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EDU 02: Mobile Learning (M-Learning) As A Paradigmatic Mechanism To Facilitate Practical Subjects In An Undergraduate Financial Information Systems Course: A Developing Country Perspective

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ABSTRACT

A plethora of obstacles impede on students' ability to successfully complete practical subjects in an undergraduate Financial Information Systems course (FIS), especially in a developing country such as South Africa. This is mainly attributed to four key encumbrances, namely the limited accessibility of computers on campus, the lack of software needed to complete assignments off campus, the limited availability of Internet access and bandwidth off campus, and its prohibitive cost to students. As the preponderance of these students are from previously disadvantaged communities and can merely not meet the expense of computers, Internet connections, and relatively costly commercial software, they are reliant on campus computer laboratories, whose access are not always practical due to time, distance, and location constraints. It could therefore be argued that current learning mechanisms to facilitate practical subjects in a FIS course do not comply with the demands faced by higher education (HE) institutions in developing countries. In order to ascertain the aforementioned, an action research study was conducted to investigate whether m-learning can serve as a paradigmatic mechanism to bridge existing learning gaps in practical subjects in an undergraduate FIS course in HE institutions of developing countries. Data were collected from 79 students who had to adhere to a set of delineation criteria. Stemming from the results and discussion, key findings indicate that m-learning can broaden educational opportunities for disadvantaged and marginalised students, extend the availability of educators outside the boundaries of the classroom, address student requirements for mobility, flexibility, and ubiquity, assist in bridging existing learning gaps in practical subjects, and increase throughput and success rates in a FIS course.

KEYWORDS: Mobile learning, Mobile technology, Mobile device, Practical subject, Developing country, Accounting

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1. INTRODUCTION

The use of mobile technologies (i.e. mobile/smartphones, tablets, mobile computers and digital media devices that readily fit into ones pocket) is gradually drawing a great deal of attention across all education sectors in both developed and developing countries. These technologies facilitate the connection to a variety of information sources and enable communication almost anywhere, and at any time. M-learning is viewed as “learning across multiple contexts, through social and content interactions, using personal electronic devices” (Crompton, 2013:4). According to Cochrane (2010:134), m-learning distinguishes itself from traditional learning environments by its potential to bridge pedagogically designed learning contexts, facilitate learner-generated contexts, and content (both personal and collaborative) while providing personalisation and ubiquitous social connectedness.

The development of technology has brought a variety of changes to the accounting environment. This has created a need for the services of an accounting person with specialist knowledge of high-technology commercial data processing. The Financial Information Systems (FIS) course offered at the Cape Peninsula University of Technology (CPUT) contains large components of accounting and programming, which leaves open the possibility of specialisation in either field. Students enrolled for practical subjects (subjects that necessitate the use of a computer preloaded with required software) within the FIS course encounter numerous barriers to successfully practice their subject-related skills, as well as to electronically complete and submit assignments. As a result, the formative and summative assessment marks of these students indicate a concerning downward trend year on year. This is primarily attributed to four key encumbrances, namely the limited accessibility of computers on campus, the absence of the required software needed to complete assignments and tasks off campus, the limited availability of Internet access and bandwidth off campus, and its prohibitive cost to students. Since the majority of these students are from previously disadvantaged communities and can simply not afford computers (hardware), Internet connections and relatively expensive commercial software applications, they are dependent on campus computer laboratories, whose access is not always practical due to time, distance and location constraints. In quintessence, a broad base analogy can be drawn that students are not availed the freedom to choose when, where, and how they study, consequently creating the requirement for mobility.

Stemming from the above, the perception was formulated that currently learning mechanisms to facilitate practical subjects in a FIS course do not comply with the demands (providing access to learning while on the move from any location at any time) faced by HE institutions of developing countries which, in turn, have an adverse influence on student performance; the research question which was addressed through this research study reads as follows:

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How effective is mobile learning in bridging the existing learning gap to facilitate practical subjects in a Financial Information Systems course in a Higher Education institution in a developing country?

For the remainder of this paper, discussion takes place under the following headings: 1) literature review, 2) methodology, results and discussion, 3) benefits and barriers of m-learning in accounting education, and 4) conclusion.

2. LITERATURE REVIEW

2.1 The shift form e-learning to m-learning

M-learning is viewed as an extension of e-learning, where the focus is on the use of mobile devices that allow a greater degree of access to learning resources (Gupta, 2012). One of the primary reasons why m-learning is such a popular alternative compared to e-learning, is that the immobility of personal computers restricts students to the potential of making use of anywhere, anytime learning (Rawlinson & Bartel, 2006). Within an e-learning environment, students are limited to the use of a personal computer and/or Internet at an immobile location (Motiwalla, Tello & Carter, 2006) and as a result cannot access any course-related material or assignments while on the move. Conversely, m-learning allows students to interact with educators and peers and complete course work at their own pace and at any time and location of their choice, thus taking learning away from a fixed location.

2.2 M-learning in developing countries

A worldwide assessment of the use of m-learning in HE has brought into sharp focus the ever increasing use of mobile technologies in HE across the globe. Mobile technology provides more tools to accounting professionals and has forever changed the manner in which data can be accessed and shared by these professionals from any device or location at any time (Drew, 2015). However, the integration of mobile technology into accounting education has not kept pace with the technology-based business environment due to lack of faculty time, knowledge, and resources to implement innovation in accounting courses (Baldwin, 2014[2] cited by Staples *et al.*, 2016).

Although m-learning is moving away from small-scale pilot studies into institution-wide implementation worldwide, it typically does not reflect the current situation in developing countries. The majority of research studies focus on conceptions of m-learning based on the culture and affordances of developed countries. Despite the increasing popularity of m-learning, a review of relevant literature indicates that most educational research focuses on conceptions of m-learning initiatives in especially field work, literacy education, and mathematics education in developed countries, and that

[2] Baldwin, A. (2014). Lessons Learned from Integrating iPads into the Accounting Classroom. Paper presented at American Accounting Association 2014 Annual Meeting.

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there is little academic support on how mobile technologies can be utilised in practical subjects within accounting education from a developing country perspective.

Gnanasekar, Mieyappan and Rajesh (2016) note that in India, interactive m-learning anywhere and at any time after face-to-face lectures could enhance students' understanding of lectures and improve learning. Similar results were found by Suryaningrum, Wuryani and Purbasari (2015)**,** when they investigated the effectiveness of mobile based learning technology versus face-to-face learning of accounting information systems. Research results indicate that mobile based learning technology is more effective than face-to-face learning for additional learning of accounting information systems. In contrast with the aforementioned findings, Kutluk and Gülmez (2013) conducted research on m-learning perspectives of accounting students at a university in Turkey, and found that though mobile devices have not yet been effectively utilised for accounting lessons, students are interested in using these devices in the case of technological support and as an alternative to access to knowledge anytime and anywhere.

Today there is little doubt that mobile technologies can be utilised as a successful educational medium. Despite the growing demand of mobile technology in the developing world, the potential to address educational challenges through Information and Communication Technologies (ICT) is restricted by the level of technology adoption and resource constraints in the South African education environment. The developing country dispensation is subject to caveats such as, low level of technology penetration, poor infrastructure, lack of reliable and affordable Internet access, narrow bandwidth, limited Wi-Fi availability, logistics and deployment challenges, social, economic and cultural issues (Adam *et al.*, 2011), financial resources and academic preparedness, as well as robbery/crime (Le Roux, 2015). For technology to be used in education, it must be affordable and accessible, but this remains a barrier for many HE institutions, educators and students in especially developing countries. Staples *et al.* (2016) postulate that challenges from integrating mobile devices into accounting education are diverse, and that institutional guidance and technological support are important aspects that must be addressed in order to ensure that m-learning succeed. Despite these barriers, the ubiquity of mobile technology suggests that it could be meaningfully applied in an educational environment of developing countries in order to provide equal access to remote resources while 'on the move', and potential collaboration with educators and peers outside the boundaries of the classroom, and hence broaden educational opportunities for disadvantaged and marginalised students (Mafenya, n.d).

2.2.1 M-learning in South African accounting education

The majority of research available on m-learning use in accounting education was conducted in developed countries. Conversely, there is a dearth of published material on m-learning in South African accounting education, with only one article and a single

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conference paper that could be found where learners where exposed to m-learning in an accounting subject. In the aforementioned article, students' views and experiences on the integration of social network sites, mobile messaging applications and podcasts were investigated in a second-year accounting course at the University of South Africa. It was found that students have an enthusiasm for some technologies and a limited interest in others, suggesting that technologies in South Africa is unique when compared to developed countries and need to be taken into consideration by educators if the potential benefits of technologies are to be used effectively in South Africa education (Van Rooyen, 2012). In an earlier study, Van Rooyen (2010) found that the effective use of mobile technology can enrich the learning experience of accounting students and offer them a more satisfying and successful experience. Henceforth, it is imperative to further explore the affordances of m-learning in specifically accounting education.

3. METHODOLOGY

This research study was empirical in nature and combined qualitative and quantitative forms of analysis. Primary quantitative data were obtained from two distinct student groups (undergraduate first-year students enrolled for a FIS course at the CPUT) by means of a combination of quantitative (questionnaires, formative and summative assessments, academic student journals) and qualitative (observation, focus groups, academic student journals, synchronous and asynchronous communication) techniques. Action research (plan, act, observe, reflect) was used to glean data pertaining to m-learning implementation and whether it can bridge the existing learning gap to facilitate practical subjects in a FIS course in HE institutions in developing countries.

True to the characteristics of action research, this research study moved through two cycles over a period of two consecutive years (one cycle during the second semester of each year) using successive groups of undergraduate first-year FIS students (Year 1: Cycle 1, n = 33; Year 2: Cycle 2, n = 48). Respondents had to adhere to the following delineation criteria:

- Each respondent had to be a full-time undergraduate first-year student enrolled within the Financial Information Systems course at the CPUT.
- Each respondent in Cycle 1 could only utilise mobile devices (tablets) on campus and not outside the boundaries of the institution..

Moreover, relevant ethical considerations were taken into consideration throughout this research study (Collis & Hussey, 2009). Respondents were safeguarded from physical harm and were guaranteed of anonymity and the confidential treatment of information provided. Furthermore, all respondents voluntarily participated in this research study and were informed that they could withdraw from it at any point in time (should they so wish).

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Prior to the execution of the two cycles, none of the participants have ever been exposed to any form of m-learning. The first cycle (Cycle 1, n = 33) was viewed as exploratory in nature in which the data gathered influenced the approach for the second cycle (Cycle 2). One month after classes commenced during Cycle 1, each student was issued with a high-end Android tablet preloaded with productivity applications that assisted them in completing and submitting practical assignments and interact with educators and peers in a revolutionary way outside the boundaries of the classroom – something that was previously not possible. It is however important to note that these devices were provided to students for exclusive use at the institution. The initial plan was to provide students with mobile devices for utilisation both on and off campus for the duration of the subject, however technical support issues, an increased risk in device loss/theft, and device breakage, made this an unpractical and not a feasible option during the execution of Cycle 1. During the course of Cycle 1, formal reflections by the educator were kept by means of an academic research journal, focusing on the entire m-learning experience from an educator perspective. It was clear that the technology did not work seamlessly, but despite this barrier, student enthusiasm and participation were remarkable and encouraging. In addition, student observations served as a reflective mechanism to identify the benefits and barriers of m-learning, to evaluate the implications of m-learning in an undergraduate accounting subject, as well as to serve as a record for future use. Reflections maintained for the duration of Cycle 1 (a semester) by the educator met the expected outcome and revealed that the teaching and learning experienced of students were enhanced, which in turn resulted in improved student performance.

In contrast with Cycle 1, a new intake of students were at the outset exposed to m-learning during Cycle 2 (n = 46) the following year. Students were provided with tablets and were allowed to utilise mobile devices off campus, hence allowing students a true m-learning experience. In addition, students in Cycle 2 were also exposed to Mobile Instant Messaging (MIM) discussions via WhatsApp by utilising their own mobile phones to send questions on subject-related assignments/tasks or concerns to the educator. This support service enabled students to complete their work by adding further perspectives to their applications gained through the interaction with the MIM group members and input from the educator and/or their peers. Not only did this initiative assist students in their learning process, but it also provided an attractive and effective learning tool that can enrich the learning environment and experience of students.

4. RESEARCH RESULTS AND DISCUSSION

Throughout the remainder of this section, consolidated research findings extrapolated from the data analysis are discussed under the following headings: 1) formative and summative assessment, 2) observation, 3) questionnaires, 4) synchronous and asynchronous communication, 5) focus groups, and 6) academic student journals.

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4.1 Formative and summative assessment

The formative and summative assessment marks of undergraduate first-year accounting students at the CPUT consistently decreased over a period of four years prior to m-learning implementation during the second semester of Cycle 1. Formative assessment marks reflect a statistically significant decrease for four years prior to m-learning implementation; however, these marks reveal a statistically significant increase for three consecutive years since m-learning was introduced during the second semester of Cycle 1. Figures 4.1 and 4.2 reflect that there was a statistically significant gain in formative practical assignment marks and formative class test marks respectively, post m-learning implementation in Cycle 1 when students were only allowed to use the provided tablets on campus. A zero mark reflects that the student did not write any formative class tests and/or did not submit any practical assignments.

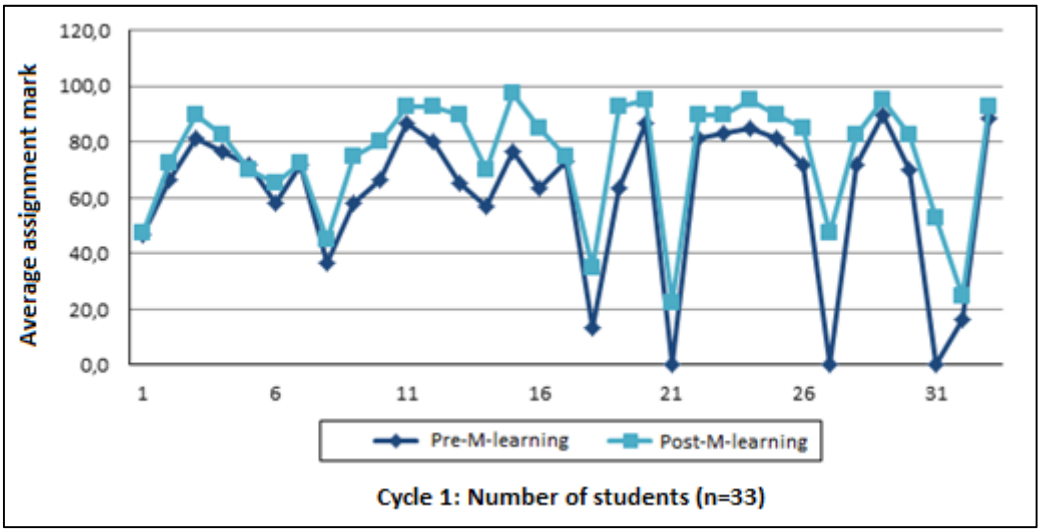

Figure 4.1: Average of Formative Practical Assignment Marks (Pre-M-learning vs. Post-M-learning) over a six-month period in Cycle 1

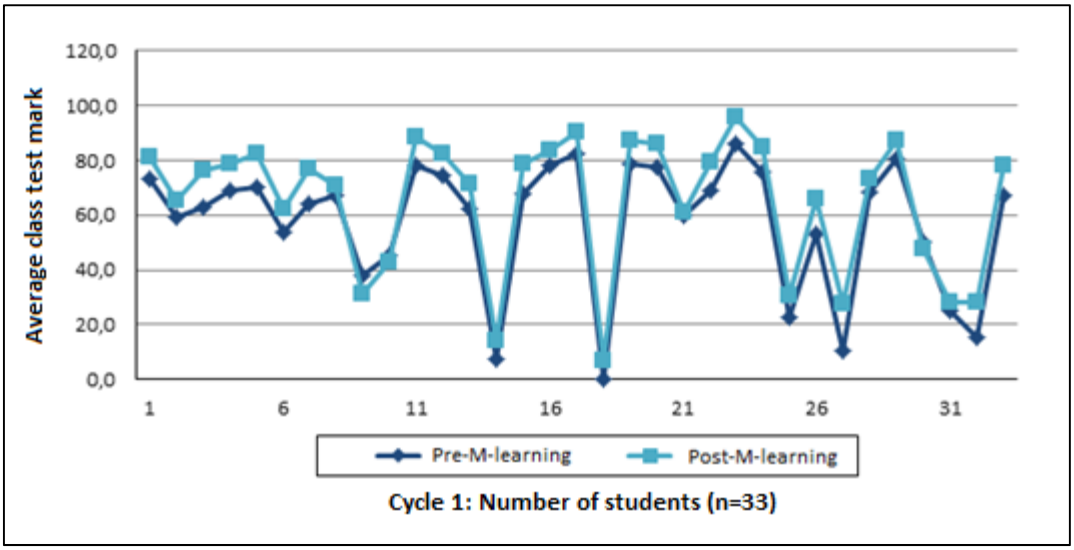

Figure 4.2: Average of Formative Class Test Marks (Pre-M-learning vs. Post-M-learning) over a six-month period in Cycle 1

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Similar to the results obtained in Cycle 1 (on campus m-learning only), a significant difference in formative assessment marks were found when compared to that of Cycle 2 (on and off campus m-learning). In both cases students in Cycle 2 scored statistically significant better than their Cycle 1 counterparts. Since no significant difference was found between the summative assessment marks of the two m-learning groups (Cycle 1 and Cycle 2), an analysis of variance was performed to determine whether there are differences between the years (Pre-m-learning vs. Post-m-learning) concerning the formative and summative assessment marks. Results depict that there is a difference between the means of the assessment marks for the different years. With respect to Cycle 1 when m-learning was introduced, there is clear evidence that marks improved after the m-learning experience. More specific, there was an increase in especially formative assessment marks for both Cycle 1 and Cycle 2 after m-learning implementation. Stemming from the aforementioned results, it is evident that m-learning had a positive impact on student throughput and success rates. It is however important to note that since this study was an exploratory research, it did not control for other variables that may influence student performance.

4.2 Observation

Observation of students was conducted by the educator to gather information on student attitudes and how they use and interact with mobile technology. Video material and photos were included as observation examples in order to provide an accurate description of events, as well as to assist in the triangulation of data.

- **Enthusiasm:** Students have shown a substantial amount of enthusiasm when mobile devices were handed out for the first time, and during the course of their studies. Unlike studies that have fell victim to the 'novelty effect' (Kneebone & Brenton, 2005), also referred to as the 'generally positive effect', that results from the enthusiasm for using a new device or tool in learning, students have never appeared to be bored or frustrated (despite several limitations or barriers) when the novelty of using these devices started wearing off over a period of six months. To these students the benefits and use of mobile technology to assist them in practical subjects were clearly outweighing the limitations they faced.
- **General mobile device usage:** Students became effective quickly in executing subject-related assignments/tasks, were found to be less bored in class and became more active and engaged during the learning process. Despite the fact that engagement does not necessarily translate in learning more, this research study proves that student marks (especially formative assessment marks) improved dramatically since the implementation of m-learning. Mobile devices are mainly used to accomplish subject-related tasks such as going online (74.7%), completing and submitting assignments (67.1%), accessing institutional web pages (64.6%), accessing social networking sites to communicate with peers (59.5%), viewing and downloading course material and assignments (59.5%), as well as taking notes in

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class (53.2%). This is mainly attributed to the structure of classes, which are based around students utilising mobile devices to aid their classroom-based teaching and learning practices in formal educational settings. It is of interest to note that despite the smaller screen size and onscreen input of tablets and mobile phones (when compared to computers), 35% of the students unexpectedly opted to make use of mobile devices even if they had access to a personal computer in a practical class. Unexpectedly, some students have even gone so far to have never used a computer again since they received the mobile devices. Mobile devices are also used for other teaching and learning purposes such as taking photos (instead of taking notes) of work covered on the whiteboard, recording lectures, downloading and listening to podcasts and vodcasts, assessing library services and communicating with the educator.

- **Collaboration/communication:** Students in general assisted each other when struggling with subject-related aspects, and indicated that they predominantly do not use their mobile devices to communicate with peers and educators outside the classroom (i.e. IM, e-mail), but rather prefer face-to-face discussions on subject-related issues.
- **Context:** Despite the vast possibilities that mobile devices bring to an educational environment, it comes as no surprise that some students still prefer to use conventional mechanisms (i.e. desktop computers, class hand-outs/subject material, paper-based notes) to accomplish their learning activities in formal learning settings. This can be attributed to the fact that students prefer to rather write down notes instead of typing them, since it is a much slower process to type on a mobile device without a keyboard, and also to rather read printed hand-outs as opposed to electronic notes. It could therefore be argued that mobile devices are only used in certain contexts by some students. On the contrary, it is also true that some students prefer to use mobile technology to do subject-related work as opposed to using computers and taking notes, which proved to be mostly the case in practical subjects.

4.3 Questionnaires

Students from both cycles (n=78) were asked to complete pre-questionnaires (that address their current use and perception of mobile technology before being exposed to m-learning), as well as post-questionnaires (that address the usability, use and impact of mobile technology, as well as the experience and attitude of students toward the utilisation of mobile technology) to assess the effectiveness and usefulness of m-learning after being exposed to mobile technology. Findings highlight that the majority of students would like to be able to use mobile technology outside the boundaries of the classroom as a tool to help them with work since nearly 75% found it difficult to access university computer laboratories outside class times, and none of them have access to the required software off campus. The findings furthermore, in no particular order, reveal that the use of mobile devices are perceived to: 1) be useful for teaching

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and learning purposes; 2) have mobility and 3) have social interaction value; 4) have an enjoyment factor; 5) be easy to use; 6) improve student attitudes; 7) have certain access barriers; and 8) the behavioural intention to use mobile devices is perceived to be positive. Most of the students use mobile devices on a daily basis for at least 30 minutes at a time for mainly formal subject-related activities, and indicated that it should be mandatory for students to utilise mobile technology within Financial programmes. Students find it acceptable to learn practical subjects with mobile device access only and felt more enthusiastic about the use of mobile devices after being exposed to m-learning.

4.4 Synchronous and asynchronous communication (Cycle 2)

Synchronous and asynchronous communication was introduced during Cycle 2 and entailed records of comments and thoughts generated by learners by means of MIM (WhatsApp) and e-mail. WhatsApp is a synchronous communication tool where text messages can be sent and delivered instantaneously between users. A major advantage of this type of communication is its minimal cost ranging from 97% - 99% less than text messages or Short Message Service (SMS), thus providing learners the opportunity to interact and collaborate with their peers regarding subject-related issues, and to access professional educator support in an affordable manner. The support service was at students' disposal 7 days a week/24 hours a day (24/7).

Students were initially excited and keen about the idea of using MIM within the FIS course, however it was found that only a few (30.4%) made use of this unique opportunity. Students used this service mainly to: 1) Ask subject content-related questions before formative and summative tests; 2) ask for assistance with assignments/tasks; 3) be assisted with subject administrative queries; and 4) resolve technical difficulties experienced with mobile devices. MIM were received and answered any time during the day and night, with the earliest being at 05:59 am and the latest at 00:59 am. From an educator perspective, MIM proved to be quite a challenge to use when answering student queries, since it is a relatively time-consuming process to answer queries using the different input mechanisms of a mobile phone.

4.5 Focus groups (Cycle 2)

Focus groups took place during Cycle 2 only, after all the questionnaires have been conducted and were based upon the further exploration of issues that had emerged from questionnaire data. It focused on students' experience with mobile technologies and how they use and interact with these technologies. Student responses were collected for qualitative analysis similar to research conducted by Boone (1995:95), i.e. for "Comments", "What did you like?", "What did you dislike?", etc.

- The majority of the focus groups (89%) indicated that they have found it extremely easy and fair to complete and submit assignments utilising mobile technology anywhere, anytime without the need of a computer and expensive commercial

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software. Most students (63%) found it acceptable to exclusively use mobile devices in a practical subject.

- All the groups highlighted the usefulness of mobile devices that could be used anywhere on campus to complete programme-related work, in contrast to the constant unavailability of overpopulated computer laboratories.
- The majority of the groups viewed mobile devices as an educational investment and indicated that they would buy a mobile device if it could aid them in their studies, or if it would be a course requirement.
- It is a harsh reality that theft and robbery in South Africa are severe problems, especially for mobile devices that are carried on a person. Because of the danger of using mobile devices in South African public spaces, most students did not utilise mobile technology while commuting. On the other hand, some students, although by far the minority, indicated that they have used mobile technology while travelling, but that it was dependent on the location, time of day, and travelling time.

4.6 Academic student journals (Cycle 2)

Academic student journals were kept by students during Cycle 2 to reflect on their m-learning experience, activities and thoughts during mobile technology utilisation. Student journals addressed issues relating to the when, where, for how long, for which event/activity, and by whom the mobile technology was used. In addition, it also provided students with the opportunity to comment on any high or low aspects experienced during mobile technology utilisation. Journal entries were reviewed and assisted in:

- Identifying common trends in mobile technology utilisation amongst students.
- Isolating areas where problems regularly occur.
- Identifying where more work needed to be done or where real strengths have been developed and some obstacles have been overcome.

During educator reflection in the second cycle, the aforementioned observations assisted in identifying the typical potential usage patterns for m-learning learners, and in setting new goals for future research projects and developments. Most students used mobile technology in the mornings and the afternoons for 10 minutes to an hour per session for formal subject-related activities.

5. BENEFITS AND BARRIERS OF M-LEARNING IN ACCOUNTING EDUCATION

The following benefits were identified during the reflection processes of the educator during the two action research cycles, as well as from extensive data gathered with regard to the implementation of m-learning within accounting education:

- All students (regardless of their culture, social- and financial background) could electronically complete and submit assignments/tasks from anywhere, and at any time without the necessity of a computer or being on campus.

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- Student marks improved statistically significantly after the implementation of m-learning.
- Students had 24/7 access to their educator via IM to address any subject-related issues.
- Students have rarely subverted formal education by engaging in activities that are not related to the lecture, proving that mobile devices can effectively be used to facilitate learning in formal and informal educational settings, without necessarily distracting the teaching and learning process.

Students expressed and were confronted by several barriers that kept them from enjoying a true m-learning experience:

- **On campus access only (Cycle 1):** Students were only allowed to utilise mobile technology exclusively on campus, therefore not allowing them a true m-learning experience. These students had restricted opportunities compared with other m-learning programmes in which students usually have access to mobile devices 24/7.
- **Uploading assignments onto the Learner Management Systems (LMS):** Students were required to connect (synchronise) their mobile devices to an Internet-enabled computer (via cables) in order to upload their assignments onto the LMS (Blackboard) since the CPUT is not in possession of a mobile LMS (Blackboard Mobile) site license that would allow them to upload assignments directly from a mobile device.
- **Limited or no Wi-Fi availability:** Several Wi-Fi related issues were experienced, which included extremely weak or no Wi-Fi signals on campus and at university residences. These issues had a severe and critical impact on students' ability to access the Internet, and most importantly subject-related work via mobile devices.
- **Lost/stolen devices:** A major concern throughout the duration of the m-learning initiative was the constant anticipation for lost or stolen devices. This was the main and exclusive reason for not allowing students to use mobile devices off campus during the pilot study (Cycle 1). This proved to be successful as all the students returned their devices in working order. On the other hand, during Cycle 2, where the m-learning group was allowed to utilise mobile devices off campus, one student lost a mobile device on an airplane, another provided a police statement indicating that the mobile device was stolen after a car break in, and two students disappeared from all enrolled classes and as a result have never returned the devices.
- **Limited access to computer laboratories:** Despite the fact that students were required to have access to an Internet-enabled computer in order to upload assignments/tasks onto the LMS, several students were also confronted with the fact that they could not access computer laboratories on campus, especially in the morning, when they wanted to upload and submit assignments before the submission deadline. This once again proved that by not affording students a true

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m-learning experience by enabling them to complete and electronically submit assignments/tasks outside the boundaries of the classroom before the due date and time, it could potentially have a negative impact on their academic performance.

- **No Wi-Fi enabled printers:** Students could not directly print subject-related material from their mobile devices, as there were no Wi-Fi enabled printers available on campus. Students were therefore forced to use the old-fashioned method of synchronising the mobile device with an Internet-enabled computer in order to print – clearly defeating the objective of providing students with a true m-learning experience.

6. CONCLUSION

This research study is concerned with exploring whether m-learning can serve as a paradigmatic mechanism to bridge existing learning gaps to facilitate practical subjects in a FIS course in a developing country. In many respects, the findings of this research study juxtapose and strengthen what the literature in the field of m-learning already suggests. However, this research study has taken earlier notions one step further, by attempting to identify by means of a mixed-method data gathering approach, the effectiveness and usefulness of m-learning, as well as the benefit and barriers related to m-learning in practical subjects within a FIS course. Key findings indicate that mobile devices can be utilised as an acceptable additional technology in practical subjects In a FIS course, and that it can assist in bridging existing learning gaps by extending the availability of educators outside the boundaries of the classroom, addressing student requirements for mobility, flexibility and ubiquity, and improving student throughput and success rates. Results indicate that student marks have improved statistically significant after m-learning implementation, and that student reactions toward these devices are positive and may increase their enthusiasm and motivation to work and learn. Nonetheless, despite the vast number of benefits that mobile technology brings to teaching and learning in accounting education, it is important to recognise that mobile devices still cannot entirely replace traditional methods of instruction and assessment, and thus should be combined with face-to-face education in developing countries. Equally, it is important to ensure that mobile technology is used in a pragmatic way by focusing on the advantages of mobile devices, rather than to endeavour and replicate the functionality of a computer, allowing traditional instruction and the utilisation of mobile technology to complement each other (Le Roux, 2015). The research results of this study contribute to the knowledge base of m-learning in accounting education, especially in a developing country such as South Africa. The author of this paper suggests that further research is conducted on providing a better understanding as to how m-learning in accounting education, work in great detail. By doing so, HE institutions, educators and students, among others, may glean more insight into how m-learning can be effectively implemented to provide sustainable, affordable and reliable accounting education. Not only can this research assist in placing HE institutions at the forefront of pedagogical practice, but it can most

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importantly broaden educational opportunities for disadvantaged and marginalised students, extend the availability of educators outside the boundaries of the classroom, address student requirements for mobility, flexibility and ubiquity, and increase throughput and success rates.

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