The smart phone Revolution Has Arrived in Classroom! What Are my Options?

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Abstract

Smartphones can enhance universal access to education, equity, quality and efficiency in education. ICT can also play a major role in improving education management, governance and administration. While the introduction of Personal Computers into the school system and the building of school networks are happening all over Africa, use of digital learning content in schools and colleges is rapidly increasing world over. Smartphones continues to evolve as ICT inspired tools and teaching approaches offered the possibilities of transforming students learning experiences by heightening their motivation and a sense of autonomy. The smartphone revolution from retail into corporate market is now getting into our classrooms. It has become an ordinary resource for teachers to use to enhance instruction. To maximize its effectiveness in the classroom, the teacher needs to have positive attitude and technological skills. The objectives of the study are

to; examine the benefits of using tablets in the classroom, options available for using m-learning and challenges faced by both teachers and learners in use of the smart phone This study is informed by the Technology Adoption Model (TAM) which is an information system theory that models how users' come to accept and use a technology. I shall use the mentioned objectives for argument to probe the research and to provide a path to understanding how tablets in education transform the pedagogy. In an effort to ensure smartphone integration in teaching and learning in schools, the Government has over the years invested heavily in establishment of the requisite ICT infrastructure.

Keywords: *Smart phone Revolution, Classroom, Options.*

Introduction

With the growing portability and functional convergence of technologies, as well as with cost reduction of products and services, mobile devices are increasingly present in everyday life. According to the 2013 UNESCO Report, mobile technologies are commonly found nowadays even in areas where schools, books, and computers are scarce. Due to the fall in prices of these technologies, mobile phones in particular, even in impoverished areas, many people can afford and know how to use mobile devices (UNESCO, 2013). Therefore, the presence and relevance of such devices in everyday life have motivated research in the educational field (Pachler et al., 2010). Mobile learning (m-learning) is the field of study that analyzes how mobile devices can contribute to learning (Batista, 2011). M-learning involves the use of mobile technologies, either solely or combined with other communication and information technologies to allow learning anywhere, at any time (UNESCO, 2013).

Cellphone have come a long way since two-pound Motorola dyna Tac 8000x was introduced in 1984. Subsequent generation of mobile phones continue to evolve and become more affordable. According to Nelson research, smartphones sales in 2012 have increased. The smartphones owner population is growing. Multi- functionality and connectivity are opening doors for learning. Students connect to internet improving their academics as teachers use them for audio and recording and taking digital image to enhance their instruction. However, mobile devices, especially mobile phones, are criticized by teachers in view of the problems they bring – distraction, for instance. Regarding mobile phones specifically, Machado (2012) argues that it is necessary to establish restrictions to the use of such devices in schools in order to have a better development of the pedagogical actions, and also to "slow down" students from the hectic pace of contemporary life. However, the author also considers feasible to incorporate this equipment into the various educational projects. Gibson et al. (2012) also say that, even though many teachers consider mobile phones a distraction in the classroom, others believe they are beneficial. The first, most successful smartphone was blackberry. Smartphone have become part of contemporary culture because it has an operating system which manages the gadgets hardware and software.

What Are Smartphones?

Smart phones are high end mobile phones which combine the features of personal digital assistants (PDAs) and mobile phones creating a powerful, portable communication tool. They carry a variety of features within a small, often light weight frame. They however vary in size, colour, style and features as many manufacturers seek to remain at par with and even surpass the technology of their competitors. It is believed that it can empower teachers and learners by facilitating communication and interaction, offering new models of delivery and generally transforming teaching and learning processes. The penetration rate of mobile phone in classroom is rising rapidly. In Kenya penetration rate has doubled within a short time.

The Technology Adoption Model

This paper is informed by the Technology Adoption Model (TAM) which informs an information system theory that models how users come to accept and use technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when to use it. TAM was developed by Fred Davis et al., 1989; Richard Bagozzi et al., 1992. The TAM proposes two specific beliefs- perceived ease of use and perceived usefulness determines one's behavioral intention to use technology as shown in fig 1.
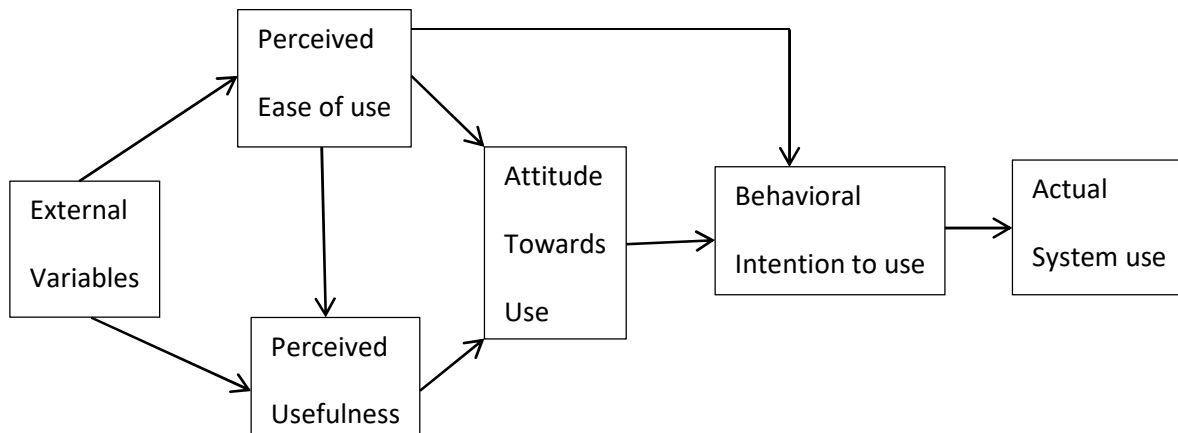
Source: Bagozzi et al (1992)

Use of Smartphones in Classroom

Smart phones are used to access internet, schedule homework and send email to teachers and fellow students regarding assignment. The phones allow students to conduct web searches. It encourages students score and improvement is noticed in the subjects. For example students at a high school in Taiwan were given tablets and smart phones to use in classroom, teachers conceded a few drawbacks to the new technology but contend the learning opportunities outweighed the disadvantages.

Use of Smartphones per Subject

Mathematics	data analysis, geometry measurement, numbers, operations, algebra and angles. Use video clip on Pythagorean Theorem. These can be sent to students' phone then used in classroom to support students understanding. Use calculator to perform mathematical operations such as subtraction, addition and multiplications. Integrate everyday situation in teaching, identifying geometrical figures. Sorting and grouping; sort and group objects, according one attribute, ordering; arrange objects in ascending and descending order, draw small and big objects using ICT devices. Numbers; arrange numbers in sequence from 1-9, play video games on counting, find the missing numbers in given sets of numbers, symbolic representation of numbers; type number symbolic from 1-9, complete number puzzles.
Languages	write poems, create captions for picture images to inspire a story. Learners can record clips of their own activities and view them in class. The activities may include learners singing, telling stories, reciting poems and rhymes. In teaching language activities in kindergarten, it could be used to enhance listening skills for example learners could listen and watch clips of people greeting and bidding farewell recorded in m-device and practice responding to greetings and bidding farewell. It also used for reading speaking (self-expression), learners can watch video clips depicting various emotions and feeling and talk about them. Passing information; watch video clips or animation to help them connect words with meaning. Articulation of letter sounds; listen to sound clips and manipulate other interactive programs that enhance letter sound articulation.
Arts	record the story in image and sound or tell story through film. Drawing and photographing images, adding speech/ music to a photo series.
History	guest speaker, audio presentation, clear, correct and accentual speech. Learners could be encouraged to enjoy listening by using animated stories and recorded short stories from resource person about things about immediate environment for example trees, animals, people and encourage them to ask questions or retell parts of the story
Geography	economic- read geodata images, geographic positions, debate the concept of total transparency.
Theatre &music	listen to wide range of music available for example pop and rap music on phones gives students access to classical jazz, big band. Students can have the opportunity to compare and discuss the differences in these styles. From smartphone, listen and respond to music, perform simple music, coordinate parts of the body as they play music.

Sciences	stopwatch can be used to time experiments. In teaching kindergarten environmental activities for example health practices watch videos on different feeding habits, cleaning foods (fruits and vegetables).
CRE	show video clips of children reading the holy bible, watch birth of Jesus, listen and watch audio visual materials on events that take place on Christmas festival, display different places of worship.

Smartphones in Classroom Potentials

In classrooms, smartphone are slowly shifting out of the toy and liability- to-attention category and into the tool-and- engaging students' category that is being embraced by teachers who believe in a non- standardized approach to education. Smartphone enhance teaching and learning process. It is used to engage learners in meaningful learning that translates into improved student performance. Effective integration should focus on pedagogy design which takes into account the fact that teachers need to 'learn about technology in the context of their subject matter and pedagogy' (Hughes 2004, p. 347). Additionally, Smartphone can support various types of interactions in the learning environment: learner-content, learner-learner, learner-teacher, and learner-interface.

It is evidenced that the popularization and technological development of mobile phones have given prominence to these devices in m-learning (Xie et al., 2011; Gibson et al., 2012; Buck et al., 2013; Burton et al., 2013). Due to their popularity, mobile phones can contribute to increase access to digital educational content. As portable equipment, they can promote learning both inside and beyond the physical space of educational institutions (UNESCO, 2012). Use of such devices can also contribute to more attractive teaching and learning processes, thus with their applications catering to different learning styles (Buck et al., 2013). Therefore, mobile phones have the potential to make learning more accessible, collaborative and relevant (UNESCO, 2012).

Batista (2011) lists positive aspects found students' ability to use the keypad, practicability and students' receptiveness regarding the educational use of mobile phone. Research conducted by Tangney et al., (2010); Ndafenongo (2011); Kalloo & Mohan (2012) have shown the possibilities and contributions of mobile phones. Tangney et al. (2010) argue that, given their inherent capacity to motivate collaboration and contextualized learning, mobile technologies have the potential to contribute to pedagogy. The authors provide strategies to develop resources for smartphones aimed at the teaching and learning as well as support teachers in using them. When using these tools and apps, the teacher is free to create learning and to learners, the tool easy to handle, engaging, enjoy working collaboratively. Use of video clips in mobile phones contributed to improve student participation and concentration, to accelerate content development, to stimulate peer collaboration and interaction, and to promote student autonomy.

Options Available

Technological advancements have allowed smart phones to perform various functions with increasingly better performance. However, the use of these devices in educational contexts divides opinions, especially when used in the classroom. Smart phones can support different pedagogical tasks, but may also be responsible for problems such as distractions during classes. Therefore, such use is still facing resistance in formal education.

Interesting ways to use Smartphones in Classroom

Q.R codes- can be used in a classroom to present information such as assignment and get feedback to learners by generating Q-R codes that can be read by their smartphones.

Homework Diaries- for many learners' homework diaries get lost or become tattered, phones can replace them i.e setting work and reminders are easy ways for students to engage with learning.

Quick research- phone is an innovative way to undertake research tasks provided boundaries are set, and then it can prove a great success.

Take picture- take photos of posters or other things that can't be glued inside a book.

Photo rally- use camera to record evidence of items.

Video- when demonstrating a technical sequence for example landform process.

Voice recorder- use a voice recorder as a means of collecting audio evidence/ feedback on work, interview, keywords for revision.

Stopwatch- science teachers can use it during experiments for example for measuring pulse rate in a medicine class.

Captain's log- students can use voice or video at their own time and pace.

Calling expert- teachers can use special apps to make a video or voice with an expert in order to achieve certain objectives.

A fun way of learning language- for example translation with text or picture, spelling by use of flashcards, games or crosswords. Listening to podcasts stories, reading article from pdf reader e-books, google. Writing text messages, projects for example podcasting, visualize lists of vocabulary.

Calculator- this is used for maths and physics

Camera phone- take picture of any text, diagram or interesting scene/ thing.

Digital story telling- this is done through video, webcasting, audio/ video recording, photo sharing among others.

E- reader or text option- students can access full text websites.

Dictionary or word play- students can google to define a word.

Sending message reminders- the subject teacher may send sms reminders for example asking learners to bring particular material, don't forget the homework. The teacher can also receive message (sms) from students thus help teachers to stay in touch with learners who may have particular queries and provide a fast response.

Calendar- teachers may use it for teaching geography for example revolution leap year.

Use study boost to review/study- students and teachers can create a set of study or review questions on this site. The questions are then sent by text to the students so that they can review using their phones.

Use google sms or chacha- student can text questions to google 466458 or chacha 242242.

Create a mobile group- teachers can create a group using services such as remind 101, celly or broad text to send text to students. This is an easy way to send assignment, the sms is sent once and it goes out to everyone.

Class video project- invites students to prepare video, record drama. The whole class can watch the video using projector.

Benefits of Using Smartphones in Classroom

Smart phones improve access to education. M-learning increases access for those who can't physically attend learning institutions. It presents an important venue by which to reduce the gap between the haves and the have nots in contemporary society where to access to knowledge and information is increasingly important (Vanwest, 2005).

M-learning provides a potential way forward for expansion of education programs to larger segments of the population, they do not need to fix phone infrastructure for installation of mobile phone networks (Motlik, 2008), and many people are already familiar with the mobile phone application. M-learning exerts impact on educational outcomes by increasing access, it represents a continuation and improvement of distance learning through increased utility and application. Literature suggests, broadens the availability of quality education materials through decreased cost and increased flexibility while enhancing the efficiency and effectiveness of education administration and policy.

Promotion of New Learning

It presents more than a mere extension of traditional forms of education, facilitates alternative learning process and instructional methods that the theories of new learning identify as effective learning. According to proponents of new learning, mobiles facilitate designs for personalized

learning in a responsive difference and diversity in the way learning occurs. They facilitate authentic learning, lifelong learning, learning that occurs spontaneously in impromptu settings outside the classroom. They make learner-centered possible by enabling students to customized 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)

Powerful Participation Tool

Helpful to encourage participation in class by students texting their questions to teachers. It also brings real things to life by taking students and taking photos for example in physical Geography, vegetation. It can be used for note taking, dictation or typing Student may use a voice over recording apps. It is fairly quick and easy to search for information using smartphone thus access library. Free apps will allow them to share their notes and continue collaborating when class is over.

Effective ways of Using Smartphones in Classroom

Pose question and ask students to search for answers. Use an app like poll-everywhere to encourage participation and engagement around the ideas and issues you are presenting in class. **Instant answers;** access to the internet provides for instant answers for example in Botany Biology if they want to know why leaves change colour they only ''search away from learning. It also gives students the ability to get an answer to a question they may feel uncomfortable asking in class. If a teacher uses a term they do not understand, they can find the answer without in tempting the class.

Wide Access to Information; Learners can be exposed to a word to create ideas outside their bubble. They can learn another language or teach themselves how to draw, knit or play chess i.e may gain endless array of options available and skills they might not otherwise have access to.

Access to Video; Enhance learning experience by providing instant video access for example man's first step on moon is easier to digest in form of instant video available.

Social Learning; It is a great way for students to share information thought and ideas on a subject. Students who are shy in classroom may blossom in a social learning situation.

Use to Coordinate; They can use it to create dictionary and thesaurus apps thus double checking lyrics on internet to create sound track that applies to current studies.

To Communicate; Establish wasp, twitter and e-mail accounts to share class assignments and reminders, students can read from their smartphones during silent reading.

Create a ''scavenger hunt'' design activity that focuses on a real-world challenge related to topic, and then have students report their findings.

Smart phone has the ability to browse full websites with large amount of data and it will appear the same way as it is in the desktop browser. Also has QWERTY keyboard which is similar to the computer keyboard. The key board can be hardware (physical keys that you type) or it can be software (on a touch screen like you will find on an IPhones). Smart phones have got application that can help you create and edit Microsoft office documents. Smart phone also has a GPS which can be used to locate place that are new to you. When traveling to unknown places it is a good idea to have a GPS to help you find the place you're looking for. Smart phones will help make your tour navigable. When it comes to messaging a smart phone will send messages and also email messages. A smart phone can synchronize your personal and most likely your professional email account. Some smart phone can support multiple accounts depending on the make and model.

Reasons to Use Smartphones in the Classroom

Students learn in a way they are comfortable. There is a widespread use of smartphones by younger children. More and more students know how to use them and they are becoming the most used 'tool' by children. Students are able to get answers quickly. Smartphones provide the ability to get answers questions quickly. A student may not ask for clarification to a question he or she has in an open classroom hence the use of a smartphone in a classroom setting can provide those answers. The audio and video capabilities of smartphones can bring learning to live within the classroom. This can be done through video images, music and voice. In addition, students can even be allowed to connect with other students from around the world, hence expanding their learning world. The use of the smartphones allows for social learning. Smartphones can allow students to work in groups on projects, sharing information and discoveries. Therefore, the students can move toward a common goal, in a format they are comfortable using. With the widespread use of smartphones by younger and younger students, what are the practical reasons for allowing smartphones as a learning tool in the classroom? Consider these points: Students learn in a way they are comfortable. Smartphones are young-person intuitive. More and more students know how to use them, and they are becoming the most used "tool" by teens. Students can get answers quickly. Smartphones provide the ability to get answers quickly.

In some situations, a student may not ask for clarification to a question he or she has in an open classroom. Use of a smartphone in a classroom setting can provide those answers. Audio and video can bring learning to live. Audio and video capabilities of smartphones can put a voice to John F. Kennedy, a dramatic video image to the Hindenburg disaster, and allow students to hear the music of Chopin or Al Jolson. They can even connect with other students from around the globe and expand their learning world. Smart phones are high end mobile phones which combine the features of personal digital assistants (PDAs) and mobile phones creating a powerful, portable communication tool. They increase students' performance; students can sms text messages to send out vocabulary items at spaced intervals, thus increase students' retention. Text messaging can be used to encourage interactive learning. It also reinforces vocabulary learning by creating flashcards. Voice memo recorder can also be used to collect samples from TV or radio or guest speaker, interview or conversation outside classroom.

Mobile phones are relatively cheap and increasingly powerful (Chinney, 2006). Students enjoy using their phones because of easy access to materials and ability to practice anytime and anywhere in addition some students like the screen size limitations, which make the amount of content more manageable than that of other teaching materials (Chen et al., 2008).

Smartphones have several pedagogical considerations. Most importantly phones are social tools that facilitate authentic and relevant communication and collaboration among learners.

Challenges of Using Smartphones in Teaching/ Learning

Naturally, there is controversy, and quite a few naysayers would rather see their kids find other ways to learn. A school and teachers are beginning to realize that smartphone and tablets are here to stay some are even adapting policies of BYOT (Bring Your Own Technology). Safety and security, skills, competency, availability and finance are current and future interventions will inject the much needed infrastructure, skills and attitude necessary to spur ICT integration for teaching and learning in our schools. It is important that teachers deliberately seek to acquire basic ICT skills as well as enhance their capacity in ICT integration. This will greatly improve their capacity in curriculum implementation. However, despite the potential of mobile phones for educational purposes, schools in general do not make use of them; choosing, quite often, to prohibit their use in the classroom (Seabra, 2013). It is recognized that mobile phones can be responsible for distractions. Machado (2012) discusses ringtones in the classroom, with their variety of musical genres and styles (often amusing) may significantly disturb pedagogical activities as planned by the teacher.

Though a silent practice, texting can also draw attention away from the lesson, as well as be used to send answers of tests or exams. In addition, games, music, videos, photos and access to the internet may compromise student performance in class (Machado, 2012). Therefore, the author understands that, in general, use of mobile phones should be restricted in schools, but that, on the other hand, this equipment can contribute to pedagogical actions as a tool for research and production of answers in tests and exams in more efficient ways than traditional ones. Batista (2011) also identifies these negative points; variety of models and resources in the phones, size of the screen and cost of internet access, smart phone not durable especially when not taken good care of. For example it can malfunction easily when they come into contact with water. It is very expensive to buy compared to other phones. It becomes more complex when it comes to operating because of the many applications which need to be mastered to avoid confusion when operating it. It can only work efficiently where there is accessible internet connection when it comes to browsing. Smart phone cannot be used to store large amount of data due to their storage memory. You cannot depend on smart phone for all your work, you will all need a computer to do some tasks.

Kress & Pachler (2007) use of mobile phones in education is a complex theme which presents positive aspects and difficulties that must be taken into consideration, for example;

Harmful Effects of Digital Device; Much exposure for students who have video screens in front of their faces and headphones on their ears are viewed as harmful.

Inappropriate Materials; Students may access materials which are not relevant for example pornographic.

Child Predators and Cyber bulling; Creates much exposure to and potential danger for the students.

Provide Disconnect; a disconnect of students from face to face social activities, family communication and nature.

Therefore the choice of apps requires special attention, since many are specific to certain operating systems (Batista, 2011). It is also essential to consider that even in other sectors mobile phones can cause trouble. Distraction related to the use of these devices can, for instance, affect work, personal relations, and leisure. Hence, this is a matter that demands pondering even in contexts other than educational. However if used in the proper way, these devices can make great contributions to educational actions According to Richardson (2008) ''our students must be nomadic, flexible and mobile learners. They carry a variety of features within a small, often light weight frame.

Conclusions

All the ideas discussed offer increased opportunities for learning by taking advantage of the tool that students are intimately familiar with and carry around all the times. Dealing with challenges of using smartphones may seem difficult but teachers who have used them have found it to be a worthwhile pedagogical investment

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