). A profitable use of mobile phones in schools will be to make teachers and other staff members aware of the benefits together with the limitations. Training will be essential to inform teachers on how to deal with the negative attitudes that prevail against mobile phones. Above all, teachers need to develop knowledge of the potential of mobile phone technology for curriculum

uses (Hartnell-Young, 2008). This new technology suggests that teachers will have to teach differently from the way they were taught while training to teach so they need an opportunity to engage in purposeful activities in which the affordances of mobile phone technologies are made explicit (Hartnell-Young and Heym, 2008). These authors suggest that teachers can benefit from playful, active and experiential learning in which the opportunity to construct, enact and revise their learning path is granted (p. 167).

According to the UNESCO (2012b) report, lack of motivation and shortage of qualified teachers needed for the challenging Twenty First Century (C21) educational context in the Africa and Middle East (AME) region is an endemic crisis in teaching and teacher development systems. A number of projects have been piloted in the region, even though they are experimental, the aim was on how mobile phones might enhance opportunities for the professional development of teachers in their pedagogical practices and administrative duties. The report observed that less time is devoted to training teachers on how to use mobile phones and more emphasis is placed on how mobile learning platforms can be integrated into instructional strategies (p. 20). In South Africa, the Nokia Mobile Mathematics (MoMath) project commenced in 2007, in 2010 the project reached seventy two (72) teachers and by the end of 2011, the project had reached 500 teachers. These teachers received a two-day training by project team members and teachers who were part of the first pilot phase. The initial project evaluation revealed seventy nine 79% satisfaction and the same views were confirmed six months later. Nevertheless, a more systematized Continuing Teacher Professional Development (CTPD) process for teachers has been put in place. CTPD does not only assist teachers with ICT transformation but also provides the pedagogical and innovative skills (UNESCO, 2012b).

8.0 Technology, Innovation, and Educational Change

Literature has shown that technology (in general) is an important commodity for learning. Currently, literature is placing emphasis on innovation and innovative teaching and learning. Researchers such as Jacobson & Reimann (2010) have explored learning environments (for the twenty-first century) that may help students achieve set goals. Kozma (2003) conducted surveys on innovative pedagogical practices that used ICT but did not conduct research on the technology itself. Nevertheless, papers by these researchers are representative of global or international research on learning technologies and pedagogical practices in various learning environments and context. However, the underlying principle in both papers is the affordances of technology for improving teaching and learning that can be translated further to a broader sense of economic growth (Kozma, 2003) and to classroom achievement goals (Jacobson & Reimann, 2010). According to Kozma (2003), technology and educational change have a profound influence on economic transformation where technology and knowledge drive productivity and economic growth (knowledge economy) and social transformation which is referred to as information society. Jacobson & Reimann (2010) have mentioned a distinction between inventions and innovation. Invention is explained as a novel and initial unique artifact and practice while an innovation is that which becomes more widely disseminated or appropriated by commercial environments more generally (p. 2). According to Kozma (2003), a successful implementation of innovative practices depends on different levels where at each level there are actors and factors. These levels include the classroom and its practices, the school or local community, and the state, national and international setup. Jacobson & Reimann (2010) share the same notion that there is much more to the environment than the technology (p. 2). These authors also make reference to factors such as teaching practices and school leadership which may affect the breadth and depth of uptake of learning technologies in schools.

9.0 Conclusion

Literature has shown the value of combating conservatism among teachers, Governments and the general public regarding technology in general and mobile phones in particular. This paper may serve as an awareness-raising research and advocacy for the value of mobile phones in providing teaching and learning support as they are the most common and affordable device. The paper adopted the UNESCO Working Paper Series on Mobile Learning (2012) on the state of mobile learning technologies through mobile phones in educational environments. Research has demonstrated that mobile phones, especially smart phones have great value in teaching and learning through their features and applications. This paper shows the imperativeness of adopting this technology in Botswana secondary schools if supported by appropriate policies. Literature suggests visionary leadership, robust technology capacity, professional development and the need for change of policies as critical attributes that enable the adoption and enhancement of this technology. The concept of educational change and or transformation is a common factor in current research in education. This notion is supported by the central theme- the future (Jacobson & Reimann, 2010) which implies invention of better designs or artefacts for learning environments. These authors have explored and provided a wide range of artefacts and theory that can help teaching and learning in the twenty-first century. Therefore, Botswana like other developing countries has access to mobile phone technology that could be tapped and used in secondary classrooms. Secondly, the useful features of mobile technologies could be infused in the teaching and learning of various subjects in the curriculum. The integration of these technologies could have their entry point at the curriculum development level so as to acquire the desired impact.

While there are several challenges associated with mobile phone technology, these could be handled through well thought out national policies that would benefit from the positive aspects of using these tools in promoting teaching and learning. To enhance these tools, it is important to recognize their ability as instrumental tools of paramount importance. The purpose of this paper was to identify capabilities of mobile phones when used as a teaching tool. This study provides a synopsis of the advantages of integrating mobile phone technologies in secondary schools. It suggests that these capabilities of mobile phone can be adapted for Botswana to develop or improve teaching and learning. The significance of pursuing this paper was to provide Botswana educators with some insight regarding the benefits and limitations associated with using mobile phones in the classroom. Selected UNESCO reports have been used as core sources for demonstrating research on mobile phone technology use and nonuse in Africa and beyond. It seems fitting that the current decade, which research characterizes it with the ever dynamic and advances in education may be overwhelmed by mobile technologies. The conclusions arising from this review are:

10.0   Mobile phones availability to teachers and students in classrooms today

Research has shown that mobile phones are the most commonly used devices in the world today and a very large number of people in Africa own mobile phones. Mobile devices – because of their ubiquity and portability – are positioned to influence teaching and learning in a way personal computers never did (UNESCO, 2012c). This UNESCO report also reported that many countries, more especially in Africa, twenty times more people connect to the internet through mobile phones than fixed-line computers (p. 11). According to DeWitte (2010), the potential of learning through mobile learning can be expanded beyond

the traditional classroom walls through anytime and anyplace learning. According to research, the potential is huge for education-related content. Mobile phones are positioned to provide supplemental help in learning through videos, social media, digital citizenship and internet filtering. They can also be an extension of the way teachers communicate with their students.

11.0   Useful features / application of mobile phones for education purposes

Mobile phones provide inexpensive computing. Recent phone designs, smart phones, are portable, pocket sized and have a number of features with the potential to support instructional practices (Thomas & McGee, 2012). These authors add that mobile phones provide interaction and communication with teachers and peers which promote a more active and continuous learning environment (p. 22). Mobile phone tools support instruction through texting, this may take place between student to student, teacher to student, teacher to teacher and teacher to parent; digital imaging, using mobile phone camera to capture images for knowledge development; podcasting, mobile phones used to capture dynamic audio and video recordings; and internet access, internet as an instructional tool that links students with vast sources of information (Thomas & McGee, 2012).

12.0   Challenges facing integration of mobile phones in schools

According to DeWitte (2010) M-learning does not come without limitations (p. 2). Despite research findings that secondary students have a positive attitude toward cell phones being permitted in the classroom, some educational administrators are sceptical of classroom disruptions, cheating, and cyber bullying. However, it is possible to reduce these limitations to make mobile phones a useful tool in teaching and learning (DeWitte, 2010).

13.0   How to enhance mobile phone innovation

Research shows that mobile phones for learning are an emerging technology in schools (DeWitte, 2010, p. 14). In this situation, educators are faced with a challenge of being up-to-date on mobile phone technology and creating ways to integrate them to meet different needs of students especially at the secondary school level. Despite being viewed as destructive devices, educators will need to propose workable solutions in order to move mobile learning from the margins of educations to the mainstream (UNESCO, 2012c, p. 7). Governments should develop policies that acknowledge mobile phone technologies as they make inroads as adequate teaching tools in educational settings including Botswana.

14.0   Recommendations

The findings of a review of literature on mobile phone technologies in secondary education suggest four key conditions that must exist for a mobile phone learning initiative to succeed: visionary leadership and commitment, robust technology capacity, professional development, and lastly, policies that promote and support the initiative (MindShift, 2012).

15.0   Visionary Leadership and Commitment

The development of any reform may depend very much on the leaders and what they envision. In schools, the government and other leaders should pioneer robust mobile phone learning technology programs. Many countries in Africa, such as South Africa, are doing more to replace print resources with digital versions (MindShift, 2012). This effort requires everyone's involvement in the programs to have a clear understanding of the goals, intended outcomes, and expected benefits and risks (MindShift, 2012). The commitment requires collaborative work between educational technology departments with curriculum development departments to align their objectives and have technology entry point at the curriculum development level and not the classroom level (MindShift, 2012).

16.0   Robust Technology Capacity

An analysis of Botswana's capacity of existing technological infrastructure will be an important area to consider for the successful implementation of such a technical learning initiative. Due to the dynamism of technology, careful consideration and planning for the demands of the new program, including broadband access, hardware and software, and technical support need to be carefully analyzed (MindShift, 2012). This analysis will include projections for broadband requirements and related aspects. Ideally, internet and wireless connectivity should be available throughout to maximize the potential of mobile phones. As mobile phones differ, in size and other features such as memory, speculations are that within the next five years, the whole of Africa will be a smart phone market, and by 2013 more smart phones will be sold than basic phones in South Africa (Verma, 2011 cited in UNESCO, 2012b).

17.0   Professional Development

One of the challenges Botswana has to deal with for the success of incorporating learning technologies in schools, including mobile phones, is the pedagogical repertoire of teachers. According to MinShift (2012), researchers and educationists say that improvements in student outcomes are likely to occur if mobile learning initiatives lead to fundamental changes in instructional strategies. Now that research shows that technology affords learning anywhere and anytime, it may be ideal to incorporate learning technologies into Colleges of Education for teachers to integrate it into their instruction and training. Though technology is dynamic and there is variety of it in the market, educational technology personnel should be in a position to provide appropriate support and advice as stated in point 1 above. At this point, another challenge is the training of educational technology personnel who will provide guidance on developing digital content and resources. In-service educators may close the gap by creating and joining communities of practice or professional learning communities where they meet regularly, either face-to-face or online to share ideas, discuss challenges and ways of improving the teaching profession (MindShift, 2012). Jacobson & Reimann (2010) and Kozma (2003) allude to the fact that learning technologies may not be effective by themselves but rather the need for professional development in the use of ICT as it is paramount in order to accomplish and optimize positive impact of these technologies. Jacobson & Reimann (2010) mentioned teachers as key users of these technologies and they observed that in the classroom, the key infrastructure users are the teachers because they do not only use learning technologies themselves, but also orchestrate the use for other users, the students (p. 2).

18.0   Need for Policies that promote and support the initiative

One of the policy commitments that may be of paramount importance to educational technologies states that, as a significant proportion of population is connected to mobile phone services; service providers will be required to engage in innovative ways of packaging and readily availing specific information, in the areas of e-health, e-learning, e-agriculture, e-meteorology, government e-services, e-library and e-commerce to respective target audiences (Republic of Botswana, 2011, p. 14). There is therefore the need for more specific policies for the use of teaching and learning technologies including mobile phones.

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