European Journal of Open Education and E-learning Studies
ISSN: 2501-9120
ISSN-L: 2501-9120
Available on-line at: www.oapub.org/edu

doi: 10.5281/zenodo.2649514 Volume 4 | Issue 1 | 2019

EFFECTIVE USE OF MOBILE PHONES IN ENHANCING EDUCATION OUTCOMES IN KENYA - A HISTORICAL STUDY ON FACTS AND MISCONCEPTION OF MOBILE PHONES USES BY STUDENTS

Kagenyi David Macharia[i]
Senior Principal Lecturer,
Kenya school of Government (KSG),
Mombasa, Kenya
Specialist in Education Policy,
PhD Student, Kenyatta University,
Kenya

Abstract:
The primary objective of the educational process is the development of the thinking of learners. This paper deals with the development of learners' thinking in mathematics, in the transition from the acquisition of calculation algorithms to the acquisition of the algorithmic rules. Algorithmic rules need to be understood and it means the need to change the way of teaching. A substantial change in teaching is the use of question-answer system. This system is described in the paper in terms of pedagogy and psychology, and all these facts lead to comprehensive view of the application of the system in teaching mathematics. In the next part of the article we describe the features of learners thinking. When the method of substitution is taught properly, these features enrich the learners‘ thinking. The method of substitution is the first algorithmic rule.

Keywords: mobile phones; mobile learning; meducation, educational outcomes; new learning, new teaching

1. Introduction

The goal of the Vision 2030 is to transform the country into a globally competitive and a prosperous nation by the year 2030. The vision is founded on the social, economic and political pillars. Within the social pillar, education sector plays a critical role in facilitating the process of inculcating knowledge, attitudes and skills necessary for catapulting Kenya to a globally competitive country and acquiring new knowledge in a systematic way with a view to improving products and processes. The sector therefore has a major responsibility of facilitating the process of developing manpower necessary

[i] Correspondence: email: david.macharia@ksg.ac.ke, kagenyidm@yahoo.com

for transforming Kenya into a globally competitive country (Kenya Basic Edu. booklet 2014)).

For quite some time, the international development community has emphasized the paramount role of education in bringing about sustainable socio-economic development in Africa. Goal 2 of the United Nations Millennium Development Goals (MDGs) aimed to achieve universal primary education for children everywhere, boys and girls alike, by 2015. On the other hand Goal 4 of the United Nations sustainable development goals (SDGs) aims to ensure inclusive and quality education for all and promote lifelong learning opportunities for all. Since 2000, there has been enormous progress on the goal to provide primary education to all children worldwide. The primary school enrolment rate in developing regions reached 91%. By measures in any school, that's a good grade. Now, let's get an even better grade for all kids and achieve the goal of universal primary and secondary education, affordable vocational training, access to higher education and more (UNDP SDGs Booklet 2017). Looking at Kenya enrolment by Gender and Level of Education the trend in enrolments across the three levels of basic education is as follows; The ECDE level has witnessed tremendous growth between 2009 and 2014, registering an annual growth of 6.1%. The growth may be attributed to assured transition between ECDE and primary schools as most ECDE centers are hosted in primary schools. The absolute parity index has improved in favor of girls from 2009 to 2014. The national average for the parity index has hidden cross county variations which have been presented in chapter four.

Enrolment in ECDE increased by 772,600 pupils over the period between 2009 and 2014 this giving an annual growth rate of 6.1%. The total number of pupils enrolled in Primary Education increased by more than 8% over the period, with about 767,200 additional pupils and an annual growth rate of 1.6%. Secondary Education had the highest increase over the period with about 837,300 additional students that represent almost 57% increase over the period and with 9.4% annual increase.

The parity index between girls and boys at ECDE level, increased over the period from 0.95 in 2009 to 1.05 in 2014. Thus there were more boys than girls at the beginning of the period and this changed to having more girls than boys in 2014. In Primary Education, the parity index improved over the period but did not get to parity by 2014 and hence equality is not yet achieved. Despite a real improvement in the gender parity at Secondary Education over the period, the index is still low at 0.92. Thus there are fewer girls than boys at Secondary Education level.

Access at grade six (retention) has improved over the years from 95% in 2009 to 100.2% in 2014 (EFA target). The enrolment at class eight has grown over the same period at an annual rate of 0.6%.

However, this rate of growth in the enrolment is lower than the annual growth of the population that is theoretically supposed to be in class 8 (Age 13) over the same period hence the significant drop in the primary completion rate from 86.5% in 2009 to 79.3% in 2014.

Under the Education for All Framework, the desire of all countries that ratified the commitment is to attain universal primary education, i.e. all children of school going age to enroll in school and complete the primary cycle as designed. In Kenya there is universal access but after grade six, the system loses children along the way thereby undermining the attainment of universal primary education (Kenya Basic Edu. booklet 2014).

Significant challenges remained, however. For example, in Sub-Sahara Africa the enrolment ratio has reached 90%, but there still remain more than 18 million children of primary school age who are not enrolled. Similar challenges confront secondary and tertiary education. In developing countries, on average, only 54% of children of the appropriate age attend secondary school currently (UN, 2008).

Additionally, more than one-third of the world's adult population – most living in the developing world – has no access to printed knowledge, new skills, and technologies that could improve the quality of their lives (Dhanarajan, 2009). Inequalities in access to education continue to pose major barriers in the developing world, and the delivery of cost-effective and quality education remains a persistent problem.

In the attempt to find viable solutions to these problems, much hope has been placed in new information and communication technologies (ICTs). It is believed that ICTs can empower teachers and learners by facilitating communication and interaction, offering new modes of delivery, and generally transforming teaching and learning processes. Of the many different forms of ICTs, mobile phones are thought, for several reasons, to be a particularly suitable tool for advancing education in developing regions. First, mobiles phones are the most prevalent ICT in the developing world, and the penetration rate is rising rapidly. In Africa as well as Asia, mobile phones penetration has doubled within a short span of time; in 2001, average penetration was 19.7 per 100 inhabitants while in 2005 the penetration rate rose to 40.9 (Orbicom, 2007). Also relevant is the fact that mobile phone ownership is increasingly more common in the lower socio-economic segments of society (Samrajiva & Zainudeen, 2008). Second, mobile phones are an especially good 'leapfrogger' since they use the radio spectrum. There is, therefore, less need for new physical infrastructure such as roads and phone wires, and base-stations can be powered via generators in places where there is no electrical grid (Economist, 2008) in Kenya remote areas are using Sola energy to charge phones others use Diesel/petrol generators. Finally, in addition to voice communication, mobile phones allow the transfer of data, which can be particularly useful for delivering educational content over long distances. Currently whatups is common social media communication platform.

The concept of mobile learning (Mlearning) – understood for the purposes of this article as learning facilitated by mobile devices – is gaining traction in the developing world. The number of projects exploring the potential of mobile phone-facilitated Mlearning in the developing world is steadily growing, spurred in part by the use of mobile technology in the educational sector in the developed world which has

expanded from short-term trials on a small scale to large-scale integration. However, there remains a lack of analysis that brings together the findings of the rising number of Mlearning programs and projects in the developing world in general and Kenya in particular.

With the increasing attention now being given to the role of mobiles in the educational sector in developing countries, there is a need at this juncture to take stock of the available evidence of the educational benefits that mobile phones provide in the Third world that is the less developed countries of Africa and Asia. Consequently, this article explores the possibilities of Mlearning/Meducation/Mteaching programs and projects in Kenya. Inequalities in access to education continue being a barrier in the developing world, and the delivery of cost-effective and quality education remains a persistent common problem.

This article is a historical study, showing how effective use of Mobile phones in education will contribute to improved educational outcomes in Kenya. It examines the extent to which the use of mobile phones (Mlearning) helps to improve educational outcomes by improving access to education under Meducation and by promoting new learning and new teaching under Mlearning and Mteaching respectively. The paper argues that Mlearning, Mteaching and Meducation are current realities in all levels of education not only in Kenya but world over. Educators and education stake holders should therefore not panic on negative effects of the use of mobiles phones by students but should focus on various benefits of mobile phone uses in education. It argues that mobile phones uses in education benefits surpass many times their negatives. Therefore educators/education stakeholders should be in the front line in fighting and eliminating all misconceptions and said untruths (negative myths) on mobile phones use in education and by students. In exploring how mobile phone-facilitated Mlearning/Meducation/Mteaching contributes to improved educational outcomes, this article examines specific issues like; the role of mobiles in improving access to education, the role of mobiles in promoting new learning, those new learning processes and new instructional methods currently stressed in educational theory.

The structure of the article continues as follows. After the introduction, the article engages with the literature that discusses how mobile technology can address the problems of access confronting the educational sector as well as mobile technology's role in relation to new learning. The article then examines examples of the actual use of mobile phones for education in developing countries in of Africa and Asia and of the developed world of the US and UK. The article discusses the potential of mobile phone-facilitated Mlearning as well as with indications for possible future areas of research. It concludes with conclusions and recommendations. An elaborate reference is give at the end of the paper.

2. How Mobiles phones improve Access to Education

In theory, Mlearning increases access for those who are mobile or cannot physically attend learning institutions – those who would not otherwise be able to follow courses in a traditional educational setting due to the constraints of work, household activities, or other competing demands on their time. Mlearning makes education more accessible in that it enables learners to pursue their studies according to their own schedule. The portability of mobile technology means that Mlearning is not bound by fixed class times; Mlearning enables learning at all times and in all places, during breaks, before or after shifts, at home, or on the go. Interestingly, however, while Mlearning is portable, it is not necessarily associated with physical movement. According to a study conducted by Vavoula, few people actually utilize the time spent in transit to learn (Sharples, Taylor, & Vavoula, 2005) in (John-Harmen Valk, atel 2010) www.irrodl.org/index.php/irrodl/article/view/794/1487.

Mlearning, as Visser and West (2005) suggest, can also increase access in those situations where cost represents a significant barrier to learning. For those in rural or remote areas where environmental and infrastructure challenges hinder other learning modalities, particularly eLearning, Mlearning presents great opportunities. For the individual learner, mobile technology is much less cost-prohibitive than other technologies like personal computers and broadband connections that are necessary for eLearning. In as much as mobile technology presents a less cost-prohibitive medium for learning, it represents an important avenue by which to reduce the gap between the haves and the have-nots in contemporary society where access to knowledge and information is increasingly important (VanWeert, 2005).

In regards to cost, the benefit of increased access afforded by Mlearning is particularly relevant in the developing country context. Many developing countries are completely bypassing investments in costly, fixed telephone infrastructure for the installation of mobile phone networks (Motlik, 2008; Sharples, Taylor, & Vavoula, 2007; Traxler & Dearden, 2005). Thus, Mlearning provides a potential way forward for the expansion of education programs to larger segments of the population rather than via the eLearning model that has been adopted in much of the developed world. Mlearning allows a method of educational instructions delivery that is more cost-effective than eLearning methods, in that many people are already familiar with mobile phone applications (Motlik, 2008), more so children of age 3 year are able to use smart phones without any assistant or guidance from a teacher.

In so much as Mlearning exerts an impact on educational outcomes by increasing access, Mlearning represents a continuation and improvement of distance learning through increased utility and applicability (Keegan, 2002). Mlearning, it broadens the availability of quality education materials through decreased cost and increased flexibility while also enhancing the efficiency and effectiveness of education administration/management, policy formulation, and curriculum development and implementation.

3. How Mobiles phones are Promoting New Learning

Others suggest that the benefits of mobile phones are not merely limited to increased access to educational services. Mlearning, also facilitate changes in the character of learning modalities that in turn impact educational outcomes. In this regard, Mlearning represents more than a mere extension of traditional forms of education; Mlearning facilitates alternative learning processes and instructional methods that the theories of new learning identify as effective for learning.

According to proponents of new learning, mobiles facilitate designs for personalized learning in that they are responsive to difference and diversity in the way learning occurs. They facilitate designs for situated learning by providing learning during the course of the activity – in the field for a botany student, in the classroom for a teacher trainee, or in the workshop for an engineer. In this sense, Mlearning also facilitates designs for authentic learning, meaning learning that targets real-world problems and involves projects of relevance and interest to the learner (Kukulska-Hulme & Traxler 2007; Traxler, 2007).

The supposed value of mobiles also arises from the manner in which they facilitate lifelong learning. Mobiles can support the great amount of learning that occurs during the many activities of everyday life, learning that occurs spontaneously in impromptu settings outside of the classroom and outside of the usual environment of home and office. They enable learning that occurs across time and place as learners apply what they learn in one environment to developments in another (Sharples et al., 2005, 2007).

Mobile phones theoretically make learner-centred learning possible by enabling students to customize the transfer of and access to information in order to build on their skills and knowledge and to meet their own educational goals (Sharples et al., 2007). Mlearning thus exerts a democratizing effect on the learning experience as learners take a greater responsibility for the learning process instead of being passively fed information by an instructor. Whereas in traditional models of education the goal is the transfer of knowledge from teacher to student, Mlearning empowers students to actively participate in the learning process to make it a process of construction and not mere instruction (Dela Pena-Bandalaria, 2007). Mlearning thus represents learning that is not 'just-in-case,' education for the sake of producing a bank of knowledge, but rather represents learning that is 'just-in-time,' 'just enough,' or 'just-for-me' (Traxler, 2007). As a facilitator of new learning, Mlearning goes beyond an emphasis on the possession of information to enabling learners to find, identify, manipulate, and evaluate existing information (Brown, 2003).

Mobiles can also supposedly facilitate knowledge-centred learning by providing efficient and inventive methods by which students can learn with understanding – meaning that they deepen their understanding of a specific subject matter rather than merely memorizing large amounts of information – and then use this knowledge as a basis for new learning through integration and interconnection. Mobile devices make

possible assessment-centred learning as well by enabling the provision of continual feedback throughout the learning process, presenting learners with diagnosis and formative guidance as to what might be improved or what might be learned next. Moreover, in providing prompt feedback, Mlearning maintains the appeal of learning and provides a motivating factor that can at times be lacking in traditional modes of education (Geddes, 2004). Mobile phones also facilitate community-centred learning, meaning learning that the learner deems valuable because of its relevance to the surrounding social context; Mlearning facilitates learning that can be used to achieve socio-economic goals that respond to problems, such as problems related to health or family care confronting the surrounding community (Sharples et al., 2007; Wagner & Kozma, 2005).

Given that social interaction is central to effective learning, as indicated by theories of new learning, mobile phones should also impact educational outcomes by facilitating communication. Mobiles permit collaborative learning and continued conversation despite physical location and thus advance the process of coming to know, which occurs through conversations across contexts and among various people. Via mobile technology, learners engage in conversation whereby they resolve differences, understand the experiences of others, and create common interpretations and shared understanding of the world (Nyiri, 2002; Sharples et al., 2007).

In promoting educational modalities that accord with the theories of new learning, Mlearning should offer an appeal aspect that also impacts educational outcomes. Mlearning can be particularly appealing for those who have not succeeded in traditional learning environments; it can attract those not enamoured by traditional learning approaches that are generalized and decontextualized in nature. Mlearning is also beneficial in that it can provide immediate feedback and thus provide continued motivation for those who are not motivated by traditional educational settings. Moreover, Mlearning presents an appeal simply because the use of mobile technology in and of itself presents something new and exciting for a great array of learners (Geddes, 2004).

Mobiles, therefore, should impact educational outcomes by altering the character of education and learning because the nature of mobile technology converges with and facilitates new learning. The new learning is personalized, learner-centred, situated, collaborative, ubiquitous, and lifelong. Likewise, mobile technology is increasingly personal, user-centred, mobile, networked, ubiquitous, and durable (Sharples et al., 2007). The literature indicates that the benefits afforded by this convergence should exert a positive impact on educational outcomes. Use or Implementation of Mobile Learning, mobile teaching and mobile education world over www.opencolleges.edu.au/informed/features/how-educators-are-practicing-mobile-learning.

In a few decades, mobile technology has spread to the furthest corners of the planet. Of the estimated 7 billion people on Earth, 6 billion now have access to a working mobile phone. Africa, which had a mobile penetration rate of just 5% in the

1990s, is now the second largest and fastest growing mobile phone market in the world, with a penetration rate of over 60% and raising daily.

The phones themselves are not advanced by developed nations' standards. Most people in developing countries have what are called "feature phones," which are less sophisticated than smartphones and have fewer features. But have numeric keypads, and can access the internet on a tiny screen–which, by the way, is not a tiny screen to them but a window of vast opportunity.

Mobile technology has spread to various corners too. In areas where schools can't afford to receive traditional educational materials, mobile devices have moved in. One library in Ghana that has no books on its shelves, but now has an e-reader, giving the students of its village access to hundreds of books that could never be physically sent to the library.

UNESCO reported that 250 million students worldwide cannot read, write, or count, even after four years of school. How schools respond to the growth of mobile devices will affect generations of students and their readiness for college and the workforce.

4. Examples of the world's Meducation/Mteaching initiatives

4.1 Eneza Education, Kenya

In Kiswahili, "eneza" means "to reach" or "to spread." Eneza (originally called mPrep) is a mobile assistant for teachers that gives schools and parents access to solutions such as quizzing platforms, performance dashboards, and tips for helping their students. Through SMS or the Web, students can receive educational content, browse through Wikipedia, and ask teachers questions.

4.2 Ustad Mobile, Afghanistan

Ustad Mobile phone (Mobile Teacher) is a mobile course creation tool developed in Afghanistan. The open source toolkit has already been used by policewomen in Afghanistan to develop literacy courses in local languages. Smartphones or feature phones can be used to access the content, developed by instructors on computers. The software is a free download, and can be used to design quizzes, multiple choice questions, math drills, and so on. Instructors can use the cloud reporting tool for real time access to detailed reports on effort and performance.

4.3 One2Act Mobile Feedback, Norway

Mobiles phones can be used to get real-time feedback from learners' devices using One2Act, allowing teachers to provide rapid and customized feedback to learners. Teachers get an instant dashboard of the students' understanding of the topic covered, using this to increase classroom interaction, group collaboration, and peer learning as a springboard for reflection and discussion.

4.4 TBR Mobilization & Emerging Technology, Tennessee

This research and resource project from Tennessee showcases what is possible in the 'm-campus' with social networking and mobile devices enabling gaming, simulations, and virtual worlds. These can be used to increase recruiting, retention, and graduation rates; to improve teaching, learning, and workforce development; and for meeting the needs of 21st century workforces.

4.5 OER4Schools Programme, Commonwealth

OER4Schools is a Commonwealth professional development programme for low-resourced primary schools. Interactive teaching of mathematics and science is supported with digital technology. Interactive teaching is possible with and without ICT.

4.6 UNESCO, Nigeria

In Nigeria, UNESCO is piloting a program with English teachers. Program leaders send messages daily with examples of how to teach English language to teachers throughout the country. It also allows teachers to share their learning with one another, previously very difficult to do between remote rural villages. An agreement with the mobile provider keeps costs for users low.

4.7 Open Education Resources University, Worldwide

A recent initiative that will reduce the cost of obtaining a formal education is the Open Education Resources University (OERu), which is a consortium of accredited universities around the world that is planning to offer formal courses at a significantly reduced cost, making education affordable to millions of students. The OERu will play an important role in lifelong learning around the world since learners of any age can complete courses at an affordable cost, and will have a major global impact if the courses are delivered on mobile devices.

5. How educators and stakeholders are making a difference in Mlearning, Mteaching and Meducation use world over

To improve access to Mlearning, Mteaching and Meducation educators and other stakeholders are enhancing their effective use in schools by;

1) Do more with less. Creative doesn't always mean complicated. In developing countries, mobile connectivity has leap-frogged fixed line connectivity. Students and teachers who weren't connected are now connected and have access to volumes of online materials enjoyed by those in developed countries.
2) Encourage the use of apps that work on smartphones and basic phones alike.
3) Advocate for clear policies. The uncertain policy moment plaguing most of the world does not exclude Australia and the U.S. Becoming active in your school's

mobile technology policy sends a clear message to leadership that you've considered mobile learning.

4) Help parents understand the benefits of mobile learning. Contrary to popular parental belief, mobile technology neither distracts learners nor disturbs learning environments –especially if it isn't made taboo by authority figures.
5) Create Open Educational Resources with a mobile, international audience in mind. Traditional course material should be designed properly to facilitate flexible delivery. In addition, make your OER easy to locate. A 2011 study found that two major obstacles for teachers' use of OERs are locating and finding the most appropriate resources. Tag your OERs properly so that anyone from anywhere can locate them.
6) Use mobile tech to reinforce newly learned material in Pakistan. In Pakistan some young women, students would travel to a central location for lessons in Urdu, then return to their remote villages for several weeks. The only way for teacher's to reach them quickly was through text messages that reminded them about reading and discussion assignments. This practice played a very important role in the teaching and learning environment of these women.
7) Convince your colleagues it doesn't have to be expensive. Teachers to develop mobile data that is cheap and be similar to how it's sold to smartphone users in the United States and other developed nations.
8) Make content easily digestible and user friendly. In the digital era, information is now recorded in an electronic format, allowing learners to access it anytime, anywhere. Mlearning courses should be designed in modules of four to eight hours.
9) Design content and choose platforms that can be used in the workplace. It's a fact that people are now using mobile devices throughout their lives, it only makes sense that we should design mobile learning platforms and course content to be easily transferrable from school environments to professional settings.
10) Provide input to software and hardware companies. Frequently, mobile applications are developed for business and entertainment rather than for education. But educators need to provide input to both hardware and software companies to develop appropriate, multi-purpose mobile technologies that meet education needs.
11) Spend more time explaining content than creating it. A lesson on mathematics can be developed and validated by experts at one educational organization and placed on the Internet for everyone to access rather than having millions of teachers around the world developing the same lesson.
12) Support your own professional development. To really achieve our mobile access goals, teachers need to stay informed through use of mobile phones
13) Ensure quality. What constitutes quality in mobile learning still has yet to be clearly defined and agreed upon on a global level, but we know that it can differ

greatly from what constitutes quality in traditional settings. Educators should ensure Mlearning quality in the 21st century.

6. Conclusion

From reviewed literature and desktop analysis, the study concludes that, Mlearning, Meducation and Mteaching are in separable realities in modern education access and provision. The future of modern education lies on the effective use of mobile phones by the education managers, teachers, learners and all stakeholders in all levels of education. Educationist and other stakeholders should embrace mobile phones uses in the whole process of education and be in the fore front in fight misconceptions and untruthful myths on Mobile phone uses in education by learners and other stakeholders. Mobile phone uses in education will highly boost access to education in all levels.

6.1 Recommendations

All developed countries of the world in general and in particular of sub-Saharan Africa and south Asia should continue investing heavily in mobile phone education provision plat form. Kenya ministry of education need to carry out a comprehensive analysis on, The effectiveness of mobile phone uses in enhancing access to education in the country as in line to Sustainable development goal number 4 and the vision 2030 social pillar.

About the Author

A senior principal lecturer/ consultant at Kenya school of Government (KSG) Mombasa Kenya, served as HOD in the Department of Advanced training, Research, Consultancy and Advisory services at Embu campus for three years, a part time lecturer at Kenyatta universities, an educator, a family counselor, a husband and a father, A PhD student at Kenyatta University specializing in Education Policy.

References

Alam, S., & Islam, Y. M. (2008, July). *Virtual interactive classroom (VIC) using mobile technology at the Bangladesh Open University (BOU)*. Paper presented at the 5th Pan-Commonwealth Forum on Open Learning. Retrieved from http://wikieducator.org/images/4/45/PID_563.pdf

Batchuluun, B., Ramos, A. J., & Trinona, J. P. (2007). Evaluations of distance-based delivery methods: Report C, mobile technology in nonformal distance education. In J. Baggaley & T. Belawati (Eds.), *Distance education technology in Asia* (pp. 131-149). Lahore: Virtual University of Pakistan.

Brown, T. (2003, June). *The role of m-learning in the future of e-learning in Africa?* Paper presented at the 21st ICDE World Conference, Hong Kong.

dela Pena-Bandalaria, M. (2007). Impact of ICTs on open and distance learning in a developing country setting: The Philippine experience. *International Review of Research in Open and Distance Learning*, *8*(1). Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/334/793

Dhanarajan, T. (2009). Education for all in the digital age. In S. Akhtar & P. Arinto (Eds.), *Digital review of Asia Pacific 2009-2010* (pp. 45-49). New Delhi: SAGE Publications.

Dighe, A., Hakeem, H., & Shaeffer, S. (2009). ICTs in non-formal education in Asia Pacific. In S. Akhtar & P. Arinto (Eds.), *Digital review of Asia Pacific 2009-2010* (pp. 59-66). New Delhi: SAGE Publications.

Donner, J. (2008). Research approaches to mobile phone use in the developing world: A review of literature. *The Information Society*, *24*, 140-159.

Frohberg, D, Göth, C., & Schwabe, G. (2009). Mobile learning projects – a critical analysis of the state of the art. *Journal of Computer Assisted Learning*, *25*, 307–331.

Geddes, S. J. (2004). Mobile learning in the 21st century: Benefits for learners. *Knowledge Tree*. Retrieved from http://knowledgetree.flexiblelearning.net.au/edition06/download/Geddes.pdf

Islam, Y. M., Ashraf, M., Rahman, Z., & Rahman, M. (2005). Mobile telephone technology as a distance learning tool. *Proceedings of the Seventh International Conference on Enterprise Information Systems,* Miami, USA, May 25-28, 226-232.

Islam, Y. M., Rahman, Z., Razzaq, S. S., Sayed, M. A., & Zaman, S. (2006). Effect of feedback during lecture style delivery both in a face-to-face classroom & during a distance education television session in a developing country like Bangladesh without the use of Internet. *Proceedings of the Sixth IEEE International Conference on Advanced Learning Technologies*, 469-471. Available from IEEE Xplore Digital Library: http://ieeexplore.ieee.org/Xplore/guesthome.jsp

John-Harmen Valk, Ahmed T. Rashid, and Laurent Elder Pan Asia Networking, IDRC, Canada (2010) www.irrodl.org/index.php/irrodl/article/view/794/1487

Kam, M., Kumar, A., Shirley, J., Mathur, A., & Canny, J. (2009). Improving literacy in rural India: Cellphone games in an after-school program. *Proceedings of IEEE/ACM Conference on Information and Communication Technology and Development (ICTD '09)*, Doha, Qatar, April 17-19. Retrieved from http://www.cs.cmu.edu/~mattkam/publications/ICTD2009.pdf

Keegan, D. (2002). *The future of learning: From elearning to mlearning*. Hagen, Germany: FernUniversitat. Retrieved from http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/1a/b6/8e.pdf

Kukulska-Hulme, A., & Traxler, J. (2007). Designing for mobile and wireless learning. In H. Beetham & R. Sharpe (Eds.), *Rethinking pedagogy for a digital age: Designing and delivering e-learning* (pp. 180-192). London: Routledge.

Motlik, S. (2008). Mobile learning in developing nations. *International Review of Research in Open and Distance Learning*, *9*(2). Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/564/1071

Nyiri, K. (2002, August). *Towards a philosophy of m-learning*. Paper presented at the IEEE International Workshop on Wireless and Mobile Technologies in Education, Vaxjo, Sweden. Retrieved from http://21st.century.phil-inst.hu/eng/m-learning/nyiri_m-learn_philos.htm

Orbicom (2007). *Emerging development opportunities: The making of information societies and ICT markets*. Ottawa: IDRC.

Pouezevara, S. L., & Khan, R. (2007a). Learning communities enabled by mobile technology: A case study of school-based, in-service secondary teacher training in rural Bangladesh. In *Innovative information and communication technology in education and its potential for reducing poverty in the Asia and Pacific region* (Appendix 11). Asian Development Bank. Retrieved from http://www.adb.org/Documents/Reports/Consultant/39035-REG/appendix11.pdf

Ramos, A. J. (2008). *Final report for sub-project #2, Project MIND: The viability of mobile SMS technologies for non-formal distance learning in Asia*. Philippines: Molave Development Foundation, Inc.

Ramos, A. J., & Trinona, J. P. (2009). Mobile technology in nonformal distance education. In J. Baggaley & T. Belawati (Eds.), *Distance education technology in Asia* (pp. 231-56). Lahore: University of Pakistan.

Sharples, M., Taylor, J., & Vavoula, G. (2005, October). *Towards a theory of mobile learning*. Paper presented at 4th World Conference on mLearning, Cape Town, South Africa. Retrieved from http://www.mlearn.org.za/CD/papers/Sharples-%20Theory%20of%20Mobile.pdf

Sharples, M., Taylor, J., & Vavoula, G. (2007). A theory of learning for the mobile age. In R. Andrews & C. Haythornthwaite (Eds.), *The Sage handbook of e-learning research* (pp. 221-247). London: Sage Publications.

Samarajiva, R., & Zainudeen, A. (Eds.). (2008). *ICT infrastructure in emerging Asia*. Ottawa: IDRC.

Traxler, J. (2007). Defining, discussing and evaluating mobile learning: The moving finger writes and having writ . . . *The International Review of Research in Open and Distance Learning*, *8*(2). Retrieved from http://www.irrodl.org/index.php/irrodl/article/viewArticle/346

Traxler, J., & Dearden, P. (2005). *The potential for using SMS to support learning and organisation in Sub-Saharan Africa*. Retrieved from http://www.wlv.ac.uk/PDF/cidt-article20.pdf

United Nations. (2008). *The Millennium Development Goals Report*. New York: UNDESA. Retrieved from http://mdgs.un.org/unsd/mdg/Resources/Static/Products/Progress2008/MDG_Report_2008_En.pdf#page=14

van Weert, T. (2005). Lifelong learning in knowledge society: Implications for education. In T. J. van Weert (Ed.), *Education and the knowledge society: Information technology supporting human development* (pp. 15-25). Boston: Kluwer Academic Publishing.

Visser, L., & West, P. (2005). The promise of m-learning for distance education in South Africa and other developing nations. In Y. L. Visser, L. Visser, M. Simonson, & R. Amirault (Eds.), *Trends and issues in distance education: International perspectives* (pp. 117-129). Greenwich, CT.: Information Age Publishing.

Wagner, D., & Kozma, R. (2005). *New technologies for literacy and adult education: A global perspective*. Paris: UNESCO Publishing.

World Bank (n.d.). *Country groups*. Retrieved from http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20421402~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html

www.opencolleges.edu.au/informed/features/how-educators-are-practicing-mobile-learning/