Smartphones for Smart Learning in TVET:
The Case of Nkabune Technical Training Institute

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Abstract

In today's world, people are on the move and are demanding access to learning materials and information anytime and anywhere. Today's learners want to have the opportunity to review course materials and correspond with instructors and colleagues while sitting in a restaurant or waiting for a bus; they are not rendered immobile by the restrictions of desktop computer technology. Due to their affordability and flexibility, smart phones are touching peoples' lives in many ways: communication, entertainment, socializing, health, etc. But the Technical Vocational Education and Training (TVET) sector is struggling to make sense of this change. The objective of this paper is to examine the potential applications of smart phones in enhancing learning. It also discusses the prospects and challenges in the adoption of this innovation. Questionnaires and interviews were administered to students and lecturers in Nkabune Technical Training Institute in Meru, Kenya. The results show that most students (69%) own smart phones and they use them mainly for social media and communication, while a significant number (40%) use the smartphones for their school related tasks. It was found that smart phones contain very powerful educational applications that if used well can improve technical vocational education and training. This presents an opportunity for educators to design educational methods, activities and materials that are suitable for Smartphone's and allow students to use this technology to accommodate students' diverse needs.
Key words: *TVET, smartphones, m-learning, smart learning*

Introduction

As a result of the accelerated technological development that transpires all around us in the digital age, it is expected that people adapt to frequent changes in our environment. The majority of the teaching staff was not born into the digital-informational revolution, and so must undergo training to prepare for the digital proficiency. This generation of technology users has been called 'Generation X', or 'digital immigrants', and it is they who will educate Generation Y – the generation born into the information age (Prensky, 2009) and the ones who will educate and teach the 'Z Generation'. The education system, especially the teaching methods, must therefore be modified to tackle the oncoming wave of digitally-proficient students, their skills, experiences and needs.

Teaching in the present era calls for reference to technological transformations as well as attention to definitions of school, teachers, learners and curriculum. For the increased incorporation of technologies, Daggett (2005) argues that a shift in focus is necessary, from teacher-centered instruction to student-centered learning in which teachers take a secondary position as director, guide and supporter of the learning process. He believes that this is the

Only way for developing learners' leadership skills, teamwork and necessary and relevant skills which will assist them to cope with challenging daily issues. According to Daggett, this will help students develop leadership skills, teamwork and other competences necessary and relevant to challenging issues in everyday life and the needs of the future workforce. Additional skills required are creativity and ingenuity, communication and collaboration, critical thinking and problem solving (Salpeter, 2003). Training programs that take into consideration technological changes must be committed to address the reforms needed in teaching methods and take advantage of the potential of mobile technologies for an innovative pedagogy in education. In today's world, people are on the move and are demanding access to learning materials and information anytime and anywhere. The smartphone-owner population is growing. Multi-functionality, portability, and connectivity of the smartphones are opening doors for learning. These tiny pocket computers keep students connected to the Internet, improving their academics. However, many students and teachers are oblivious of the power in their hands and the potential for success.

Purpose of the Study
The general aim of this research was to examine the potential applications of smartphones for teaching and learning in TVET institutions.

Specific Objectives
a)   To find out the rate of smartphone ownership among students in Nkabune TTI.
b)   To investigate the nature in which students use the smartphones
c)   To investigate the potential applications of smartphones in teaching and learning in TVET institutions

Literature Review

From E-learning to M-learning to Smartphones Learning
Smartphones that are used to support learning need to be considered in the context of the literature on mobile learning. Mobile learning research has considered a broad range of technologies, especially those that have emerged for the general consumer, for example, mobile phones, personal digital assistants (PDAs), and cameras. However, it has been difficult to define mobile learning. Early definitions concentrated on the mobility of the technology (Sharples et al., 2009) and generally overlooked the significance of the personal, portable and ubiquitous nature of the devices, the new locations and communities that became available to the learner due to connectivity, the impact technology can have on engagement in environments as diverse as labs, the work place and lecture theatres, and how this can affect approaches to teaching and learning, learner engagement and control, formality and situations.

Rahman (2011) in his paper related to mobile leaning in Malaysian Technical and Vocational Education, discusses the basic concept of mobile learning and of effectiveness of E-learning in

Malaysian TVET institutions. The researcher highlights that mobile learning is the evolution of e-learning, which completes the missing component of an e-learning solution. So, using mobile computer based devices in TVET is mostly considered and preferred as recommended tools. It is also believed that more versatile and potentially powerful smartphones will become viable in TVET in the medium term future - in both developed and developing countries.

The prevalence of smartphone devices as indicated in the widespread consumer acceptance and demonstrated in their exponential growth in sales (Gartner, 2010), demands that higher education explores the potential for enhancing learner engagement and prepares itself to address student expectations for a more mobile learning experience. There is evidence of growing interest in the use of smartphones in higher education leading to new pedagogical practices. Cochrane and Bateman (2010a), reflecting on three years of action research into the pedagogical affordances of smartphones, correlate the user-centred and social value of Web 2.0 technologies to education with the Smartphone's capacity to facilitate student-centered social constructivist pedagogies, which McLoughlin and Lee (2008) refer to as 'Pedagogy 2.0'.

What is a Smartphone?

In the early inception of mobile technology development, mobile phones were elite devices primarily used by middle and upper class people (Lacohee, Wakeford, & Pearson, 2003). Compared to old-fashion landline phones, mobile phones of today are free from the constraints of location specificity, apart from the basic capability of communication (Lacohee, Wakeford, & Pearson, 2003). As mobile phones evolve, more and more features have been added, such as full color screen, texting function, mp3 function, and embedded camera.

The trend of existing mobile phone's development is that they are getting smarter (hence the nickname 'smartphone') and more user-friendly. In Defining the Smartphone, Litchfield (2010) examined the top five most accepted definitions of smartphone, and concluded that there was no single, accepted definition. Due to the constantly evolving nature of mobile phone technology, the line between 'smart' and 'dumb' phones is unclear. Actually, even "dumb" phones can have some 'smart' features, such as a touch screen and a proper operating system. At the conclusion of his research, Litchfield offered the definition of smartphone in 2010 as a phone that "runs an open operating system and is permanently connected to the Internet" (Litchfield, 2010).

However, it is important to know the 'smart features' on smart phone nowadays. Today's smartphones, just like Personal Computers (PCs), also incorporate operating systems which allow the add-on applications (or software) to run on top. The hundreds and thousands of applications, which operate as software in PCs and allow users to do what they want, are the core sources of facilitation and convenience for people's lives. Customized to its owner, every smartphone has different interface and applications to adapt to its owner's needs. They also have constantly evolving computing power and capabilities as opposed to old 'feature phone'. Also, today's smartphone has internet connectivity allowing users to stay informed and to have unlimited services available at their fingertips. Whilst smartphones are only pocket size, they

incorporate computing power and memory capable of running complex software and storing huge amounts of data. Functionality including full "qwerty" keyboards, cameras, audio recorders, gesture-based input, and high resolution displays, is complemented by a wide range of applications which include support for office productivity, location-based interactivity, media production, web browsing, social media, communication and entertainment.

Smartphones can conveniently and directly connect to the Internet through protocols including Wi-Fi and 3G and indirectly through Bluetooth. All these current features are allowing smart phones to have the same capabilities as computers but with the added bonus of mobility. All in all, a smartphone is like a very small personal computer. Loaded with useful applications, it is a powerful 'pricey' package.

Challenges of using Smartphones in TVET

Size of Device: Despite the fact that small smartphones are good for portability, their size adds to the possibility of getting stolen or lost. Moreover, their screen is small; some users might find texts hard to read. Usability: The keypad is too small on some smartphones making it hard for some users to type. Yes, detachable keyboards are available, but that will just add to the cost (Litchfield,2010).

Methodology

This research was carried out at Nkabune Technical Training Institute in Meru County, Kenya and targeted all lecturers and students in the institution. Copies of the survey questionnaires were distributed, using simple random sampling to 80 students and 20 lecturers. The questionnaire was constructed by the researcher of this study and reviewed by peers for content validity and reliability. The survey questionnaire consisted of 3 parts. The first part consisted of questions related to demographic data such as gender, age group, department and level of studies, and a question whether they owned a smartphone. The second part consisted of questions focused on regular usage of smartphones. These include types of usage; place where smartphones were always used and if smartphones were used for social networks. The third part consisted of questions related to how smartphones were used for learning. Multiple-choice and multiple selection questions were employed. Survey responses were analyzed using descriptive statistics, with reporting approach based on percentile and mean scores. Software used was SPSS 18 for analysis and data entry.

Results and Discussion

General Characteristics of the Respondents
This section gives findings on general socio-demographic characteristics of the respondents such as age, gender and educational background amongst others.

The majority of respondents were female at 62% and the rest 38% were male. This is attributed to the fact that Nkabune TTI previously admitted only female students.

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Table 1: Age Distribution of the Respondents

18-24	25-30	31-35	36-40	41-50
53	23	14	8	3
52%	23%	14%	8%	3%

Most of the respondents (52%) fell between the ages of 18-24 years. This is attributed to the fact that this is mainly the age when students attend college in Kenya. Most of the respondents (65%) were pursuing diploma courses at the time of this study, 28% certificate courses, 6% were pursuing degree courses (these are mostly teachers) and 1% were pursuing post graduate studies.

Department of Study

Table 2: Department of Study

ICT	BUSINESS	FOOD & BEVERAGE	CLOTHING TECHNOLOGY	LIBERAL	ENGINEERING
11	38	36	5	7	3
11%	38%	36%	5%	7%	3%

Most of the respondents at 38% belonged to the business department, followed closely by food and beverage at 36% and the least was engineering who represented 3%. Nkabune TTI is a national centre of excellence in food and beverage training.

Smartphone Ownership

From the results, majority of the students at 69% and teachers at 88% own smartphones, 99% of the respondents who did not own a smartphone at the time of the study indicated that they were planning to acquire a smartphone soon.

Operating System used

The most commonly used type of operating system is android (73%), followed by windows (15%). This is attributed to the fact that android phones are cheaper (CCK Report, 2012) in Kenya as compared to the other types of operating system.

Types of information Consumed on Smartphones

Table 3: Frequency and Types of Information Consumed on Smartphone

SITUATIONS	OFTEN	SOMETIMES	SELDOM	NEVER
Text messaging (SMS)	81%	12%	5%	2%
Searching for specific information	67%	25%	6%	2%
Talking on the phone	84%	29%	6%	1%
Social media (Facebook, WhatsApp, Instagram)	62%	22%	14%	11%
Latest News and technologies in your course of study	41%	36%	13%	10%
Researching for assignments and homework	41%	27%	16%	16%
Watching educational videos (you tube, podcasts)	9%	31%	34%	27%
Reading books (ex. Kindle Reader app, app, etc.)	13%	17%	18%	52%

From the findings most the respondents used their smartphones mainly for calling (84%), texting (81%) and social media (62%). Few respondents used their Smartphones for reading (13%).

Situations when Smartphone were used

Table 4: Situations when Smartphones were used

SITUATIONS	OFTEN	SOMETIMES	SELDOM	NEVER
Idle time at school (Nkabune TTI) during breaks, lunch, etc.	75%	17%	7%	1%
Riding on the bus, or in car (commuting to school)	74%	19%	5%	2%
Waiting in line (examples: dining hall)	55%	30%	14%	1%
In bed when you wake up (weekend leisure time. before you get out of bed, etc.)	52%	25%	14%	9%
In bed before you go to sleep	46%	26%	17%	11%
For school related tasks	40%	37%	14%	4%
For work related tasks (teachers)	39%	35%	17%	9%

Most respondents used their smartphones during their idle time (75%) and while commuting (74%).

How Smartphones were used for Learning in TVET

Frequency of use of Smartphones for Learning
Most students (68%) used smartphones everyday in their learning in Nkabune TTI, (26%) used them on a weekly basis while (4%) on a monthly basis. Tools used for Autonomous Work. Majority of the respondents use smartphones to search for information using search engines (65%), 10% use them to read information on the websites related to their courses and 5% to download educational videos.

Usage of Smartphones by Teachers

Majority of the teachers (59%) use smartphones to search for information on the internet and to prepare their lesson notes.

Need to use Smartphones Regularly in TVET

Majority of the respondents (98%) indicated that they wanted smartphones to be used regularly in technical vocational education and training.

Conclusions

The study has shown that majority of students and teachers own smartphones and the few that do not have, are willing to purchase one in the near future. It is therefore important for teachers and the management in TVET institutions to come up with teaching and learning methods that will utilize this technology.

From research infrastructure for example, computers and networks have been identified as the greatest hindrances to E-learning (UNESCO, 2012), which agrees with this study that smartphones are affordable and already available to the students and teachers, hence it will be very easy and less costly to use for learning purposes.

With their connection (internet connection, Wi-Fi and Bluetooth) along with their portability and long battery life, smartphones enhances student performance because students have easy and fast access to information and learning materials for longer periods as compared to computers.
Most students use their smartphones for social media and communication and it is therefore vital for teachers to use these media to interact with students. Teachers can use Facebook, WhatsApp groups or twitter hash tags to discuss topics with the students.

Most students use Google to search for information on assignments and homework. Teachers can therefore utilize more of Google applications such as Google forms, Google docs and Google drive to store and share learning materials with the students. By using smartphones for learning students can make good use of their idle time since the study has shown that students use smartphones during their idle time i.e. during lunch, break or while travelling

Advances in mobile access to services such as the learning management system (LMS) have the potential to make a significant impact on the student experience. TVET institutions should adopt the use of open source learning management systems such as Moodle which can be customized for use in smartphones. The Moodle is a particularly interesting example as it both assists students logistically   while also enhancing learning.

The implications of smartphones in learning are far-reaching, and its potential effect on TVET, profound. As mobile learning capabilities continue to expand new forms of learning

will continue to evolve and the next few years will see a period of rapid growth for mobile learning, with evolutionary rather than revolutionary changes. This growth suggests that smartphones will play a major role in reshaping the future of TVET; this study has shown that smart phones contain very powerful educational applications that if used well can improve education. This presents an opportunity for educators to design educational methods, activities and materials that are suitable for Smartphones and allow students to use this technology thereby accommodating students' current diverse needs.

Recommendations

The management in TVET institutions should offer faculty training and professional development opportunities, focusing on how smartphones are best utilized in the classroom, how to reduce their potential for distraction, and methods for communicating in class as well as mobile device policies with students.

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