

**Utilising m-Learning for Enhancing Student Participation at a  
South African University of Technology**

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## **KEYWORDS**

WhatsApp

Mobile instant messaging

FRAME model

Academic participation

Pedagogy

Collaborative mobile learning



## **GLOSSARY OF TERMS**

MIM	Mobile Instant Messaging
m-learning	Mobile learning
BE	Basic Education
HE	Higher Education
ICTs	Information Communication Technology Systems
FRAME	Framework for the Rational Analysis of Mobile Education
CMC	Computer Mediated Communication
PDA's	Personal Digital Assistants
ESL	English as Second Language



**Abstract:** Previous studies on the academic utilisation of mobile devices in South Africa have rendered some invaluable insights into the rationale and different ways students utilise mobile technologies in and outside the classroom. However, these studies have addressed issues about social practices of adoption in high schools that emphasise tutor-directed, instant messaging-mediated supply of supplementary tuition/training in subjects like science and mathematics. Consequently, insufficient attention has been devoted to understanding the dynamic complexities of implementing mobile learning (m-Learning) projects in tertiary institutions. This research contributes to the m-Learning discourse by exploring a collaborative m-Learning perspective, through the pedagogical application of WhatsApp, a special-purpose instant messaging service implemented at a University of Technology in South Africa. This research paper argues that mobile instant messaging (MIM) may create alternative academic discussion platforms for the students' collaborative interactions outside the classroom, which implies the transformation of pedagogical delivery. The FRAME model was utilised as the theoretical lens for this study. An interview instrument was developed based on the FRAME model constructs. Face-to-face semi-structured interviews were conducted with twenty participants. The findings suggest improved academic participation, the promotion of collaborative m-Learning for critical thinking, knowledge creation and sharing, as well as fostering effective learning through student-centered approach hence liberal transformation in the lecturer's mode of instructional delivery.

## ACKNOWLEDGEMENTS

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Last but not least, I wish to express my deepest gratitude to my beloved family; for their understanding and endless love, through the duration of my studies. Taurai Guetrude, my wife and my daughter Tanyaradzwa Anna AKA “Tanya” and my son Takudzwa Aaron, I salute you.



## DECLARATION

I declare that Utilising m-Learning for Enhancing Student Participation at a South African University of Technology is my own work, that has not been submitted before for any degree or examination at any University, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Aaron Bere

Signed.....



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## SECTION 1: INTRODUCTION

The Sunday Times (17 January 2012), cited improvements made by the South African Basic Education department to improve student pass rates in schools. However, the Minister of Education showed dissatisfaction in township and rural school performances. She indicated that teaching and learning strategies for these areas must be revisited. Apart from township and rural students' dwindling performance, dropout rates were also noted as a concern.

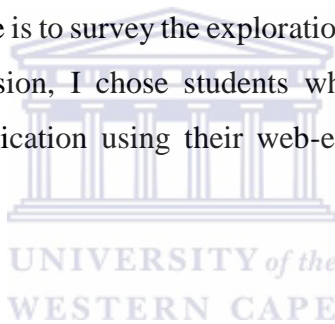
The preliminary investigation indicates that throughput is not only a concern in Basic Education (BE), but also in Higher Education (HE), especially on township students. The report by the Council on Higher Education (CHE), released in August 2013, indicated that about "one in 20 black South Africans succeeds in higher education, and more than half who enrol at university drop out before completing their degree". The 2013 CHE report argues that poorly equipped black African township and rural schools contributes to these poor tertiary throughputs. I think that possible reasons for these poor results on township students might be associated with high crime rates in South African townships. Due to these high criminal activities, township students have limited access to libraries after hours. Furthermore, study groups where students could meet in the evenings and engage and share ideas about school work could hardly be formed. Poverty might be another factor that contributes to poor pass rates, since most township and rural students do not have access to the Internet and other important study resources after school. These possible reasons hinder students from actively engaging with other students or with their facilitator outside the classroom. In other words, their learning is limited to a classroom.

In response to the above mentioned academic obstacles, as a lecturer employed at a University of Technology, I developed a learning initiative using the WhatsApp mobile instant messaging service. The initiative utilised the WhatsApp messaging service as a learning platform that could expand learning opportunities for underprivileged students at a University of Technology. I chose to use the WhatsApp application because of its growing popularity among people earning lower salaries. Kuittinen (2012) indicated that in October 2011, WhatsApp was delivering approximately one billion messages each day. Ten months later, WhatsApp reported that it was hosting approximately ten billion messages a day. Of this number, four billion were inbound while six



billion where outbound. This mobile instant messaging (MIM) is preferred by many people because of its extremely low charges. As a sign of global dominance, WhatsApp is currently rated as the leading instant messaging service worldwide. In South Africa, WhatsApp is among the most preferred instant messaging tools, with a user base of 4.6 million, trailing behind Mxit's 9.35 million registered users (South Africa Social Media Landscape, 2012 ). In this learning initiative, WhatsApp instant messaging was utilised to explore the possibilities for employing mobile learning (m-Learning) strategies, to foster student participation. Among other things, I used WhatsApp mobile messaging to facilitate collaborative learning among the students outside the formal classroom.

The WhatsApp learning initiative targeted third year Information Technology students registered for the Information Systems module at a University of Technology in South Africa. Given that the underlying principle of the initiative is to survey the exploration of future mobile instant messaging in order to promote digital inclusion, I chose students who could download and install the WhatsApp instant messaging application using their web-enabled handheld devices and form scholarly consultative clusters.



### **Research purpose**

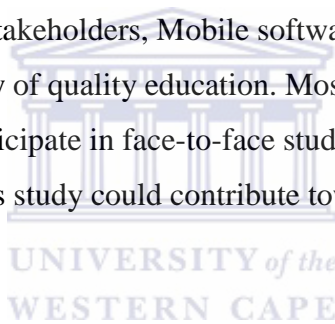
As a lecturer, I adopted a mobile messaging application, WhatsApp which I used as a learning platform to interact with students outside the classroom, to augment the often limited consultations that happen in class, due to the constraints of time and my huge workload. In the course of my duties, I observed that although students often wish to pose questions in class, there are several hindrances to lecturer-student and peer-based engagements through questions and answers. These included inadequate face-to-face academic consultation time, low self-esteem, social hierarchy and students' lack of confidence in openly participating for academic purposes, due to fear of derision by peers and/or lecturers. The adoption of an informal, mobile instant messaging service in lectures and beyond, therefore, seemed to provide a potential solution to improve the participation of shy and low-self-esteem students to actively engage in academic discussions both with their peers and lecturers. The purpose of the learning initiative was to promote participation using m-Learning technology, hence heightening blended learning.

### **The scope of the study**

The research focused on a learning initiative which I developed for third year Information Technology students enrolled for the Information systems module at a University of Technology in South Africa. Given that the study was aimed at the potential of emerging technologies MIM to foster digital inclusion, students who could download and install WhatsApp to their web-enabled handheld devices (Smart phones, iPads, tablets and PDAs) and form academic consultative clusters were considered.

### **Rationale for the study**

The rationale for the study is to stimulate interest in exploring Information Communication Technology Systems (ICTs), that have the potential to improve teaching and learning through informal collaborative learning through the use of MIM. It may be of interest to educators, scholars, facilitators, government stakeholders, Mobile software developers, and ordinary citizens who have an interest in the delivery of quality education. Most importantly, this study is intended to benefit students who cannot participate in face-to-face study groups due to limited resources or low confidence. Optimistically, this study could contribute towards an increase in the pass rate.



### **Research problem**

As a lecturer at a University of Technology, I encountered problems with low student participation in the classroom. This problem made it difficult for the researcher to identify areas that needed further elaboration in order to improve the students' understanding of the subject. In brief, I formulated the problem statement for this investigation as follows: Limited student participation at Universities of Technology in South Africa negatively impacts teaching and learning.

### **Research question**

The main research question for this study is: What is the pedagogical potential of WhatsApp (as a technology) to enhance students' participation in an academic programme at a University of Technology?

I formulated the following sub question:

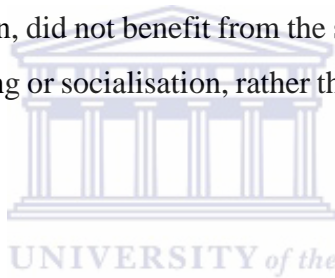
- i) To what extent does WhatsApp affordances influence students' participation?

### **Research aims**

The aim of this study is to explore the pedagogical potential of WhatsApp instant messaging in the enhancement of students' participation in an academic programme.

### **Research limitations**

The learning initiative utilised in this study had the following limitations. Some students didn't have web-enabled handheld devices, so it was impossible to recruit and retain the WhatsApp academic participation of all the students. Those students with Web-enabled phones, but who struggle to download the application, did not benefit from the study. Nevertheless, those who were found to be concentrating on chatting or socialisation, rather than academic engagement, were also left out.



### **Significance of the study**

The significance of this paper is that it could influence the way that mobile phones could be used to supplement traditional instructional delivery by creative and alternative dialogic learning spaces that have potential to improve student participation.

## SECTION 2: LITERATURE REVIEW/CONCEPTUAL FRAMEWORK

The main argument of this paper is that mobile phones may possibly supplement traditional instructional delivery by creating alternative dialogic learning spaces that have the potential to boost student participation. Despite the tremendous likelihood to activate mobile collaborative learning environments that generate deep lecturer-student and peer-based engagement with content, the potential of mobile devices to promote student-centred learning has been sub-optimally exploited or remains ill-conceived in academic literature.

The literature review for this study will cover m-Learning, mobile instant messaging, collaborative learning and social constructivism.

### **m-Learning**

The adoption of mobile phones among the youth of Africa is increasing. However the notion of using mobile phones to enhance learning remains a challenge, despite these high adoption rates (Berger & Sinha, 2012). Looi, Seow, Zhang, So, Chen, & Wong (2010) argued that students belong to the digital generation. This generation integrated the exploitation of emerging technologies such as collaborative social networking systems, video, photo exchanging, and podcasting in their lifestyles. Apart from making phone calls, cellphones are also used for accessing the Internet, social networking, and podcasting on the move, particularly by the digital generation. Utilisation of these ubiquitous emerging technologies promotes information sharing, and informal peer mentoring. Furthermore, these emerging technologies enable facilitators to work unrestrained by time and place. Students enjoy learning in these 'informal' platforms more than in 'formal' learning environments (Looi, Seow, Zhang, So, Chen, & Wong, 2010).

In the previous decade, mobile phone adoptions in Africa have grown at a rate of 30% per annum. The continent is estimated to possess around 750 million mobile connections to date. Availability of low cost handsets and cheap SIM cards contributed to the 20% increase in the embracement of mobile phones in South Africa from 2005 to 2010, particularly among the youth (Berger & Sinha, 2012). The wireless mobile technology industry in the African region has become an enabler for economic growth; utilisation of mobile services have been witnessed in education, agriculture,

banking and health (Walsham & Sahay, 2006 ; Walsham, Robey, & Sahay, 2007). This high digital inclusion among Africans can be utilised for enhancing the quality of learning in universities. Current thinkers corroborates my views by asserting that rapid developments of wireless communication and its high adoption levels promise to positively reshape the educational environment (Shih, Kuo, & Liu, 2012; Chu, Hwang, & Tsai, 2010; Chiou, Tseng, Hwang, & Heller, 2010).

I am also of the opinion that the proper utilisation of mobile technologies for learning may unveil unexplored avenues for effective learning. Shih, Kuo, & Liu (2012:301) defined m-Learning as “a learning paradigm which takes place in a ubiquitous computing environment”. These m-Learning environments enables people to learn at their convenience in terms of place and time, and it is suitable when anywhere and everywhere learning is required to situate students in a reliable learning environment. Looi, Seow, Zhang, So, Chen, & Wong (2010) are of the opinion that the portability and flexibility of mobile devices have the possibility of supporting an educational transformation from instructive teacher-centered to active student-centered learning. In the mobile learning paradigm, the lecturer facilitates the learning process, rather than being viewed as an exclusive proficient of knowledge. From this definition, I can deduce that m-Learning is in line with constructivists’ perspective that emphasize on student centered approaches. Previous research findings on m-Learning documented that the mobility and connectivity of mobile emerging technologies enable students to turn into active participants rather than passive receivers in instructional delivery activities. Instead of just learning through listening to the lecturer, students with mobile devices can experiment with new avenues of learning, and share their experiences with others (Squire & Klopfer, 2007; Roschelle, 2003; Colella, 2000).

The potential for m-Learning to facilitate the mobility of the context of interaction could promote effective education from both the instructor's and learner’s perspective. According to the Centre for Digital Education (2011), a recent technique in m-Learning allows the lecturer the mobility to create learning materials anytime and anywhere, by using mobile technologies with specialised software. As such, Looi, Seow, Zhang, So, Chen, & Wong (2010) argues that “the new notion of m-learning foregrounds a transitory context in which all learning resources (interacting peers, educators, pedagogical content, the enabling technology) are all “on the move”. Mobile learning, therefore, breaches the spatial, temporary, time zones by bringing educational resources at the

disposal of the roaming learner in real time”. It also lends itself to overcoming the shortfalls of traditional instructional delivery, especially its reliance on transmission of pre-packaged content, delivered by specific individual academics at specific times and at specific venues. Essentially, it grants the learners considerable power to choose what they desire to study and when they want to study, and from which place they will study (Schulman, Garcia, Wykoff, Duncan, Withum, & Graygo, 2012; Brett, 2011; Ally, 2009). Learning through mobile devices is flexible because it affords learner engagement beyond the prescribed materials, through their interaction with peers, senior students and the extended academic community. The m-Learning strategy broadens learners’ learning space by extending learning beyond the closed walls of classrooms to informal spaces, augmenting the learning community of information seeking students, and recruiting the participation of thought leaders formerly beyond the reach of learners (Schulman, Garcia, Wykoff, Duncan, Withum, & Graygo, 2012).

‘Anywhere and everywhere’ learning milieus accommodate learning that takes place both privately and collaboratively (publicly) and across different contexts. Interestingly, mobile digital inclusion overpowers the notions of traditional learning where the location, time and environment for learning are regarded as important factors for effective instructional delivery (Chu, Hwang, & Tsai, 2010). The learning environment is no longer defined by attending class, and rather by the instructional delivery, unimpeded by scheduled class periods. Handheld mobile technologies have enabled students to learn both in formally and informally, during and after school sessions. Learning responsibilities are at times student-initiated, hence promoting students to take control of their learning (Looi, Seow, Zhang, So, Chen, & Wong, 2010; Watson, 2006).

The following projects reports on previous utilisation of student centered m-Learning approaches. Brett’s (2011) study conducted in the United Kingdom documented initiatives to promote collaborative learning using Short Message Service (SMS). In this study students academically interacted with their peers and facilitator in a virtual platform, thereby enjoying flexible mobile learning, since learning could be supported anytime and anywhere. However, students’ overall experiences with the exploitation of mobile technologies for pedagogical delivery were positive. Additionally, the SMS usage for creating interactive learning opportunities was reported to be successful. Brett argues that an effective m-Learning environment can be achieved through

improved staff development, and more dialogue with mobile learners. The flexible learning notion is in line with Kukulska-Hulme & Traxler (2005), who claim that m-Learning is centred on flexible learning, facilitated by hand held electronic gadgets. Similarly, Wood (2003) postulates that m-Learning emphasises the suitability of handheld electronic gadgets such as tablet PCs, iPads, mobile phones, and laptops for teaching and learning.

In the United States of America m-Learning was adopted in the military medicine. The findings of the m-Learning military medicine study suggest that mobile learners were motivated, persistent, independent and goal-oriented. As a result, m-Learning was reported to be effective and its effectiveness was linked to reduced study time, owing to self-directed learning. The study reported that mobile learners gained the same knowledge in about one-quarter of the time needed to provide it in traditional didactic lectures (Schulman, Garcia, Wykoff, Duncan, Withum, & Graygo, 2012).

In 2008, the South African presidency requested a project exploring the usage of mobile technologies to enhance educational activities. In 2009 Imfundo Yami/Yethu Project was rolled out to 30 secondary schools. The project utilised MixIt, a mobile instant messaging platform, to support mathematics teaching and learning for grade 10 learners. Findings suggest that convenient learning, playful learning, and flexible learning significantly contributed to the successful adoption of this strategy (Roberts & Vänskä, 2011).

The three m-Learning projects stated above clearly indicate the m-Learning perspectives that contribute to effective learning. In this paper I argue that WhatsApp's growing popularity among people of relatively low financial status can be taken advantage of and utilised to promote effective learning in the South African tertiary institutions.

### **Mobile instant messaging**

Dourando, Parker, & de la Harpe, (2007:78) defined Mobile instant messaging (MIM) as “an asynchronous communication tool that works on the wireless, handheld and desktop devices via the Internet, and allows students and peers to chat in "real time". Given the high penetration of mobile phones at South African universities and the concomitant demands for networked engagement at tertiary learning level, MIM can play a crucial role in student collaborative mobile learning processes and the fostering of on-task behaviour.

MIM is profoundly valued for its capacity to foster a unique social presence that is qualitatively and visually distinct from e-mail systems. As Quan-Haase, Cothrel & Wellman (2005) suggests, “Instant Messaging (IM) applications differ from e-mails primarily in their focus on the immediate delivery of messages through: 1) a “pop-up” facility to show messages the moment they are received; 2) a (“buddy list”) visible list of users currently online; and 3) a method for indicating when “buddies” are online and available to receive messages”. I am of opinion that, the above mentioned MIM affordances maybe utilised to promote effective learning in an environment where the majority of students possess mobile devices that supports IM facilities. Furthermore, when MIM is applied appropriately in an academic environment it may significantly promote the learning process.

Prior studies documented the academic paybacks of MIM as: fostering contact between faculty and students, creating mutual discussions and educational support among students, encouraging active learning, provision of instant feedback, emphasising time on the activities; integration of a variety of capacities and affording authorised access by users (Desai & Graves, 2006, Farmer 2003). While these academic benefits may provide valuable motivators for the appropriation of MIM for educational purposes, they render limited understandings into the potential of MIM to change traditional forms of didactic delivery. Tran, Yang & Raikundalia (2009) investigated 149 Australasian students who were regular users of text based computer mediated communication (CMC), to grasp the nature of using these applications and the problems students encountered when using them. Their study explored users’ conversational awareness, including their consciousness of turn-taking, conversational framework and of various conversations. Tran, Yang & Raikundalia (2009) reported that “text based CMC constitutes a lightweight communication tool that facilitates people’s social conversations such as emotional awareness and multiple identities”. They further suggest that in organisational contexts, structural consciousness of a conversation and awareness of turn-taking assumes importance, and therefore, such awareness can support the impact of the effectiveness of users’ tasks. In spite of these studies, what impact MIM has on individual participation in collaborative learning activities remains speculative, and hence an interesting subject for debate. More importantly, the potential of MIM for breaching the digital divide in resource-constrained learning environments remains an academic mystery.



I am of the opinion that the Framework for the Rational Analysis of Mobile Education (FRAME) model may be useful for establishing the potential of MIM in breaching the digital divide in resource-constrained learning environments.

### **m-Learning and the FRAME model**

Koole's (2009) theorised the FRAME model, a conceptual lens for grasping m-Learning that unfolds from the convergence of wireless mobile handheld technologies, social interaction, and human learning capacities. The FRAME model perceives the joint creation of dependable information in m-Learning environments to be predicated on the juncture of interactions (among individuals, in dyads, and clusters), and the mediating role of conversational technology (Koole, 2009; Koole, McQuilkin, & Ally, 2010; Kumar, Jamatia, Aggarwal, & Kannan, 2011).

The FRAME model can be utilised for investigating collaborative learning facilitated by WhatsApp. Koole (2009) claims that the technical aspects of mobile technologies that stimulate a student's cognitive needs and factors that influence cognitive loads constitutes the core aspects for device usability. Based on the researcher's WhatsApp initiative preliminary investigation, I gathered that collaborative learning supported by WhatsApp may stimulate students' cognitive needs, since students may learn using devices they carry around throughout the day. The ability to learn synchronously and asynchronously may also promote collaborative learning because students will have an opportunity to study at their convenience. WhatsApp affordances such as notifying a user whenever a new message is received and also indicating peers who are online are essential for collaborative learning. Since WhatsApp (mobile technologies) allows group member interactions, I find it worth investigating its potential to promote collaborative learning using the FRAME model.

The FRAME model also addresses the human learning capacities. Human learning capacities emphasises an understanding of how students utilise what they already know and how they transfer information. I assume that students can utilise WhatsApp to share knowledge obtained from class and other sources. I find it appropriate to utilise the FRAME model to investigate how students use what they already know and how they feel about using WhatsApp for learning. Furthermore,

will use the FRAME model to investigate how WhatsApp may motivate students to learn using WhatsApp MIM (Koole, McQuilkin, & Ally, 2010).

Most students are proficient in using WhatsApp for social networking, a platform with little or no rules for engagement. However, the FRAME model will help me to investigate factors that may influence individuals to obey the rules of engagement and teamwork which allow students to share information, gain knowledge, and maintain educational customs during collaborative learning using WhatsApp. The Venn diagram below represents the FRAME model.

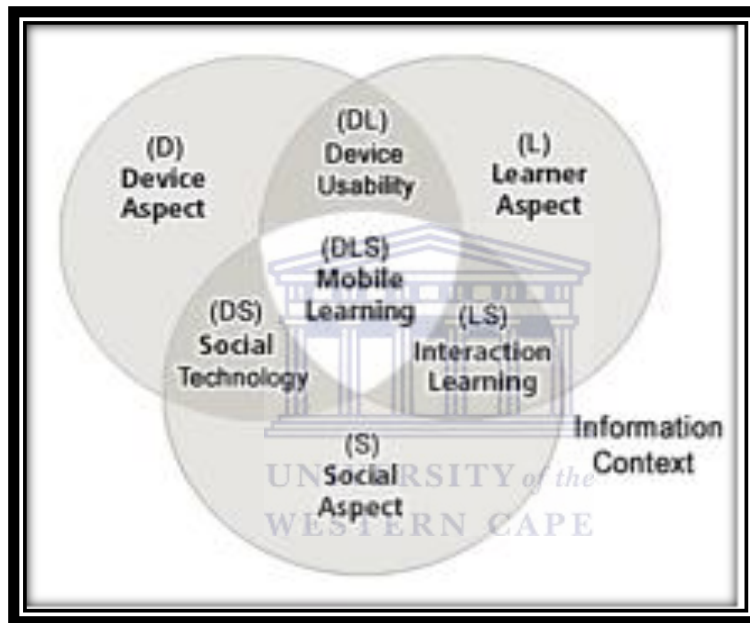


Figure 1: The FRAME Model (Koole, 2009, p. 27)

As shown in the Venn diagram, there are three circles comprising the technological device (D), the mobile learner (L) and the social aspects of the interaction (S) which are intersecting. At the intersections of these three variables are issues relating to the usability of the device (DL), instructional and learning theories involving mediated interaction (LS) and the social aspects of the mediating technology (DS). The heart of these three intersections and interactions between the three variables (device, learner and social aspects) are the ideal conditions for m-Learning (DLS).

Koole (2009) defined the device aspect (D) as “the physical, technical, and functional characteristics of a mobile device”. It is important to assess these characteristics which consistently

affect the interface between the mobile learning students and the learning activities (Koole, 2009). The learner aspect (L) underlines the intellectual abilities, remembrance, prior knowledge, feelings, and potential inspirations of the mobile learner. It emphasises understanding how learners use what they already know and how they encode, store, and transfer information. The mobile learners in MIM context bring different kinds of knowledge (tacit knowledge, peer-based knowledge, pedagogical content knowledge) and perspectives in conversations with each other via their networked devices. The social aspect (S) constitutes the seedbed of social interaction and corporation. Individuals must follow the rules of engagement and support which permit them to exchange information, acquire knowledge, and sustain cultural practices.

Koole (2009) suggests that device usability intersection (DL) draws on considerations from both device aspect functionalities and attributes of the individual or collective of learners. It foregrounds technical aspects of the technology which impact on users' cognitive demands and sense of psychological satisfaction which affect their cognitive load, ability to access information, and the ability to traverse different physical and virtual locations. Depending on group size, object of collaborative interaction, and interactional dynamics in MIM, numerous, interlocking discussion threads via MIM threaten the academic quality of discussions due to increased cognitive load on learners. This may invariably undermine the ability of learners to meaningfully engage with peers and academics. Koole (2009) defined social technology intersection (DS) as "the capacity of the device to trigger and sustain communication and collaboration amongst multiple individuals and systems". The technical capabilities of the device, such as short messaging service (SMS), telephony, and access to the Internet through wireless networks, directly impact information sharing and interaction processes amongst people with varied requirements, objectives and priorities (Koole, 2009). The interaction learning intersection (LS) synthesises pedagogy and educational theories and it is based on the social constructivism philosophy. It is located in learners' processes of meaning making, either through direct interaction with information, seeking peers or through their interpretations of content.

### **FRAME model's strengths and weaknesses**

Based on the analysis of literature (Koole, 2009; Kenny, Van Neste-Kenny, Park, Burton, & Meiers, 2009; Koole, McQuilkin, & Ally, 2010) I identified the FRAME model's strengths. The

FRAME model is based on the mobile learning fundamental aspects. These aspects are mobile learning technologies, human capacities, and social interactions which therefore promotes a deeper understanding of mobile learning (Koole, 2009). The FRAME model's potential to addresses several learning perspectives, which includes but is not limited to information load, knowledge navigation and collaborative learning, improves its strength (Koole, 2009; Koole, McQuilkin, & Ally, 2010). The FRAME model is helpful for the future development of mobile device software and hardware. Furthermore, it is useful for the development of learning materials, and for mobile learning instructional design (Koole, 2009). The strength of the FRAME model can be facilitated by the fact that the FRAME model places emphases on constructivism, hence promoting student-centric learning (Koole, McQuilkin, & Ally, 2010).

On the other hand the FRAME model's weaknesses were identified. The model was developed in the Canadian context which has very good bandwidth and mobile network connectivity, unlike here in Africa (Koole, 2009; Kenny, Van Neste-Kenny, Park, Burton, & Meiers, 2009). The FRAME model was created and tested using a Canadian population, and thus limits the model's credibility in an African context since it addresses social and personal learning for the Canadian milieu (Koole, 2009; Kenny, Koole, McQuilkin, & Ally, 2010). The FRAME model is biased towards distance learning (Kenny, Van Neste-Kenny, Park, Burton, & Meiers, 2009).

### **Previous studies based on FRAME**

The use of the FRAME model in evaluating mobile learning is growing. The following studies used FRAME model to underpin their research: Kenny, Van Neste-Kenny, Park, Burton, & Meiers, (2009) reported on the application of the FRAME model in their mobile learning study for the nursing practice education. The study took place in Canada and participants were provided with mobile learning devices that supported Wi-Fi and GPRS wireless connectivity for voice and data download. The study was meant to investigate the feasibility of m-Learning in a nursing learning environment. The results of the study indicate that participants found mobile learning feasible in their context and pleasing from a device usability perspective. Ease of use was reported to be a contributing factor for mobile learning feasibility in the nursing practice. However, nursing students did not find collaborative learning useful. The study concluded that mobile learning is

feasible in nursing practice education. The validity of the FRAME model for evaluating mobile learning was confirmed in this study (Kenny, Van Neste-Kenny, Park, Burton, & Meiers, 2009).

Koole, McQuilkin, & Ally, (2010) employed the use of the FRAME model to assess the potential of mobile learning to offer flexible and effective collaborative learning. The study was conducted in Canada on graduate distance learning students. The study utilised a low-bandwidth, generic J2ME application (Java) called MobiGlamm as a tool for accessing the university learner management system (LMS). The study reported on flexible learning facilitated by ubiquitous collaborative learning. Device usability was reported to be the most influential aspect on flexible learning. The FRAME model was reported to be an effective framework for investigating mobile flexible learning in a Canadian graduate studies milieu (Koole, McQuilkin, & Ally, 2010).

Kumar, Jamatia, Aggarwal, & Kannan, (2011) conducted a study to investigate the outcomes of the utilisation of mobile devices on student support services, and to measure its potential for boosting teaching and learning. The study was conducted in India on distance learners. Findings show that the utilisation of mobile technologies on student support services through information sharing (device aspect and device usability intersection) was positively received by students with high levels of satisfaction. The study acknowledges the effectiveness of Koole's model in assessing the consequences of mobile device involvement on student support services (Kumar, Jamatia, Aggarwal, & Kannan, 2011).

The three studies mentioned above acknowledge that the FRAME model is capable of investigating collaborative learning facilitated by mobile technologies. I chose the FRAME model to investigate the potential for WhatsApp to promote collaborative learning in my teaching and learning initiative, because the FRAME model has been accepted in previous studies to be effective in the investigation of mobile collaborative learning.

### **Collaborative learning**

Collaborative learning refers to a process in which at least two students interact academically. Small collaborative clusters are encouraged and members must be of different ability levels. Each collaborative group member is responsible for his or her learning and for assisting cluster members

to learn (Iqbal, Kousar, & Ajmal, 2011; UNESCO, 2006). Collaborative learning is a perspective of teaching which declares that learners should jointly address a problem or work mutually on a common objective to share ideas and exchange opinions. Most learning activities in a working environment are facilitated through collaborative learning hence students who have learnt using collaborative learning perspectives are more likely to adjust easier (Iqbal, Kousar, & Ajmal, 2011; Hron & Friedrich, 2003). In this study collaborative learning refers to virtual academic engagement among students using WhatsApp mobile instant messaging in groups of at most ten participants. Furthermore, the lecturer facilitates the process of collaborative learning

Collaborative learning fosters knowledge creation through the exchanges of group members, as members improve their thinking abilities through interactions and information sharing. When students jointly interact, they contribute to the advancement of the group and they also improve their intellectual capabilities (O'Neill, Scott, & Conboy, 2011). Hong, Yu, & Chen (2011) posit that students' motivation can be increased by using the collaborative learning perspective which may subsequently boost effective learning. Students potentially learn from contributing to the group and receiving assistance from the group, sharing knowledge and resolving contradictions in their cluster (Hong, Yu, & Chen, 2011; Webb & Mastergeorge, 2003).

Academic group interactions are not just an important method of learning, but also increase the abilities for supportive work, which is vital in the modern working environment. Incorporating collaborative engagements to tertiary students potentially produce graduates who may be able to work independently and competently within teams, while also appreciating the value of emerging mobile technologies in interactions, communication, critical thinking and knowledge creation (O'Neill, Scott, & Conboy, 2011; Salas, Kosarzycki, Burke, Fiore, & Stone, 2002).

The notion about collaborative learning proposes that students can solve academic problems through group interactions, resulting in learning taking place throughout these group discussions (Iqbal, Kousar, & Ajmal, 2011). Externalisation of ideas and reflection on interaction are common during collaborative learning. Vygotsky, (1978) in his previous study documented meaningful learning facilitated by learners who externalized their thinking.

Collaborative learning fosters the development of new ideas, the sharing of these ideas and improving upon them (Iqbal, Kousar, & Ajmal, 2011; Tan, Hung, & Scardamalia, 2006). Academic group collaborations potentially lead to productive learning platforms, characterised by the construction of knowledge by students through the discussion of group members. An effective learning environment is composed of community, learner, knowledge, and assessment (Harasim, 1993; Shamatha, Peressini, & Meymaris, 2004). McNeil argues that the constructivism theory promotes students to be active participants in the learning process. This aspect encourages students to actively participate in the process of knowledge creation and construction. Emerging technologies that supports collaborative learning may positively contribute towards meeting the needs of constructivist perspectives (2003). McNeil, (2003) further said that research must focus on designing and implementing virtual collaborative systems that promote the constructivism theory.

### **Social constructivism**

Previous studies on learning processes documented that there are two approaches to learning, namely objectivism and constructivism (Tan, Ooi, Sim, & Phusavat, 2012; Conner, Kirk, Cade, & Barrett, 2001). Objectivism refers to an instructional process with an instructor-centric focus. Constructivism refers to the generation of knowledge by learners through the interaction of experiences and ideas (Wen & Tsai, 2003). However, in this study I will address social constructivism as mediated by mobile technologies for learning.

The usage of mobile devices is making online education an integral part of social constructivism, a branch of constructivist learning. Scholars have concluded that social constructivism has become one of the recent paradigms in the educational teaching and learning process. In this paradigm, students construct knowledge, share ideas, and jointly creating a community of practice for sharing learning artefacts (Tan, Ooi, Sim, & Phusavat, 2012; Bryman, 2008; Wen & Tsai, 2003). Since most people are in possession of their mobile phones all the time, academics strongly believe that creation of learning platforms on mobile phones may enhance learning (Hung, Hwang, Lin, Wu, & Su, 2013; Schulman, Garcia, Wykoff, Duncan, Withum, & Graygo, 2012; Venkatesh & Morris, 2000).

Past findings indicated that students are more interested in technology mediated learning as compared to traditional learning methods (Schulman, Garcia, Wykoff, Duncan, Withum, & Graygo, 2012). In Chile, students were fascinated by the flexibility of the instructionally supplied instant messaging learning system. The system runs on mobile devices. Students with mobile devices compatible with the instant messaging learning system were placed in small groups of two or three. The facilitator would post multiple choice questions which students were required to answer. Echeverri'a, Nussbaum, Caldero'n, Bravo, Infante, & Va' squez (2011) argue that "the activity was designed so that all the group members would participate in discussing the questions as they search for agreement on the answers. If the members submit different individual responses, the system will inform them that they must come to a consensus before sending in a single final response". As the project progresses, the number of participants significantly increased (Echeverri'a, Nussbaum, Caldero'n, Bravo, Infante, & Va' squez, 2011; Venkatesh & Morris, 2000). I believe that this is an indication that students are interested in participating in learning processes that are not bound to classroom and also enjoy collaborative learning using mobile devices, hence promoting social constructivism. Furthermore, MIM as a vehicle for m-Learning can be used as cognitive tools to efficiently provide information and feedback relevant to the current learning situation (Roberts & Vänskä, 2011; Tal,n, Ooi, Sim, & Phusavat, 2012; Hung, Hwang, Lin, Wu, & Su, 2013)



### **SECTION 3: RESEARCH DESIGN AND METHODOLOGY**

This research is based on the interpretive research design. Walsham, (1995) argues that “interpretive research adopts empirical approaches which focus particularly on human interpretations and meanings”. According to Walsham, (1995), interpretive research allow participants to interpret their opinions and feelings regarding a phenomenon. As an interpretive researcher, I wanted to understand how emerging technologies may influence students’ academic participation. Furthermore, I wanted to tell a story on behalf of my research participants in the form of a research paper reporting on the potential of mobile technologies to boost academic participation, resulting in effective learning. Interpretive research helped me to understand my participants’ interpretations and feelings on the academic usage of WhatsApp.

#### **The research site**

The University of Technology at which this study was conducted is a former Technikon, which traditionally offered technical qualifications (diplomas and degrees). Historically, the graduates of this university were destined to work mainly in the professional and technical fields of business, industry and commerce (CUT, 2008). The University of Technology’s admission criteria are generally regarded as lower than those of traditional universities in South Africa, and this results in enrolment of learners with diverse levels of academic preparedness (Rambe, 2013). This university’s student population is largely drawn from different parts of the Free State province, including some remote and rural communities of South Africa. The majority of the learners is English second or third language speakers (CUT, 2008). Prior to entering higher education, high school teachers had to use code switching (from vernacular to English and vice versa) to teach these learners in various learning areas. Thus, these learners normally struggle to converse effectively in English, which is the medium of instruction at South African higher education institutions (Rambe, 2013). Furthermore, a sizeable number of these learners are mature-entry professionals who learn part time, usually after work and some have families. Although the majority of students are academically eligible to be at university, a sizable number of learners are underprepared for university education and therefore expected to enroll for bridging courses to effectively participate in higher education (CUT, 2008). Mindful of the South African government’s critical role in financing higher education and its deliberate policy of widening

access to tertiary learning, university educators are under pressure to accommodate and support these academically underprepared and historically disadvantaged learners (CUT, 2008). Historically disadvantaged students, a common term in South Africa, are at-risk learners who previously attended impoverished, under-resourced high schools and whose socio-culturally deprived backgrounds diminish their potential to effectively participate in university learning. As such, University of Technology educators are encouraged to explore the affordances of educational technologies that support the meaningful learning of historically disadvantaged students (Rambe, 2013).

### **Research procedure**

The research considered third year Information Technology students registered for the Information systems module at the research site. Given that the rationale of the study was to explore the potential of networked technology (MIM) to promote digital inclusion, hence Information systems III a technology-based module served as an ideal context for such an investigation. Therefore, to supplement lectures and the institutional learning management system where pedagogical content (lecture slides, additional readings, course notes, learning tasks) was transmitted, a MIM, WhatsApp, was adopted as a consultative space through which students would engage with peers and the lecturer in real time as well as asynchronously. I required students who could download and install WhatsApp to their web-enabled handheld devices (Smart phones, iPads, tablets and PDAs) and form consultative academic clusters (discussion groups) comprising a maximum of 10 participants per group excluding the lecturer. Students reserved difficult questions they couldn't address for class discussion, where the lecturer would provide thorough explanations and feedback to the whole class for the benefit of every student.

Clusters on WhatsApp served as vital consultative forums for engaging with group members and the lecturer on academic matters. The lecturer informed students on his availability on WhatsApp at any time (between 8 am -10 pm) to facilitate learning by addressing their queries, problems and course related issues. Mindful of the academics' dominance of traditional lectures, the lecturer sought to diminish hegemony by maintaining a social presence and getting involved only upon invitation. To generate meaningful student discussions online, the lecturer posted one question to the different clusters for discussion. Perceived knowledge and power differentials between peers were addressed by allowing students to log on WhatsApp using their cell phone numbers to ensure

that intra-cluster and inter-cluster interactions were anonymous. While the students interacted anonymously the lecturer used his real name for ease identification by students.

### WhatsApp messenger

WhatsApp MIM is a cross-platform web-based messenger that uses users' internet data bundle's to help them stay connected (WhatsApp, 2010). WhatsApp supports a feature that shows users who are online at any given moment, allowing students to randomly consult with their peer cluster members in real time or asynchronously.

Table 1: WhatsApp's collaborative features

Multimedia	It allows users to exchange text messages, videos, images, and voice notes with their interactional network and contacts.
Group chat	Supports the interaction of up to 11 group members / conversants. Members can engage in discussion forums
Unlimited Messaging	WhatsApp Messenger interactants enjoy abundant messaging without limits. The application uses 3G/EDGE internet data plan or Wi-Fi to ensure continuous data transmissions across platforms.
Cross platform engagements	Interactants with different devices (personal digital assistants, Smart phones, Galaxy tablets) can message one another through various media (text messages, pictures, videos, voice notes).
Offline messaging	Messages transmitted when the device is off or is located outside the coverage area are automatically saved and are retrievable when network coverage is restored or when the device is turned on.
Other incentives on WhatsApp	
Charges involved	Because WhatsApp MIM uses similar internet data plan used for email and web browsing, there are no costs in communicating via WhatsApp. There are no charges involved even for international calls involving interactants on WhatsApp
Pins and user names	Interactants do not necessarily need to remember their passwords or usernames, as WhatsApp works via phone numbers and can be integrated with users' address books

### FRAME model and data collection instrument

I used the FRAME model for investigating the potential for the WhatsApp initiative to foster pedagogy, because it addresses human capabilities that emphasises on understanding how learners use what they already know and how they transfer information (Koole, McQuilkin, & Ally, 2010). Furthermore, the FRAME model addresses the technical aspects of mobile technologies that stimulate students' cognitive needs and factors that influence cognitive loads (Koole, 2009). Based on Koole's (2009) claim above, I found the FRAME model appropriate for this investigation because collaborative m-Learning requires students to understand technical aspects of mobile technologies. It also requires learners to know what to do with recently acquired knowledge and what to do with knowledge which they have already acquired.

After realising the relevance of the FRAME model in this investigation, I used it to frame my interview instrument (See appendix F). I utilised the FRAME model since it addresses fundamental aspects for collaborative m-Learning. I found it important to collect data that provide insights on the characteristics which constantly affect the interface between the device, the mobile learner and the learning tasks. This section was catered for by the device aspect adopted from the FRAME model, and was most relevant for the latter. Koole (2009) claim that understanding thinking abilities, retention, prior knowledge, feelings, and possible motivations of the mobile learner are essential in a mobile learning environment, hence I used the learners' aspect construct of the FRAME model to frame questions in this regard. To investigate the social aspect of the FRAME model, I developed questions that addressed m-Learning rules of engagement and mutual aid which helped students to share information, and acquire knowledge.

#### **Data collection method: Face-to-face semi-structured interviews**

I used face-to-face semi-structured interviews as a primary data collection method to gather data from participants about their own mobile learning experiences, and opinions (Harrel & Bradley, 2009). These interviews were used to gather factual material and data, involving effective learning opportunities facilitated by m-Learning technologies using MIM. In my semi-structured interview instrument; I provided a guide with questions and topics that must be covered. I used my discretion regarding the order in which I asked questions, but I standardised the questions. In most cases I probed to ensure that I have collected accurate and comprehensive data in a manner that is relaxed. I used semi-structured interviews, because I wanted to explore deeply into utilisation of mobile

technology for learning and to understand the answers provided thoroughly (Harrel & Bradley, 2009).

I asked the same questions to all participants, but I changed the order to allow a more natural casual flow. I purposely repeated questions to provide the participants with multiple chances to eloquent how they benefited from using WhatsApp for learning. Questions were structured under the headings drawn from the FRAME model constructs. My research approach to the interview was participants' friendly in that I attempted to 'establish a collaborative and non-exploitative' environment, by allowing interview participants to choose a place and time for the interview (Creswell, 1998, p. 83).

I attempted to maintain the principle set forth in Rubin & Rubin, (2005) which is to respect my interviewees during an interview (p.32). Gluck & Patai, (1991) cautions researchers to "listen carefully to participants' voices, and to suspend, as much as possible, the research agenda for the time that the interview is conducted" (p. 11). I attempted to follow Gluck & Patai's advice by treating the interviewees as looked-forward-to conversations with colleagues where we planned to converse about their learning experience using mobile technologies.



#### **Advantages of semi-structured face-to-face interviews**

I considered using this method, because all my participants were my students whom I could easily reach. Asking the same questions on every respondent about their experiences on the use of WhatsApp for teaching and learning promoted comparability. Data collection reliability and validity was achieved through pre-testing and posting of the instrument. Writing down the answers in a standardised form facilitated data analysis. Participants' body language guided me and hence I recorded them to help interpret comments. Face-to-face interviews were inexpensive, since they were conducted at the university and at the participants' convenience.

#### **Disadvantages of semi-structured face-to-face interviews**

Some participants were jumping from one subject to another, making it very difficult for me to collect data correctly. Each location has its own characteristics, which can affect mood or attitude towards the interview.

### **Data collection, recording and storage**

I recorded the interviews with both my cell phone and a digital recorder. Two recording devices were used to ensure minimum data loss in the event of some unforeseen circumstance like one device malfunctioning during an interview or the loss of a device. After every interview, I backed up the data on my personal computer. However, I conducted interviews and collected data as planned and no unforeseen circumstance occurred to the data collection.

Microsoft Word was used to transcribe the interviews word for word. The transcribed documents were saved on my computer using participants' pseudonyms. Fifteen interviews were professionally transcribed, and I transcribed the first five interviews. The interviews lasted between 30 to 40 minutes. My speech was less than 15% of the words spoken in each interview, as calculated by word count. This is an indication that, the interviewee did much of the talking in the interview. I analysed data using thematic content analysis in conjunction with the FRAME model.

### **Selection of participants**

I utilised purposeful snowball/purposive sampling to select interview participants. Purposeful sampling intentionally draws the selection of the participant to the research question (Bryman 2008: 458) for the sole purpose of maximising the potential of gaining concrete data. Hoepfl documented the advantages for purposive sampling and its ability to identify 'information-rich cases which can be studied in depth' (Hoepfl, 1997). I used purposive sampling to select a small group of twenty students from a total population of 195 participants. The interview sample was drawn from a population that met the key selection criteria and are therefore relevant to my research inquiry.

The main selection criteria included the following:

Participants were:

- A registered IT student, taking the Information Systems module.
- A student with a smart phone that supports WhatsApp application.
- Students that had interests in using WhatsApp for academic purposes

- Students of any gender, marital status, colour, race and nationality.

### **Research ethics statement**

My research subjects were my students and I understood that I had the power to influence their participation in this study. However, I sustained the highest integrity during the study. Moreover, I exercised the highest possible ethical standards during the research process. Given that my students were my target population and that I could create additional perceived pressure for them to participate, as they may feel more awkward in declining a request to help me with my research. I clarified that there is no pressure to participate, since this study does not contribute to their marks. Furthermore, I made it clear that participation is voluntary and participants are free to withdraw from the research study at any given time (Greig, Taylor & MacKay, 2007).

The British Educational Research Association (2004) claim that providing information to participants is important, so that they can make informed decisions in response to a request for participation in a research project. I provided participants with an information letter (See appendix H), and asked for their consent (See appendix G). Prior to participation, participants were given clear research study procedures. Participants were encouraged to ask as much questions as possible so that everything can be explained to them in advance.

I discussed issues of harm, risk and potential benefit which might result from the research study. I considered the following risks:

*Over-research:* Whether there is a chance that the students are being asked to participate in too many studies. In most universities and colleges, students tend to be victims of over-research phenomenon as they often asked to complete surveys. I endeavored to avoid over-research in my study by using only one data collection method.

*Misunderstanding:* piloted the interview guide to guarantee that the information being used in the proposed study is understood by participants. I discussed possible harm or distress that might result from the questions used for data collection.

Alderson & Morrow (2011) argue that over-research and misunderstanding risks may have negative impact on participants' self-esteem, and moreover they may lead emotional distress, and

feelings of embarrassment. I am aware that research that poses a risk to students should not be conducted. Therefore, I endeavoured for a risk free research by adhering, but not limiting myself to, the proposition indicated in italics above.

Participants' names were not disclosed in any written material or discussion concerning the research project. Additionally interview transcripts will be kept for five years in a locked cupboard in my office, after which they will be destroyed. These initiatives have been put in place to ensure respondent confidentiality (Jason, Pokorny, & Katz 2000).

I considered the research investigation worthwhile and of value in uplifting the standards of educational technology. I fully acknowledged the work of other authors hence I refrained from plagiarism in my research paper. I reported my research findings candidly and honestly. While recognising the rights of participants, I also reserved the right to report, provided that I obeyed with the ethical procedures delineated here:

I obtained permission from participants prior to the study. Research procedures were communicated clearly to participants prior to the study. I disseminated participants' rights in the research. I obtained permission to carry out the study at the Institution concerned prior to the study. Strict confidentiality was adhered to, pseudo names were used in my written report, where naming was necessary (British Educational Research Association, 2004 & Economic and Social Research Council (ESRC), 2010).

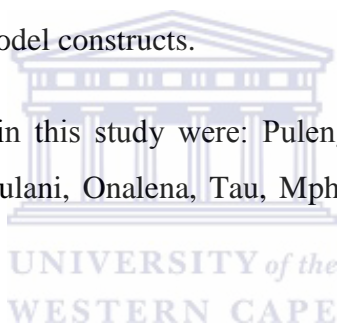


## SECTION 4: DATA ANALYSIS

Considering that the emphasis of this research is on harnessing students' experiences on a newly introduced m-Learning strategy, I followed a narrative analytic approach to analyse the data. As Bryman (2008, p. 559) says, "The aim of narrative interviews is to elicit participants' reconstructed accounts of connections between events and contexts".

Narratives were coded using a system that includes available scholarly taxonomy, in line with the idea that "at the root of semi-structured interviewing is an interest in understanding the experience of other people and the meaning they make of that experience" (Seidman, 1998, p. 3). Participants' profiles were also considered (Seidman, 1998, pp. 102-107). To facilitate a thematic analysis of the narratives, emerging themes for mobile collaborative learning were summarised in the paper in conjunction with the FRAME model constructs.

Participants' pseudo names used in this study were: Puleng, Tanya, Wang, Tshidi, Olwethu, Chichi, Candice, Mary, Pieter, Thulani, Onalena, Tau, Mpho, Gamu, Jane, Noreen, Ongezwa, Getty, Amos and Clint.



### **Participants: Mobile learners**

I interviewed 20 participants. Among the interviewed participants 14 were African, three were whites, one was Asian and two were Coloured. Participants' race summary information is shown in a pie chart (See appendix A). The population consisted of 12 female participants, and males constituted the minority with eight participants, refer to appendix B. The participants' ages were distributed as shown in the bar chart in appendix C. The majority of the participants in this study were single, while the smallest population were divorced. The marital status of the participants is displayed in the bar chart shown on appendix D.

The Venn diagram in appendix E shows the source of income for the participants. The diagram indicates that thirteen participants relied on part-time jobs for their financial needs, three had full-time jobs, four were financed by their parents and fourteen had other sources of funding which included bursaries and scholarships. Three participants' sources of income were both part-time jobs and guardian support. One participant had a full-time job, but still received financial support

from a guardian, and another full-time employee received a study bursary from his company. Among the thirteen part-time employees, eight were bursary or scholarship holders. None of the participants had a part-time job and full-time job at the same time (See appendix E).

The rest of the data analysis presents some narratives based on collected data guided by the FRAME model. The main themes of the data analysis was collaborative mobile learning, which is facilitated by device usability, asynchronous and synchronous learning, device usability and anonymous learning, device usability and ubiquitous learning, device usability and learning resources storage, learner aspect, conversations and peer feedback, social aspect and social behaviour, device aspect, portability and ubiquitous learning, social technology intersection and collaborative learning, and the interaction learning intersection and peer mentoring.

### **Collaborative mobile learning**

Collaborative learning fosters the creation of knowledge through group member interactions. Previous findings indicate that collaborative learning potentially enhances the learning process, and increases students' motivational levels to learn. This learning perspective stimulates an increase in self-esteem and it promotes the abilities for cooperative work among students (Hong, Yu, & Chen, 2011). Students can learn from collaborative m-Learning through participating in the process of giving and receiving academic assistance, knowledge sharing and resolving contradictions among themselves (Hong, Yu, & Chen, 2011; Webb & Mastergeorge, 2003).

Interestingly, the participants mentioned to collaborative learning, anonymous learning, anywhere and everywhere learning, 24/7 electronic library, edutainment and notification of other new learning material as aspects that promoted effective learning. For Jane, collaborative learning supported by WhatsApp shifted her tendency of private study to group study.

I do not stay close to any of my classmates, so I do not have anyone to consult after hours. These circumstances made me to develop tendencies of private study. WhatsApp academic strategy shifted my private studying habits to collaborative learning since I could interact anytime with my peers (Interview: Jane, November 2012).

Mpho also acknowledged that collaborative learning took place through WhatsApp. He claimed that it taught him to value his peers' opinions and to engage with their views, perspectives and

content, rather than his traditional self-study approach which basically consisted of individual problem solving. He said the following:

The WhatsApp initiative made me realise how much my classmates are worth to me. Small contributions made by my group members significantly contributed to my learning. I learnt a lot from my peers (Interview: Mpho, November 2012).

Mobile instant messaging collaborative learning, according to Sotillo (2006), does not only render interactions that facilitated student awareness of concepts, but it can also improve throughput. Olwethu had the following to say:

I learn through telling others what I know and I value peer feedback. My situation is complex in the sense that I stay about 60km away from the university, so getting involved in group discussions after hours is practically impossible, since I need to catch my transport on time. This constraint limits me from sharing knowledge with my peers, since their groups are constrained by time and space. Introduction of the WhatsApp academic strategy perfectly fits my study needs because I can academically interact with my peers at anytime of the day, regardless of my location. This initiative has contributed to the improvement of my grades (Interview: Olwethu, November 2012).

Previous studies emphasised on collaborative learning's potential to develop teamwork skills, which are necessary in the labour market. Integrating collaborative technologies in tertiary education should produce graduates who can work harmoniously with others. (O'Neill, Scott, & Conboy, 2011; Salas, Kosarzycki, Burke, Fiore, & Stone, 2002).

### **Device aspect, portability and ubiquitous learning**

With reference to the FRAME model, Koole (2009) argues that the device aspect (D) refers to “the physical, technical, and functional characteristics of a mobile device”. Mobile devices' portability and ease of use allow users to ubiquitously utilise these technologies. These devices' ability to support ubiquitous learning significantly contributes to their popularity in education (Chen, Kinshuk, Massey, Ramesh & Khatri, 2006).

Thirteen participants exclusively used smartphones and four used tablets in this study. Two students used both smartphones and iPads while one student had both a smartphone and tablet. All smartphones, tablets and iPads used supported the following applications: sms, e-mail, WhatsApp, Internet, Facebook, twitter, Skype and mp3.

The majority of the participants indicated that portability of m-Learning devices influenced their academic participation. Jane and Clint in particular had this to say:

The beauty of WhatsApp is that it is an application that runs on a portable mobile device, so my learning is not limited to one place. Since messages can be read anywhere, even in restricted areas like banks and hospitals, portability of these devices leads to flexibility in learning (Interview: Jane, November 2012).

I can scroll down and browse through my peers' questions, queries and comments at any place, because I can carry my phone around. I even get to use WhatsApp for academic purposes on my lounge suite or my bed, and therefore portability makes learning accessible anywhere, which is a good idea (Interview: Clint, November 2012).

Participants claim that internet connectivity is a huge challenge and that they wish it could be improved. Puleng in particular reported that at times he gets frustrated due to slow internet connectivity.

The challenge with Wi-Fi enabled networks, through which I access WhatsApp to academically engage with my classmates and lecturer, is that connectivity tends to be slow. It's different from broadband where access is often instantaneous (Interview: Mary, November 2012).

At times I become impatient when my messages are not delivered on time. The result is that these mobile devices' poor Internet connectivity takes away my studying mood (Interview: Tanya, November 2012).

Wang, Chichi, Candice, Gamu and Clint reported that they have two years' experience using m-Learning technologies for academic purposes. They gained their experience in secondary school. These technologies were used for inquiry and solving mathematical problems through the MixIt instant messaging application, during the Dr Maths project for grade 11 and 12 learners. All five

participants reported that they used MixIt for academic consultations with their tutors. These students were beneficiaries of the MixIt project documented by Parker (2011). Parker's study reported how m-Learning for the Mathematics Project, an innovative m-Learning project run on Mixit (mobile instant messaging service), is supporting South African teenagers to do their mathematical homework and revision. The collaborative m-Learning project enabled students to overcome the constraints of the digital divide by embedding educational content in MixIt (which is their social networking space) and availing mathematical services (short theory sections, questions and answers from a huge database). Parker's study documents that through the MixIt m-Learning initiative, over 4000 grade 10 learners accessed mathematical content over the holidays and during teacher strikes. This type of mobile access has contributed to improvements in their grades in quizzes, tests and examinations (Parker, 2011).

### **Device usability**

Koole (2009) claims that the technical aspects of mobile technologies that stimulate a student's cognitive needs and factors that influence cognitive loads, constitutes the core aspects for device usability. As Quan-Haase, Cothrel & Wellman (2005) suggests, "IM applications differ from e-mails primarily in their focus on the immediate delivery of messages through: 1) a "pop-up" mechanism to display messages the moment they are received; 2) a visible list ("buddy list") of other users, compiled by the user; and 3) a method for indicating when "buddies" are online and available to receive messages". I believe that once students see their peers online, they become tempted to chat.

### **Device usability, asynchronous and synchronous learning**

Roberts & Vänskä (2011) posits on the possibility of enhancing learning through synchronous and asynchronous learning facilitated by mobile IM. O'Neill, Scott, & Conboy (2011) argue that students improve their academic critical thinking in both contexts through collaborative learning utilisation. eLearners.com, (2012) asserts that, there are benefits and drawbacks to both synchronous and asynchronous learning. Synchronous courses significantly involve students in learning, in real-time, with learning activities. Besides, it allows for instant feedback. Some students consider real-time communication as a tool for fruitful academic discussions.

On the other hand, some students prefer learning using asynchronous technologies because they believe that they are appropriate when they require more time to form their thoughts or research before contributing their views. In a virtual synchronous instructional delivery, these students might be dominated by academically stronger and spontaneous thinkers (eLearners.com, 2012).

WhatsApp is a flexible instructional delivery method because it is capable of supporting both synchronous and asynchronous learning perspectives. Mpho and Pieter supported synchronous and asynchronous learning supported by m-Learning technologies. They had the following to say:

I like WhatsApp because it allows me to research and reflect before responding to questions, unlike in a classroom environment where impromptu responses are expected due to limited time (Interview: Mpho, November 2012).

My schedule is unpredictable because my bosses frequently changes my shifts. WhatsApp allows me to respond to earlier discussions contributed during my absence. Furthermore, I always find someone online whenever I log on who will be willing to provide feedback on my contributions (Interview: Pieter, November 2012).

Puleng alluded to the value of synchronous learning. She was particularly fascinated by the instant feedback supported by these technologies.

I value feedback during learning, because I don't want to continue studying things that I am unsure of, hence I need someone to confirm that I am on the right track. The classroom was the only place I could ask questions and get feedback on work previously studied. The WhatsApp initiative came and extended my learning, now I can get instant feedback from both my peers and lecturer while at home (Interview: Puleng, November 2012).

Mpho enjoyed the advantages for both synchronous and asynchronous learning. He argues that blending these two learning designs enabled him to learn anytime of the day. Mpho had the following to say:

Before the implementation of WhatsApp for learning strategy, sharing of ideas was limited to the classroom, since my classmates were reluctant to form after-hour study groups. WhatsApp extended my learning, since ideas could be shared anytime of the day, learning

could be done in real time and threads could be responded to later. At least now I can make a decision about when to learn (Interview: Mpho, November 2012).

### **Device usability and anonymous learning**

It was acknowledged that m-Learning through WhatsApp raised self-confidence for shy and low self-esteem students. Anonymous learning and learning with others in a group were reported to facilitate significant improvements in self-esteem and confidence among students (Attewell, 2004). Candice's views supported Attewell's argument in the following way:

WhatsApp academic participation significantly improved my participation, because nobody could trace my contributions back to me, since WhatsApp hides the name of the sender. Participating freely without fears of being judged by other students enhanced my confidence (Interview: Candice, November 2012).

Thulani corroborates Attewell and Candice's claims by declaring,

I am a shy person and I do not feel comfortable participating in a face-to-face manner, because some classmates may judge me. Furthermore, some students randomly pass negative comments against other students' contributions and these students make me hate participating in class. The introduction of the WhatsApp strategy was a relief to me, because now I can comfortably participate in academic discussions without fear of victimisation from my classmates, since no one would know that it is my contribution (Interview: Thulani, November 2012).

The WhatsApp application is engineered in such a way that group members can view each other's phone numbers and not each other's names, hence fostering anonymous learning. This device usability aspect has been found to be an effective tool for anonymous learning which eventually results in boosting the self-esteem of shy students (Attewell, 2004).

### **Device usability and ubiquitous learning**

According to Candice, Pieter and Noreen, the adoption of WhatsApp for learning created better learning opportunities by allowing students and lecturers to interact at any time and at any location, hence reducing the time one would spend looking for information in the library. m-Learning fosters

a ubiquitous learning environment that blends private and public learning spaces. The adoption of m-Learning shifts the traditional learning perception that learning is influenced by place, time and space (Chu, Hwang, & Tsai, 2010). With the mobile devices at hand, m-Learners potentially learn anywhere either in classroom or out of classroom, and any time either on campus or out of campus. In m-Learning context, learning can be initiated by lecturers or students. (Looi, Seow, Zhang, So, Chen, & Wong, 2010; Watson, 2006). Candice, Pieter and Noreen had the following to say:

The WhatsApp strategy suited my busy schedule, because it allowed me to multitask so that I could learn anywhere and at anytime. At times I participate in group discussions while at work (Interview: Pieter, November 2012).

I like shopping, so now I can academically interact with my peers while shopping, since I can learn anywhere and at anytime (Interview: Candice, November 2012).

I stay in a neighbourhood characterised by high criminal activities, thus joining evening study groups is risk, and my only option is self-study. My self-study strategy relies on nothing other than textbooks since they are my only available study resources. WhatsApp for learning enabled learning to take place anywhere and at anytime. Now I can academically interact with my peers at anytime of the day. My peers and lecturers constitute my additional study resources (Interview: Noreen, November 2012).

### **Usability and learning resources storage**

Mary, Puleng and Onalena argue that the beauty of WhatsApp mobile instant messaging for learning is that it keeps a history of previous discussions which might be useful for revision, saying that:

I always keep my chat threads in my phone, and they have been useful for revision. Through these discussion threads, I could get several of my peers' contributions, hence my responsibility was to analyse and summarise them (Interview: Mary, November 2012).

I made it a habit to visit all the threads of a specific day before going to bed, and then summarised the important aspects discussed. My first point for revision was the electronic libraries facilitated by the WhatsApp discussion threads (Interview: Puleng, November 2012).



Threads created on the WhatsApp virtual learning platform were automatically saved to my mobile device. I normally revisit these threads during revision. This system usability feature created an electronic library that stored a wealth of knowledge generated by peer engagements (Interview: Onalena, November 2012).

Given the existence of an electronic library powered by WhatsApp, Puleng, Mary and Onalena's comments were biased towards the availability of the revision material supported by WhatsApp. Pieter's opinion below corroborates with this view:

When preparing for my final examination or studying for my assignments, WhatsApp allowed me to pull diverse ideas and viewpoints from peers without the need of going through large amount of text in the library text books (Interview: Pieter, November 2012).

Based on the response of the participants, it became evident that participants still associate WhatsApp with social interactive activities rather than learning activities. As a result they found learning supported by these emerging technologies entertaining, since they regarded learning in this environment as laid-back. Resnick (2004) argued that "people's best learning experiences come when they engage in activities that they enjoy and care about". Tau and Tshidi agree with Resnick's notion and they had this to say:

One of my classmates used the DJ software and edited our lecturer's voice in one of his lectures. The edited clip was posted on WhatsApp. The clip was very funny but it was rich with Data modelling techniques (Interview: Tau, November 2012).

If I want to be updated on what has been happening during my absence, then WhatsApp is the place to be. I normally get one story in different versions and some versions are hilarious..... (Interview: Tshidi, November 2012).

Ratto, Shapiro, Truong, & Grisworld (2003) reported on the significance of academic participation, especially in small groups that use mobile technology. In their ActiveClass project, Ratto, Shapiro, Truong, and Grisworld concluded that active participation leads to active learning which eventually leads to productive learning. In this study the following participants agree that academic participation using WhatsApp significantly improved their learning.

My learning is no longer limited to a classroom. The WhatsApp strategy allowed me to study whenever I feel like studying. My classmates were always available to assist me with my learning, regardless of the location (Interview: Thulani, November 2012).

I can ask questions at my convenience and get peer feedback in a short space of time. I have improved my problem solving skills while responding to peer questions. I feel that I have learnt a lot through WhatsApp (Interview: Gamu, November 2012).

I like WhatsApp because, I can access academic material in various formats that include, but is not limited to, images, audio, videos and text which fosters my learning. Provision of learning material in various formats captured my attention, and subsequently motivated me to be involved in learning (Interview: Ongezwa, November 2012).

However, the majority liked the WhatsApp initiative, but were not willing to adopt the strategy in other subjects. They were mainly concerned with the time constraints. Puleng and Getty had the following to say:

WhatsApp was very useful for studying Information Systems III, however those academic interactions consumed a lot of time. Luckily we only used the WhatsApp initiative in one subject, otherwise I would not have been able to cope with the pressure (Interview: Puleng, November 2012).

I spent more time studying the Information Systems module, because it utilised WhatsApp which consumed much of my time. Though WhatsApp was useful, it made me lose track of time and as a result I couldn't dedicate adequate amount of time to my other subjects (Interview: Getty, November 2012).

### **Learner aspect, conversation and peer feedback**

The learner aspect (L) underscores the cognitive skills, memory, previously acquired knowledge, feelings, and probable motivations of the individual learner. It emphasises an understanding of how learners use what they already know, and how they encode, store, and transfer information. The mobile learners in MIM context bring different kinds of knowledge (tacit knowledge, peer-based knowledge, pedagogical content knowledge) and perspectives in conversations with peers

and the facilitator via their networked devices (Koole, 2009). I feel that these academic interactions that make use of networked devices are useful for the provision of academic feedback.

Feedback is regarded as a valuable aspect of learning. Among other things, it is instrumental for reflection and development. In academic circles feedback is used as a tool for informing students of their strengths and weaknesses. Thus, it creates opportunities for students to evaluate their academic performance and make appropriate improvements. Timely and useful feedback to students is vital for effective learning (Weaver, 2006).

Tau's view that students learnt through feedback from peers and the lecturer confirmed Weaver's (2006) opinion. Tau emphasised that the lecturer played a facilitating role by providing feedback, which puts students back on track after peer feedback fails to give convincing answers.

I was particularly interested in the fact that the lecturer posts a question during problem solving and waits for most students to post their responses. He would pick some themes from students' responses and then provide a correct solution, indicating where we have gone wrong. These interactions took place in a relaxed environment where students would intellectually argue with the lecturer and eventually come to an understanding. Having this valuable feedback from the lecturer which addresses almost every student's area of concern was quite crucial for my learning. Moreover, each student's feedback was given openly, letting others learn from it (Interview: Tau, November 2012).

Drawing from the Technology Acceptance Model (TAM) (Davis, 1989), perceived ease of use refers to "how effortless the potential user perceives using the technology will be". The perceived ease of use is believed to directly influence the attitude towards technology usage (Basheer & Ibrahim, 2011; Landry, Griffith, & Hartman, 2006; Davis, 1989).

Interestingly, the participants did not find training on the usage of WhatsApp for academic purposes useful. According to Jane, Tanya and Amos, training was not necessary because almost every participant was familiar with the software before it was adopted for teaching and learning. These three expressed their views as follows:

WhatsApp usage for learning was very easy to use, thus this application's ease of use did not warrant any training. I enjoyed learning with technology I can comfortably operate (Interview: Jane, November 2012).

I found WhatsApp to be an easily accessible and user-friendly application, for that reason I used it for learning without being trained on its usage (Interview: Tanya, November 2012).

Even though I suffer from technophobia, I did not struggle to use WhatsApp for learning, mainly because all the icons and navigation features are accessible. WhatsApp is "cool" because it is easy to use (Interview: Amos, November 2012).

### **Social aspect and social behaviour**

The social aspect (S) constitutes the seedbed of social interaction and cooperation. Individuals must follow the rules of engagement and aid, which empowers them to share information, gain knowledge, and maintain educational customs (Koole, 2009). The lecturer enforced rules that prohibited social interactions on the WhatsApp learning clusters. "These ground rules added value to my learning because the policy protected clusters from being stuffed with unnecessary and non-academic thread. Additionally, discussions remained focused since all threads were academic in nature" (Interview: Clint, November 2012).

Contrary to the majority of participants, married and engaged participants claim that WhatsApp academic participation is disruptive in nature.

Receiving academic material on my cell phone after hours is disruptive, worse still is to be expected to engage. I designate after-hour time to my family, and I don't want to deprive my family at the expense of my studies. However, I wish married people could form their WhatsApp academic cluster restricted from 8am to 7pm every day (Interview: Getty, November 2012).

Turel, Serenko, & Giles, (2011) defined the addiction to technology as "a maladaptive psychological dependency on the use of technology to such a degree that typical behavioral addiction symptoms occur". Some users may reveal limited self-regulation in technology usage, which may lead to the growth of addiction and associated symptoms (Black 2007). These users

may have little control over their use of technology, and end up losing control of time because they cannot stop using it (Herschlag and Zwick 2002). Amos and Chichi raised the following concerns:

I enjoy using WhatsApp for academic consultation to the extent that I do not ask questions in class at all. My friends are no longer enjoying my company anymore because I unconsciously find myself on WhatsApp even when I am with them. This results in my attention being divided. In most cases I will be reading my virtual members' posts. There are several occasions when I missed appointments because of WhatsApp for academic usage (Interview: Getty, November 2012).

I have come to realise that I am not the only one struggling with the Information Systems III module. Every time I am confused by some concepts, my peers are my first ports of call. However, when I turn on to WhatsApp for academic assistance, I usually find that some students' posts are worse than mine. I am motivated with such experiences because they make me realise that I am not very bad. My weakness is that I take my time in trying to understand concepts hence spending much time on WhatsApp. Recently, I found out that I am spending too much time with one subject on WhatsApp studying, and am therefore not paying equal attention to other subjects that are not on WhatsApp. I am concerned that I find it very difficult to spend a while without interacting with my group members (Interview: Chichi, November 2012).

Amos and Chichi's experiences with WhatsApp for academic usage corroborates with Herschlag and Zwick's (2002) views that users that are addicted to technology have little control over their use of it.

### **Social technology intersection learning activities control and management through collaborative learning**

The participants' views about m-Learning through the WhatsApp application were that their control and management of learning became distributed. The lecturer has total control and management of learning activities in a classroom environment. m-Learning using WhatsApp promotes learning through peer collaboration, hence distributing control and management of learning to students (Sharples, Taylor, & Vavoula, 2005).

Clint, in particular, emphasised the value of peer collaboration in learning. Knowledge building in different contexts, facilitated by active engagement and the construction of understanding by peer coaching, differs from that supported by other technologies of learning (Laurillard, 2007; Winters, 2007).

WhatsApp is now part of my life. Academic engagements that took place on WhatsApp improved my techniques for answering questions. Through the interaction on WhatsApp, I learnt a lot of concepts which I missed in class (Interview: Clint, November 2012).

The WhatsApp group discussions helped me to learn effectively. I could interact with my peers and lecturers about any topic at any time of the semester, without following the syllabus sequence, unlike a classroom where students are expected to ask questions that relate to that day's lesson. WhatsApp gave me the freedom to learn what I want and when I want (Interview: Chichi, November 2012).

When a question is posted, I prefer working out the solution by myself and then post it for my peers to critique it (Interview: Wang, November 2012).

Learning facilitated by mobile technologies promotes productive learning anywhere and everywhere (Schulman, Garcia, Wykoff, Duncan, Withum, & Graygo, 2012; Brett, 2011; Ally, 2009, Ken & Noboru, 2005). Tshidi's opinion was that the academic usage of WhatsApp was useful for her learning, since she could learn anytime and everywhere. Her views corroborate the authors' view:

I have a part-time job, and I am full-time registered student. I also do some chores at home. With my busy schedule, I gained a lot academically from using WhatsApp since I can study anytime and anywhere I got a chance... (Interview: Tshidi, November 2012).

Discussing concepts and problems in groups lifted the burden of individual self-reflection, and pooling together our collective minds helped us develop diverse perspectives and understand concepts more clearly.... (Interview: Olwethu, November 2012).

Tshidi, Clint, Chichi and Wang's views confirmed Sharples, Taylor, & Vavoula (2005) claim that learning through collaborative mobile Instant messaging enables students to take control and manage their learning activities.

### **The interaction learning intersection and peer-mentoring**

Based on the responses of the participants, critical thinking and assessment skills were gained by using WhatsApp for academic purposes. Ongezwa argues that WhatsApp allows students to think critically before responding, unlike in a classroom where one can be caught off guard and expected to respond to questions promptly. Puleng claims that the step-by-step problem solving skills which the lecturer demonstrated on WhatsApp, gave her better ways of approaching assessments.

Participants agreed that planning skills were also gained from using WhatsApp for learning. According to Chichi, in order for the WhatsApp strategy to support 24/7 learning, one has to properly schedule his or her time and dedicate a certain amount of time for studying.

Other skills indicated were confidence gained through learning how to use WhatsApp.

Working through problems and questions in groups has given me the psychological confidence to interact with peers... (Interview: Clint, November 2012).

Interestingly, participants were positively stimulated to learn through WhatsApp mobile learning. Factors that stimulated them included, but were not limited to, gaining assessment skills, sharing ideas with peers, making use of street language, edutainment and learning at their own time while in place they feel comfortable.

Communicating in ways I feel comfortable stimulates my learning through WhatsApp. English is not my first language, therefore expressing myself clearly and completely in English was a huge challenge. However, in WhatsApp the other students and I could use "street English" or informal language, as well as shorter versions of words. This aspect enabled me to learn effectively, since my peers understood me perfectly (Interview: Mary, November 2012).

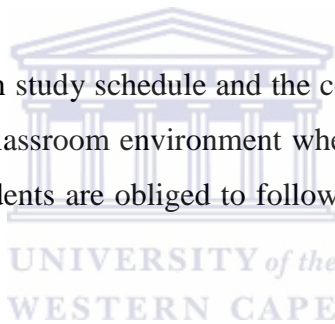
Ally (2009), Sotillo (2006), Kukulska-Hulme & Traxler (2005) argue that collaborative m-Learning technologies promote students to take control of their learning. Noreen in particular

emphasised that her motivational level to learn was boosted by the academic participation of WhatsApp, while Amos emphasised that he took control of his learning. This is what they had to say:

Receiving learning material in different formats captured my attention to learn. I was involved in peer-mentoring my classmates and this significantly boosted my confidence to learn. These two perspectives also improved my motivation to learn (Interview: Noreen, November 2012).

Using the WhatsApp strategy allowed me to access previously posted discussions and post new questions, while receiving assistance from peers and the lecturer while studying what I want. Studying what I want at anytime has given me control of my learning (Interview: Amos, November 2012).

Mary argued that creating her own study schedule and the content of what she studied gave her control of her learning. Unlike a classroom environment where a lecturer comes and lectures as per study guide, during which students are obliged to follow his schedule and making him take control of the learning.





## SECTION 5: SUMMARY, FINDINGS AND RECOMMENDATIONS

### Summary

This study was guided by one research question that reads: What is the pedagogical potential of WhatsApp (as a technology) to enhance students' participation in an academic programme at a University of Technology? This paper investigated this question by finding solutions to an identified research problem. The research question and its sub-questions were useful to solve the research problem. The crux of the research was on enhancing students' participation through the appropriation of the WhatsApp mobile technology in an academic programme.

The problem was related to low student participation in classrooms at a University of Technology, and it was as follows: Limited student participation at Universities of Technology negatively impacts teaching and learning. This problem negatively impacted tertiary education, because lecturers struggled to identify sections of syllabi that needed further elaboration in order to foster students' understanding of the subject. The aim of this study was to investigate the pedagogical potential of WhatsApp instant messaging to enhance students' participation in an academic programme. My study shows that I have fulfilled the aim of the research, since WhatsApp had an impact on the majority of students' ability to academically participate. Furthermore, the purpose of the study was to promote participation using m-Learning technology, hence heightening blended learning. The purpose of the study was addressed too.

Ontologically, I approached this research from a constructivist perspective. I used qualitative research approach; in an effort to meet my research objectives. I conducted face-to-face semi structured interviews. Flexibility and detailed ideas were gathered by straying slightly from the question. Thematic analysis contributed to the success of narratives. The utilisation of narrative analysis was useful in providing a platform for me to analyse the participants' responses. I selected 20 participants using the snowball/purposive method. Using a single data collection method which used a small sample, was one of the limitations for this study. This limitation might impacted the validity of the study, since 20 interviewed participants may not truly reflect all the views of all the students.

I utilised Koole's Framework for the Rational Analysis of Mobile Education (FRAME) model to grasp m-Learning that unfolds at a University of Technology from the convergence of mobile technologies, human learning capacities, and social interaction. I used the FRAME model to conceptualise the collaborative construction of authentic information in the WhatsApp m-Learning context to be predicated on the intersection of interactions, and the mediating role of conversational technology. Participants revealed different learning types supported by active engagements in the use of WhatsApp. To this end, the research has helped me to gain a deeper understanding of FRAME and the potential of WhatsApp to enhance academic participation of University of Technology students.

## **FINDINGS**

### **m-Learning**

Academic usage of WhatsApp made m-Learning possible, because it promoted learning through peer collaboration and sharing of ideas unbound by time and location. Mobile devices' portability and the versatility of WhatsApp promoted an academic transformation from instructive teacher-centred to active student-centred learning approach. Furthermore, mobility of learning devices and connectivity of the WhatsApp mobile application in this study enabled students to turn into active participants rather than passive receivers during instructional delivery activities. Instead of just listening to the lecturer in the classroom, students used mobile devices to utilise WhatsApp for academic engagement. In this study, WhatsApp transformed learning because it was no longer defined by the 'class' but by 'learning', unconstrained by scheduled class hours or specific locations, which resulted in m-learning.

Imfundo Yami / Yethu Project and my study are among the few studies in South Africa to utilise MIM in education. This study makes the following unique contributions to the perspectives on m-Learning: ubiquitous learning, collaborative learning, and virtual peer mentoring and anonymous learning

The study shows that m-Learning through the WhatsApp application has the following pedagogical potential to enhance students' participation: collaborative learning, availability of an electronic library, anonymous learning, ubiquitous learning, instant feedback and peer mentoring.

The m-Learning strategy facilitated by WhatsApp instant messaging has made a significant contribution in promoting effective learning, and enhanced students' participation in the following ways:

### **Contribution of the study to the Body of Knowledge**

Developing a collaborative m-Learning perspective is the contribution that I have made through this study to the already existing m-Learning perspectives. The building blocks generated through this study for collaborative m-Learning perspectives which I developed are anonymous learning, ubiquitous learning, peer learning, peer mentoring, electronic libraries, instant feedback, flexible learning and learner-centeredness.

The device aspect of the FRAME model made it possible to identify the electronic library, whilst anonymous learning, instant feedback and ubiquitous learning are important for collaborative m-Learning. Instant feedback given over WhatsApp, enhanced students participation because they wanted to be corrected or debate with other students about learning issues without continuously study things they are not sure about. Students could post questions or play the devil's advocate, and eventually discuss solutions resulting in improved participation among students.

Discussion threads created during WhatsApp peer interactions were automatically saved on students' mobile devices. Students could access these threads for revision purposes at any time, resulting in a useful digital library for the students. However, these digital libraries contained summarised information and students could create a discussion around issues discussed in the digital libraries, resulting in enhanced student participation.

Anonymous learning and ubiquitous learning were also present within the findings of the learner aspect. Ubiquitous learning, peer learning, and peer mentoring are the findings that were linked to the social aspect in this investigation. Ubiquitous learning supported by the WhatsApp strategy enhanced students' participation, since students had an opportunity to academically consult and contribute anywhere and anytime of the day. This ubiquitous learning strategy promoted students' to take control of their learning activities by studying at their convenience. Ubiquitous learning

supported by WhatsApp created more opportunities for students' academic participation using synchronously and asynchronously communication.

Peer learning that took place during the WhatsApp learning initiative promoted the creation of knowledge through peer member exchanges, as peers improved their thinking abilities through interactions and information sharing. Learners who used WhatsApp learnt by contributing to the cluster, receiving assistance, sharing knowledge and resolving contradictions within their clusters. Peers jointly utilized the WhatsApp learning initiative, resulting in peers not only learning for themselves, but also contributing to the development of the peer cluster.

Peer mentoring that made use of WhatsApp for learning enhanced students participation, since the peer mentoring process required the mentor and mentee to brainstorm learning activities. The mentor enhanced participation through the mentoring process, while the mentee enhanced her participation through asking questions and contributing to the peer mentoring process.

The common ground between the device aspect and learner aspect for the FRAME model resulted in device usability, which gave the researcher insights into some of the building blocks for collaborative m-Learning. From the researcher's investigation of anonymous learning and ubiquitous learning, findings were obtained of device usability. Interaction learning is a FRAME model construct that results from the intersection of learner aspect and social aspect. Interaction learning was useful for establishing factors that stimulate students to learn. Under this section, it was found that WhatsApp helped students to give instant feedback during activities where knowledge was shared. Furthermore, it was found that it promoted ubiquitous learning, since students could learn anywhere and anytime they feel comfortable, as well as at their own time. The intersection between social aspect and device aspect of the FRAME model gave the social technology aspect. Social technology gave rise to the findings that WhatsApp promoted collaborative learning. It also found out that WhatsApp enhanced ubiquitous learning, resulting in improved academic participation.

### **Collaborative m-Learning**

WhatsApp's mediation of learning profoundly impacted a majority of students' ability to engage with peers, resulting in improved collaborative learning. Collaborative learning promoted

knowledge generation through group member interactions. Furthermore, it enhanced creation of new ideas, and shared them among cluster members, which subsequently improved students' logical thinking process. Collaborative m-Learning enabled students to externalise their ideas and they could reflect on their discussions. On one hand the WhatsApp m-Learning initiative enhanced students' participation in diverse ways. Most profoundly, it provided an informal, instantaneous and convenient way of exchanging and sharing academically. On the other hand WhatsApp promoted collaborative learning through student-facilitator interactions. Students could consult and get guidance on academic issues through collaborative interactions with their facilitator. This kind of collaborative learning improved students' participation. In this case students were given more time to interact with their facilitator, unlike a classroom environment where time is limited for each and every student to academically engage with the lecturer.

### **Availability of an electronic library**

Discussion threads created during WhatsApp peer interactions were automatically saved on students' mobile devices. Students could access these threads for revision purposes at anytime resulting in a useful digital library for the students. However, these digital libraries contained summarised information and students could create a discussion around issues discussed in the digital libraries, resulting in enhanced student participation.

### **Anonymous learning**

Preliminary investigations show that students with a low self-esteem lacked the confidence to participate in class, due to a fear of victimisation. However, the use of WhatsApp for academic purposes enhanced student participation through its ability to support anonymous learning. Anonymous learning enhanced participation among WhatsApp mobile learners by recruiting and sustaining the critical questioning and information seeking practices of students, particularly those who conceived lectures as intimidating, hegemonic spaces for posing queries.

### **Ubiquitous learning**

Ubiquitous learning supported by the WhatsApp strategy enhanced students' participation, since students had an opportunity to academically consult and contribute anywhere and anytime of the day. This ubiquitous learning strategy encouraged students' to take control of their learning activities by studying at their convenience. Ubiquitous learning supported by WhatsApp created

more opportunities for the academic participation of students using synchronously and asynchronously communication.

### **Peer learning**

Peer learning that took place in WhatsApp learning initiative promoted knowledge creation through peer member exchanges as peers improved their thinking abilities through interactions and information sharing. WhatsApp peer learners learnt by contributing to the WhatsApp cluster, receiving assistance from the cluster, sharing knowledge and resolving contradictions within their clusters. Peers jointly utilized the WhatsApp learning initiative, resulting not only in learning for themselves, but also contributed to the development of the peer cluster.

### **Peer mentoring**

Peer mentoring that made use of WhatsApp for learning enhanced students participation, since the peer mentoring process required the mentor and mentee to brainstorm learning activities. The mentor enhanced participation through the mentoring process, while the mentee enhanced her participation through asking questions and contributing to the peer mentoring process.

### **Instant feedback**

Instant feedback given over WhatsApp enhanced students participation, because they wanted to be corrected or debate with other students about learning issues without continuously study things they are not sure about. Students could post questions or play the devil's advocate, and eventually discuss solutions resulting in improved students' participation.

## **RECOMMENDATIONS**

Previous studies have rendered some invaluable insights on participation in an academic programme (Iqbal, Kousar, & Ajmal, 2011; Hron & Friedrich, 2003). However, a number of studies have reported on the significance of m-Learning to enhance effective learning (Colella, 2000; Roschelle, 2003; Squire & Klopfer, 2007). My research findings inform the following recommendations that have the potential to enhance students' participation through the use of WhatsApp mobile technologies.

### **Recommendations to lecturers**

Lecturers need to adjust the discussion times after hours, so as to accommodate academic participation of mature and married students with additional family responsibilities. Lecturers should establish a rewarding mechanism to stimulate student interest in academic usage of WhatsApp (for example, most engaging group of the week and weekly prizes for the best contributions). Furthermore, lecturers should identify and summarise interesting student discussions on WhatsApp and post them on the institutionally supplied learner management system to prevent disadvantaging those students without phones enabled for WhatsApp.

### **Recommendations to universal institutional management**

The management team of the University should motivate lecturers in other departments to utilise WhatsApp m-Learning in their academic programmes to foster students participation. The institutional management should also devise a mechanism for subsidising mobile devices for students to promote m-Learning.

### **Recommendation to software developers**

The study reported student resistance to the wide-scale role of WhatsApp in different disciplines and subjects, because of the additional duties that students have to assume, such as information generation, contribution to peer's thoughts and close reading and interpretation of peers' views before making some contributions. To appreciate these additional responsibilities that WhatsApp brings to students, software developers should upgrade WhatsApp by integrating affordances that allow sorting discussion threads by topics to diminish the mental load on students during interactions.

## CONCLUSION

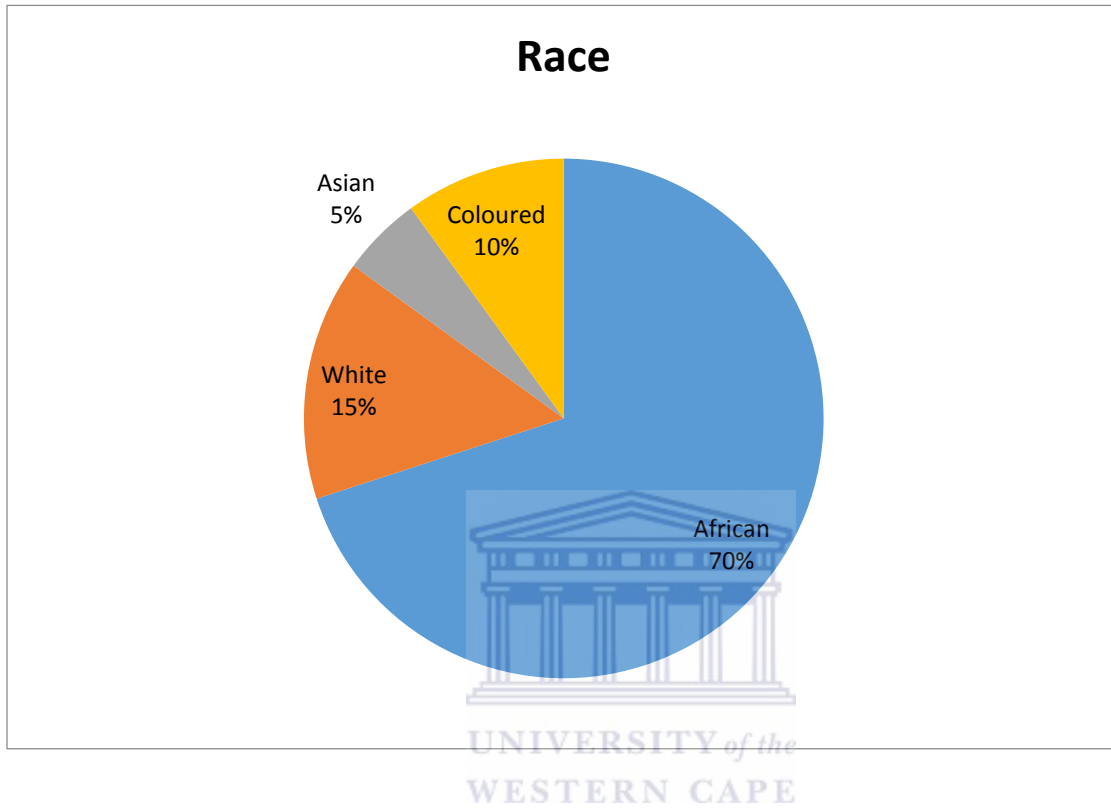
While a high amount of student participation in an academic programme does not guarantee high pass rates, it can make a significant contribution to effective learning. This research paper focused on the potential of improving student participation in an academic programme by using the WhatsApp mobile application. The findings suggest that the academic appropriation of WhatsApp improved student participation through the following pedagogical means: collaborative learning, availability of an electronic library, anonymous learning, ubiquitous learning, instant feedback, and peer mentoring. Based on these findings WhatsApp has successfully improved the participation of students at a University of Technology in an academic programme, hence fulfilling the research aim and purpose of the study.

These findings points to the new form of learning in a technologically mediated environment. Learning itself has become more than an individual action, as supported by collaborative learning evidenced in this study. New and innovative electronic libraries emerged. The research has broken the classroom boundaries by promoting ubiquitous learning. Participants documented the relevance of instant feedback during learning through synchronous communication. Technological peer mentoring was reported to be one of the main promoters for enhancing student participation. This type of pedagogical potential does not only promote student participation, but also contribute to the effective learning process through promoting social constructivism.



## APPENDICES

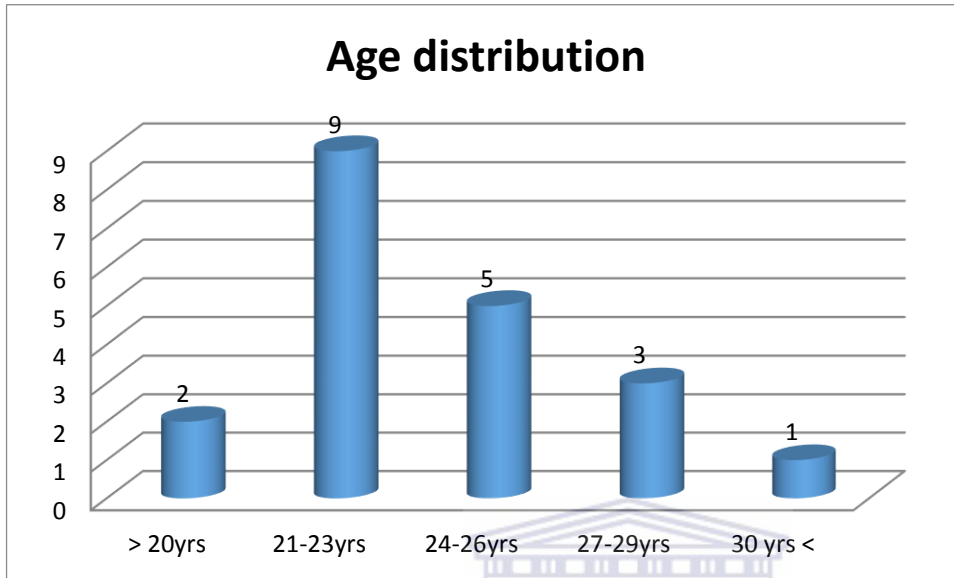
### Appendix A: Mobile Learner Race distribution



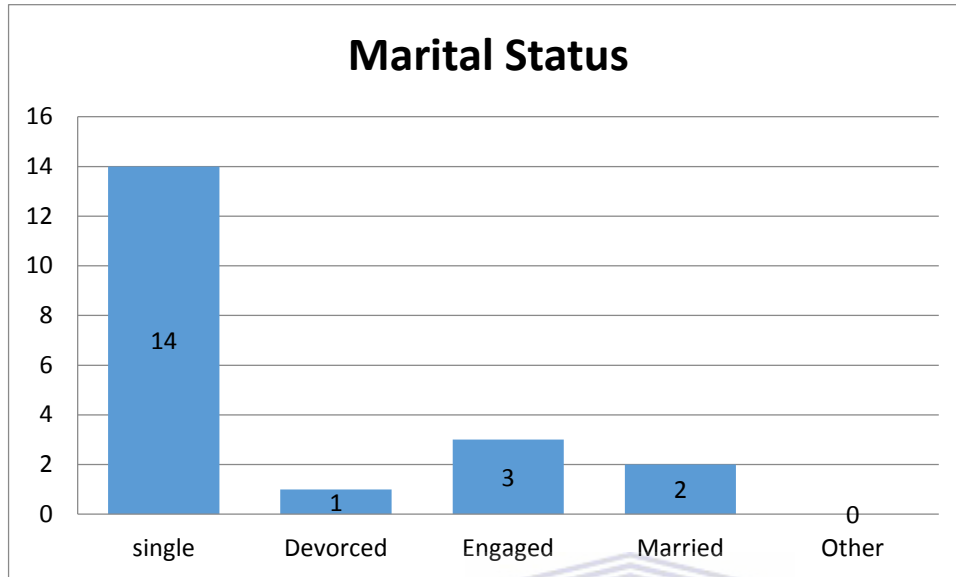
### Appendix B: Gender

Male	8
Female	12

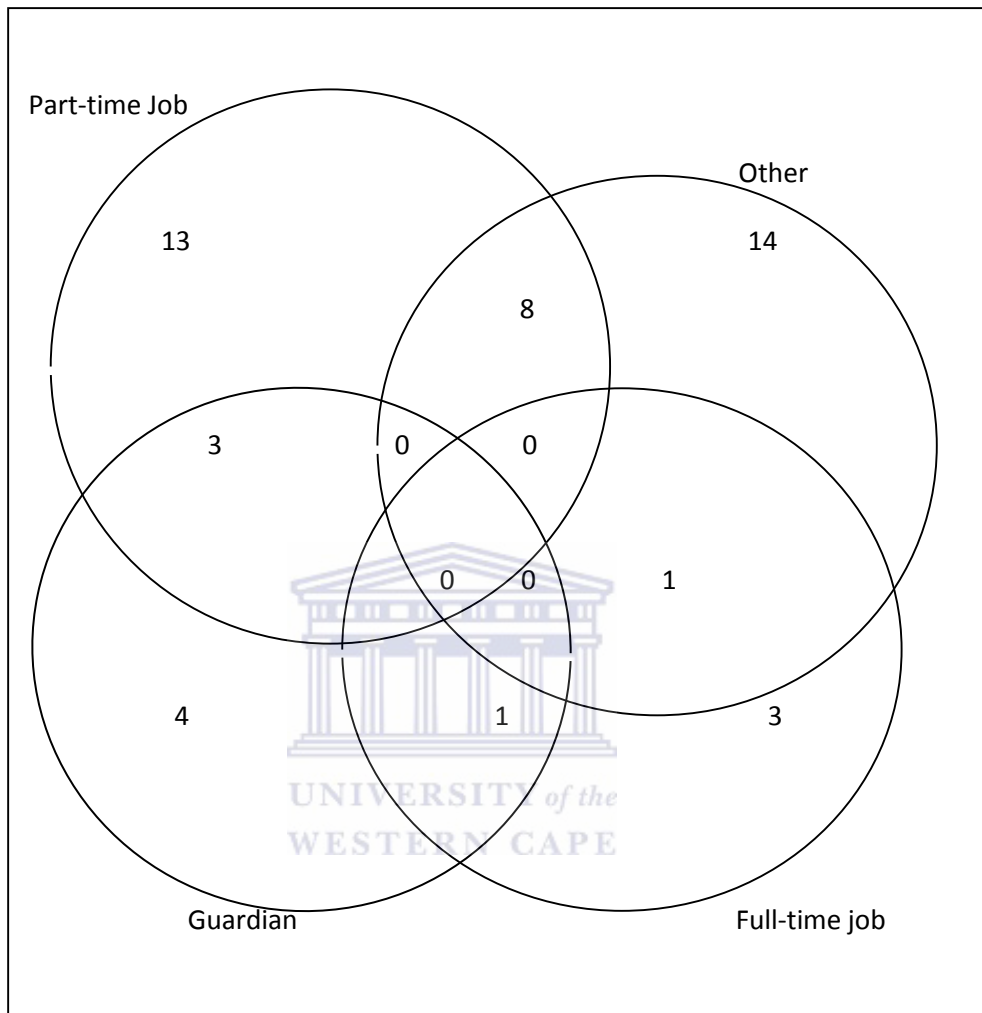
Appendix C: Mobile learner age distribution



Appendix D: Mobile learner marital status



Appendix E: Mobile learner source of finance



Appendix F: Interview guide

**Mobile Learner**

- Name.....
- Race: African  White  Asian  Other
- Gender: Male  Female
- Age Group: 19 >  19-22  23-26  27- 30  30 <
- Marital status: Single  Divorced  Engaged  Married  Other
- Dependents: None  One  Two  More than Two  Other
- Source of Income: Guardian  Part-time Job  Full-time Job  Other

**Device Aspect**

1. Have you ever used mobile learning technological devices for academic purposes?
2. If yes on number 1, for how long?
3. What have you been using them for?

	Online Assessments	Announcements	Collaborative Learning	Accessing learning material	Social networking	Other
Y/N						

4. What kind of mobile learning technological devices are you currently using for learning in your academic programme?

	Smartphone	IPad	Tablet	Laptop	Desktop	Other
Y/N						

5. What functionalities or application programs does your mobile technological device support?

	Sms	e-mail	WhatsApp	Internet	Facebook	Twitter	Skype	Other
Y/N								

6. Do you find these mobile technological devices user friendly for academic participation?
7. Do you consider portability of your device important for learning?
8. If yes in number 7, explain why?
9. How can these mobile technological devices improved in order to promote learning in your academic programme?

### Device Usability

10. Do you find mobile technological device easy to use?
11. What mobile application programs are useful for your academic participation?
12. How do you use mobile applications you identified in number 11?
13. What learning aspects supported by WhatsApp mobile instant messaging did you find useful?

	Collaborative learning	anonymous learning	Anywhere & everywhere learning	24/7 electronic library	Edutainment	Notification of new learning material	Other
Y/ N							

14. If yes on number 13, how do you find them useful? Make some examples of their usefulness.
15. Has your academic participation, using WhatsApp contributed to your learning?
16. If yes on number 15, makes examples to explain how this has occurred.
17. What academic information do you access from WhatsApp mobile instant messaging application?
18. Do you easily access academic information from WhatsApp mobile instant messaging application?
19. Do you find WhatsApp mobile instant messaging application fully utilised for learning purposes?
20. If no on number 19, explain your answer.

**Learner Aspect**

- 21. What are your overall feelings on the use of WhatsApp mobile instant messaging for academic purposes?
- 22. Did you receive enough training for academic usage of WhatsApp?  
If yes on number 22, how were trained?
- 23. Do you learn using WhatsApp?
- 24. If yes on number 24, how do you learn using WhatsApp mobile instant messaging?

	Sharing ideas with peers	Feedback from peers and lecturer	Individual study	Getting answering tips from lecturer	Other
Y/N					

- 25. If yes on number 25, provide examples
- 26. Do you find WhatsApp academic participation enhancing your motivational level to learn?
- 27. If yes on number 27, explain how?

**Social Aspect**

- 28. What ground rules for using WhatsApp mobile instant messaging for academic purposes did you find useful?
- 29. Do you find academic participation using WhatsApp disruptive to your social life?
- 30. If yes on number 30, explain how?

**Social Technology Intersection**

- 31. Do you find WhatsApp enhancing collaborative learning in an academic programme?
- 32. If yes on number 32, explain how?
- 33. Do you find WhatsApp enhancing anywhere and everywhere learning?
- 34. If yes on number 34, explain how?
- 35. Do you find WhatsApp boosting student academic participation?
- 36. If yes on number 36, explain how?

### The Interaction Learning Intersection

37. What skills did you developed from using WhatsApp for academic purposes?

	Critical thinking	Planning skills	Assessment skills	Analysis skills	Other
Y/N					

38. If yes on number 38 , make examples

39. Do you find WhatsApp positively stimulating your learning?

40. If yes on number 40, explain how?

41. Do you feel that WhatsApp created an environment that enabled you to take control of your learning?

42. If yes on number 42, explain how?





APPENDIX G: CONSENT FORM

**RESEARCH PARTICIPANT CONSENT FORM**

**Utilising m-Learning for Enhancing Student Participation at a South African University of Technology**

Aaron Bere

Central university of technology

School of Information & technology

Purpose of Research

In an effort to expand learning environments for South African under privileged students I would like to introduce WhatsApp messaging virtual learning platform. The project will seek to assess the utilisation of Mobile learning (m-Learning) for leveraging learner participation.

Specific Procedures

If you agree to take part in this study, you will be asked to do the following:

- Download WhatsApp application to your phone
- Interact academically with your virtual group member on matters concerning Information systems III
- Allow the researcher to interview you on the effectiveness of WhatsApp mobile instant messaging for teaching and learning.

Duration of Participation

16 July August 2012 to 15 September 2012

Benefits to the Individual

Participants will enjoy the benefits of anonymous learning and everywhere and anytime learning.

Risks to the Individual

Participants must be aware that their handheld devices used in the study will be at risks of contracting some viruses since they will spend a lot of time online. Research organizers will not supply antivirus software hence it is a participant’s responsibility to ensure that his or her device is secured.

Confidentiality

Your name will not be linked your to your interview response; instead, anonymous names will be used for data analysis and results section of the study. Any information that may be traced back to participants will not be included in the report. Data will be kept confidentially and it will only be accessible to those working on the research study.

The information gathered from participants will be stored in a strictly confidential manner in the principal researcher’s office. This data will be stored for a period five years and then destroyed through burning.

Voluntary Nature of Participation

No participants will be force to take part in this study, hence your participation is voluntary. Participants withdraw from the study at any given point. Furthermore, they may refuse to participate in the process of data collection. You may also stop at any time and ask the researcher any questions you may have.

Queries and concerns:

Any queries, questions or concerns, about this research project should be addressed to Professor Zelda Groener of the Life Long Learning Department at the University of Western Cape. The email address is [zgroener@uwc.ac.za](mailto:zgroener@uwc.ac.za).

Declaration

I HAVE HAD THE OPPORTUNITY TO READ THIS **CONSENT FORM**, ASK QUESTIONS ABOUT THE RESEARCH PROJECT AND I AM PREPARED TO PARTICIPATE IN THIS PROJECT.

**Participant’s** Signature and Date .....

**Participant’s** Name .....

Researcher's Signature Date.....

*\*\* Participants and the researcher must provide their initials and date at the bottom of page 1 of this consent form. \*\**



## Appendix H: Information Letter to Participants

**Project title:** Utilising m-Learning for Enhancing Student Participation at a South African University of Technology

**Investigator:**

**Supervisor:** Prof Zelda Groener

**Student Researcher:** Mr Aaron Bere

**Course:** Masters in Adult Learning and Global Change

Dear Participant,

Thank you for showing interest in take part in this research project into the use of Mobile devices to foster participation in tertiary education. The current study is an investigation into the utilisation of hand held devices to promote teaching and learning. If you are studying towards a national diploma in Information Technology, and currently registered for Information systems III module at a University of Technology in South Africa, the researchers invite you to participate in this study. This research project is being supervised by Professor Zelda Groener who is a senior Lecturer and director in the School lifelong learning at the University of Western Cape in South Africa. The research student is Aaron Bere who is a registered postgraduate student. Furthermore Aaron is an Information Technology lecturer at a University of Technology.

The ethical process of the university for which Aaron is studying requires him to complete an empirical research paper. The information provided by you will be pooled with other participants in the study and stored in a strictly confidential manner in a locked, secure office for the principal researcher. This data will be stored for a period five years and then destroyed. The results of this data will be published in the student's research paper and may appear in publications, be included in a research paper or report, or presented at teaching and learning conference; however, since all information will remain anonymous.

Those who will chose to participate may be interviewed on their experiences from using WhatsApp for academic purposes. The interview will take an average of 15 minutes. The interview questions

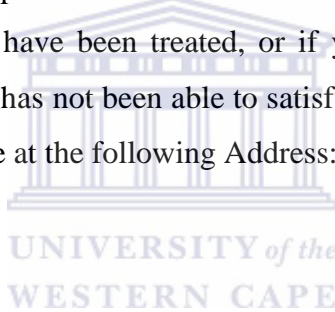
will allow the research to collect data that will be used for research paper writing. You should answer each question as honestly as you can. There are no correct or incorrect responses.

Please note that there is no deception or hidden purpose to any of the questions. It is important for you to remember that participation in this study is voluntary and it is your right to refuse to participate; however, please note that since your data is anonymous, it cannot be withdrawn once submitted. Completing and submitting your questionnaire implies that you have given full and informed consent to be part of this research.

The data from this study will be used to further develop an understanding of the adult educational technology. This research has been approved by the Human Research Ethics Committee at the Central University of Technology.

In the event that you have any complaints or concerns about the manner in which this research is being conducted, or the way you have been treated, or if you have a query that the Primary Investigator or Student Researcher has not been able to satisfy, you may write to the Chair of the Human Research Ethics Committee at the following Address:

The Chair, REC  
Research committee Services  
Central University of Technology, Free State (CUT)  
Private Bag X20539, Bloemfontein, 9300, South Africa



Any complaints or concerns will be strictly confidential. You will be informed of the outcome of the investigation. If you have any questions or concerns regarding this study please feel free to contact the Principal Investigator, Prof. Zelda Groener on the following e-mail address [zgroener@uwc.ac.za](mailto:zgroener@uwc.ac.za).

Regards

Supervisor and Student Researcher

*Many thanks for your time on this project.*

## Appendix I: Permission Letter to Conduct Research in your Department

Attention: Director School of Information Technology

I am currently completing my Masters' Degree in Adult learning and Global Change and I am required to carry out some research in the area of adult learning and global change. With this in mind, I wish to seek permission to carry out my research in your department. I will conduct my research on third year IT students on their experiences in the use of mobile instant messaging (WhatsApp) for teaching and learning.

I would like to investigate the pedagogical potential of WhatsApp instant messaging to enhance students' participation in an academic programme. If the initiative proves to be beneficial to teaching and learning I will therefore recommend its implementation to other subjects by other lecturers. I would be grateful for this permission and for your support. Data will be collected using one-on-one interviews.

I promise to treat information confidentially. I will only report information that is in the public domain and within law. The report will not report anything of a personal or comprising nature. There will also be total confidentiality of all names and I will not name the department or institution without your permission.

Yours faithfully

Aaron Bere

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