

# Using mobile devices in the Bachelor of Nursing Sciences blended program at University of Nairobi: student perceptions and experiences.

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## DECLARATION

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Date: December 2018

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## DEDICATION

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This research is dedicated to: Mum Milcah Nyaboke, late dad Enoch Bosire; my dear wife Naomi, our most treasured sources of inspiration; Yunuke, Mokeira, Nyanusi, Ombeng'i, Magoma and the little star that our Father in heaven has placed among us.

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## ABSTRACT

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Since independence, achieving universal and quality healthcare has remained a challenge in Kenya. One factor is the lack of availability of health personnel in the rural areas. The University of Nairobi has launched an e-based Bachelor of Nursing degree. The program consists of two weeks of face to face sessions with the rest of the term spent at the rural facilities. The students have been using either CD or a fixed desktop computer. Due to complaints by students, the program organizers initiated a pilot using tablets as a mobile device to deliver content and support to students. The importance of mobile learning (m-learning) has grown in nursing education and practice. This study seeks to establish the students' perception of the utility of devices used for m-learning in the e-BSN program at the University of Nairobi. Findings may be useful for those intending to pilot similar applications in remote and resource poor areas common in rural Africa.

**Objectives:** The purpose of the study was to determine the students' perceptions of utility of devices used for m-learning in the e-BSN program covering both social and technical issues associated with m-learning system and the overall effect of using mobile devices during the training in nursing practice at the University of Nairobi.

**Setting and Methods:** This was a cross sectional study with two components. The first component was a quantitative arm based on a questionnaire administered to the e-BSN students. The second arm was a qualitative component which involved in-depth interviews with the students. A combined purposive and random sampling procedure was used to identify participants in community placements. Quantitative results from the questionnaire were analyzed to provide descriptive statistics describing student perspective on the utility of devices used for m-learning in the e-BSN program at the University of Nairobi to support learning. Qualitative data from the focus groups discussions were coded and grouped into networks or themes to clarify why the students responded as they did.

**Results:** Creating communities of practice is integral in adult learning. It happens in diverse ways during the learning sessions. The finding showed students achieved high levels of course learning, developed a strong course community, interacted extensively and had high overall levels of satisfaction using online social networks. Involvement in a physical class created an important contextualization for students to understand, and thereafter, recall information confirming their preference of adult learning. Nonetheless, there is a mismatch between what program developers may desire and what actually happens during the implementation of the program. The mismatch may be attributed to human and structural limitations as observed in this study.

**Conclusions:** From the evaluation of the Student-Student transactions, it is clear that the social media WhatsApp has been important for engagement among students. Although the lecturers are exposed to technology, they appear not to have integrated use of mobile devices sufficiently in class. Further research should map out the nature and determinants of multiple engagements using the social networks and relationship with learning. There is need to improve faculty appreciation of the role the devices play in day to day communication between students and how faculty and administration of the course may exploit the mobile devices.

**Keywords:** [mobile learning; Nursing education; e-learning; medical education](#)

## ABBREVIATIONS:

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Amref	Amref Africa Health
e-BSN	Bachelor of Science by Distance learning
KNH/UoN-ERC	Kenyatta National Hospital/University of Nairobi, Ethics Review Committee
LMS	Learning management system
MEPI	Medical Partnership Initiative
M-Learning	Mobile learning
SoN	School of Nursing
UoN	University of Nairobi

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# 1 CHAPTER ONE

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## 1.1 BACKGROUND OF THE DISTANCE BLENDED BACHELOR OF SCIENCE IN NURSING (E-BSN) AT UNIVERSITY OF NAIROBI (UON)

Kenya is a developing country with challenges in providing quality and accessible care to all its citizens. The country has a shortage of healthcare professionals, especially nurses, to manage the multitude of healthcare facilities across the country. Nursing personnel form the backbone in Kenya's public health delivery system. This shortage of healthcare professionals is worsened by the migration of the healthcare professionals to urban centers while some are leaving the country for employment.

The large majority of facilities in rural areas have only one nurse working alone. Even where more than one nurse manage a station, they are overwhelmed. Consequently, obtaining permission to take time away from work to train is nearly impossible. They are also mature in age with families. Ages range from 26 years to about 50 years. Most fall in the age range 30 to 45. The majority are employed with a Diploma certificate.

In 2011, the National Institutes of Health USA launched the Medical Education Partnership Initiative (MEPI) grant response to the growing need to improve the quality of care and health outcomes in Sub Sahara Africa. The University of Nairobi won two grants and one was used to finance a blended Bachelor of Science in Nursing (e-BSN) in collaboration with Amref Africa Health and the Nursing council of Kenya. The aim of the program was to up-skill the Nurses from diploma to degree level. The training strategy also helped to access to training for Nurses who serve in the far-flung regions of Kenya. The training was designed to minimize interruption of services by incorporating a very short face to face course of 2 weeks. In the blended curriculum, training continues within the workstations of the nurses. Communication is achieved by use of technology. By situating the training in the regular work station, the students have the opportunity to immediately apply knowledge and skills learnt.

Due to network challenges, material for the program was initially offered in CDs. The CDs were found to be cumbersome requiring a computer to read. A combination of feedback from students and innovations learned from Ethiopia, the collaboration decided to purchase tablets preloaded with content for the students at a subsidized price. The introduction of mobile devices to support learning has not been evaluated for the program the e-BSN. This study therefore aims to assess utility of mobile devices in the e-BSN program covering both social and technical issues associated with m-learning system and the overall effect at the University of Nairobi.

The content is written in a total of 36 modules. The modules are uploaded in a format accessible using an application suitable for tablets and other mobile devices. The same content has been uploaded on the University of Nairobi server and is available to the students using the learning management system (LMS). During the first week of the course, the students are taken to a computer lab and shown how to access the materials online using the student portal and also how to use a tablet to access the content. The CD version is still made available for those who request a copy.

Beyond participation in content development, formal effort was made to train faculty on the use of the online system and the tablet; however, not all attended the training. The adoption and use of the mobile devices by faculty remains variable.

## 1.2 INTEGRATION OF MOBILE DEVICES IN E-BSN AT UNIVERSITY OF NAIROBI (UON)

Mobile technology is an important resource in the limited environment like Kenya. Mobile devices use enablers and constraints are completely different from those in more developed countries. The main purpose for using technology in learning is to help students reach the learning outcomes more conveniently and effectively (1). The goal of this study was to assess the utility of devices used for m-learning in the e-BSN program covering both social and technical issues associated with m-learning system and the overall effect of using mobile devices during the training in nursing practice at the University of Nairobi.

The use of mobile technology for learning depends on how it supports teaching and learning activities. In order to establish utility of incorporating mobile learning (m-learning) in the e-BSN nursing program in Kenya, there was need to understand how students are making use of their devices. Information on the use of mobile technology for nurse training in Kenya, is still limited. This study has the prospect of making a contribution to the understanding of how students use their mobile devices for their learning.

### 1.2.1 Mobile-learning in the e-BSN program in Kenya

Mobile-learning (m-learning) and its use for teaching has been an interest to educators for its potential to expand and enhance the traditional learning environments (2,3). There is an increase in the number of students that bring mobile technologies to class. The interest in m-learning has gained momentum with the desire to use it for academic purposes (4). In the researcher's previous work with others, it was found that students are engaging academically with technology. Students are making use of their own technology to connect to academic resources and course related information. Mobile devices enable productivity and efficiency and it makes learning more creative and applicable immediately (5–7).

The proposed inclusion for m-learning as an integral part of training is based on the work of Toyama, Murphy, Bakia, and Jones (2010). They showed that students learned optimally in an environment that blends components of face to face and online interaction (8). This is partly because students can engage in learning activities at any time or anywhere (6).

## 1.3 STRUCTURE OF THE E-BSN AT UNIVERSITY OF NAIROBI.

In its current form, the e-BSN program is structured to include up to 80 students for each of the two intakes a year. They have a two week face to face session per semester. There are two face to face sessions in each semester, one at the start of each semester and one for the assessment at the end of each semester. There are three semesters each calendar year. The students are expected to complete the program in eight semesters.

During the distance learning phase, the students' access content on their own computer using an interactive CD or travel to facilities where the software is preinstalled on standalone computers. During a feedback session, the students reported their frustration with the inconvenience of this strategy. The time and distance were largely cumbersome and many struggled to utilize the resource.

In response to the request by the students, the leadership of the program accepted to pilot use of mobile devices as an integral component to access content of the program. The leadership identified tablets as a good alternative as it has been shown that mobile learning allows students to access content from anywhere and at any time (9). In addition, the tablets were expected to accommodate different learning style preferences where students can engage with the content in a personalized manner (10,11).

The didactic content such as the lecture notes, e-books and additional readings is offered during face to face sessions using lectures, handouts and manuals. The tablet is expected to provide e-learning support as a virtual continuum using embedded materials or through web links. In this program, discursive interactions happen during exploration and information exchange over the media and the tutorials given over the face to face sessions. Moderating in m-learning is still evolving at the School of Nursing. The school hopes mobile devices will facilitate subject specific support to improve the learning experience and guidance. It is also anticipated the devices will promote interactions within the network of students.

Mobile devices are now widely available in Kenya and may be familiar, effective for learning, efficient and enjoyable from the student perspective. The program coordinators expect mobile devices to facilitate interaction for academic purposes during their learning (Discursive outcomes). Discursive goals refers to the experiential aspects of a learning process. The mobile devices were also expected to be used for other activities beyond accessing processing and using information to deal with their study or professional needs.

#### 1.4 MOTIVATION FOR THE STUDY

Since Kenya's independence nurses have helped to provide care in the rural and remote regions where disease burden is highest. The qualification of the nurse has a correlation with the quality of care provided. It is therefore critical to improve training access for nurses. However, providing training has multiple obstacles such as cost and time needed off work.

Frustration, the lure of better income and lack of access to further training encourage outward migration of health workers from developing countries to the more developed countries(12). The use of mobile technology will help mitigate the migration by offering access to the much needed training opportunities. This access is expected to improve retention of nursing personnel at the sites to continue providing services thus alleviating shortage associated with residential training (13). This application of blended learning is therefore of high importance in most rural African settings.

Blended learning is defined as "the thoughtful integration of face to face instruction combined *with online learning experiences*" (14). However, blended learning does not refer to a balance of face to face or online activities as there is no one size fits all model to the perfect blended learning course. This flexibility enables the instructor to determine the focus of the learning activities and determine the learning design of the course.

During blended learning, students receive regular short face to face sessions and travel back to their workstations, where they will have online learning activities to complete, for the rest of the term. This will result in an increase in numbers of nurses trained, as well as raise their academic qualifications and achieve greater retention. Both are key to improving health outcomes in rural Africa where nurses form the backbone of primary healthcare.

## 1.5 PROBLEM STATEMENT

Students enrolled into the e-learning Bachelor of Science in Nursing program (e-BSN) at the University of Nairobi faced challenges in accessing learning materials since the materials were initially only available on a CD or at learning centers. The centers were often located at inconvenient distances for the students. In a pilot program, the University responded to student complaints by introducing use of tablets to improve student access to materials. In the absence of previous experience, the utility of mobile devices for learning in the e-BSN program was unknown. More information was needed particularly about the effects on social and technical issues associated with m-learning. .

## 1.6 RESEARCH QUESTION

What were the students' perceptions of the utility of the tablet and other mobile devices as mobile learning devices in supporting their learning experience in the e- Bachelor of Nursing Sciences program at the University of Nairobi?

## 1.7 AIMS

The e-BSN program was a pilot for training using mobile devices. The tablet and other mobile devices offer the ability to communicate in real-time and asynchronously, calling, texting and video chats increasing multiplicity of learning context. The purpose of the study was to determine the how devices used for m-learning in the e-BSN program at the University of Nairobi affected both social and technical issues associated with m-learning system and, following from this, the overall effect of using mobile devices during the training in nursing practice at the University of Nairobi.

### 1.7.1 Specific objectives

1. To carry out a post-survey of student experience while using the tablet and other mobile devices in the course to determine if using a tablet helps the students in learning.
2. To establish student perception of content access using the mobile device in the e-BSN blended course.
3. To establish student perception of transactional distance in the e-BSN course.
4. To correlate the different factors that affect the students' perception of use of the mobile devices to support learning in the blended e-BSN course.

## 1.8 STUDY DESIGN

This was a cross sectional study using the convergent parallel design (15). This method utilizes both quantitative and qualitative data gathered concurrently. The two sets of the results are used together to evaluate the student perspective of the utility of the tablet and other mobile devices as a mobile device in an independent nursing practice education setting.

## 1.9 STUDY METHOD

Human perceptions are complex and often difficult to measure completely. The individual methods available are limited in scope. Often, information is best collected using different approaches and then triangulate to estimate the true value (15). Student perception of technology and its application to

learning has multiple dimensions. However, for this study, a combination of quantitative (questionnaire) and qualitative (focus group discussions) were used. There were 26 e-BSN students (year 1 (8), year 2 (9) and year 3 (9)) in the focus groups while 62 participants completed the questionnaires. This mixed methods approach is the most commonly cited in educational literature evaluating perceptions in education.

### 1.10 THE SIGNIFICANCE OF THE STUDY

In the e-BSN program at the University of Nairobi, the students face challenges of interaction which are expected to arise due to the duration away from the college, separation from each other due to being in different parts of the country and limited access to resources to support their learning. The challenges create what is referred to as pedagogical (transactional) distance

The pilot of the training using tablets is seen as a novel solution to the need for better qualified staff at rural facilities. The tablet and other mobile devices offer several options to the students and faculty; communication in real-time and asynchronously, calling, texting and video chats providing multiple situations for learning to take place.

### 1.11 LIMITATIONS OF THE STUDY

The primary objective of the study was to assess how the devices used for m-learning in the e-BSN program affected both social and technical issues associated with m-learning system and, following from that, the overall effect of using mobile devices during the training in nursing practice at the University of Nairobi. However the study provides only the perspective of the distance students and does not collect data from the full-time, campus-based students to establish if there is advantage in either setting. Information from student performance in examinations would have enriched the findings. Further, faculty perspective and perceptions of the regular learning management system would be important to triangulate information generated from this study since it helps to inform design of courses by program administrators in the University of Nairobi.

### 1.12 STRUCTURE OF THE THESIS

The first chapter has provided a brief background and context to the study, defined the focus of the study with regard to mobile learning and also provided a short view of specific application of the mobile learning in the context of University of Nairobi nursing program. Finally, the specific purpose of this study is defined and the scope limited by the specific objectives covered in this thesis.

The subsequent sections of this thesis comprise five chapters as follows:

**Chapter two** provides the theoretical underpinnings of mobile learning and how its understanding in the learning and teaching environment has evolved over the years. The chapter highlights important aspects to consider in the of distance learning as exemplified in the e-BSN and introduces transactional distance as a concept evaluating the effect of perceived distance between students and facilitators on the learning experience. The chapter concludes by describing how past research tools have been used to create the tools for collecting data in this study. This provides a motivation for the methodology chosen in the current study.

**Chapter three** describes the development of the survey (quantitative) and organization of focus group discussions (qualitative) and how they were rolled out. The chapter describes the method of sampling, data collection from the students taking the e-BSN program at the University of Nairobi, data management and data analysis. The chapter concludes by describing how ethical considerations were instituted.

Due to the volume of content, results and discussion section was split by theme into chapters four and five for easier reading.

**Chapter four** describes how the data were processed to produce summaries of the results on the six dimensions of mobile learning measured in the survey namely; overall utility, instructor attitudes, system quality, information content quality, service quality and supportive issues. Unique to this study is the use of social media and overall perception of blended learning which is explored into the next chapter. The results are summarized in histograms where the distribution of responses is described. Analysis of the qualitative data helped generate the key themes; mobile learning, blended learning, content, transactional distance and social media. In this chapter, both the quantitative and qualitative data is discussed in themes covering; overall utility, instructor attitudes, system quality, information content quality.

**Chapter five** Continues the discussion on student perspective of the mobile device as a student support aid; system quality, transactional distance in the context of the e-BSN. A second part looks at transactional distance in the context of the e-BSN. The final part of the chapter attempts to establish the correlation to 12 scales and items from the survey on the use of the tablet.

**Chapter six** highlights the key findings of the study, recommendations, assumptions and spells out the limitations of the study.



## 2 CHAPTER TWO: REVIEW OF LITERATURE

In this chapter, the literature relevant to the research deploying mobile devices in a blended program is evaluated. The key elements constituting the theoretical framework of this study is described. My understanding of mobile technology and its use in the learning and teaching environment and how it may have modified students' perception of the experience as students is elaborated. The focus of the review is on three important aspects linking the student initial status (expectations) and student desired status (achievement). These include; teacher student interactions in face to face, interactions during distance learning and the transactional distance arising by either method of interaction. In this review, the references provide examples on use of interviews and a questionnaire as tools for collecting data in similar studies. To start with, each element in the framework (See Figure 1) shall be discussed.

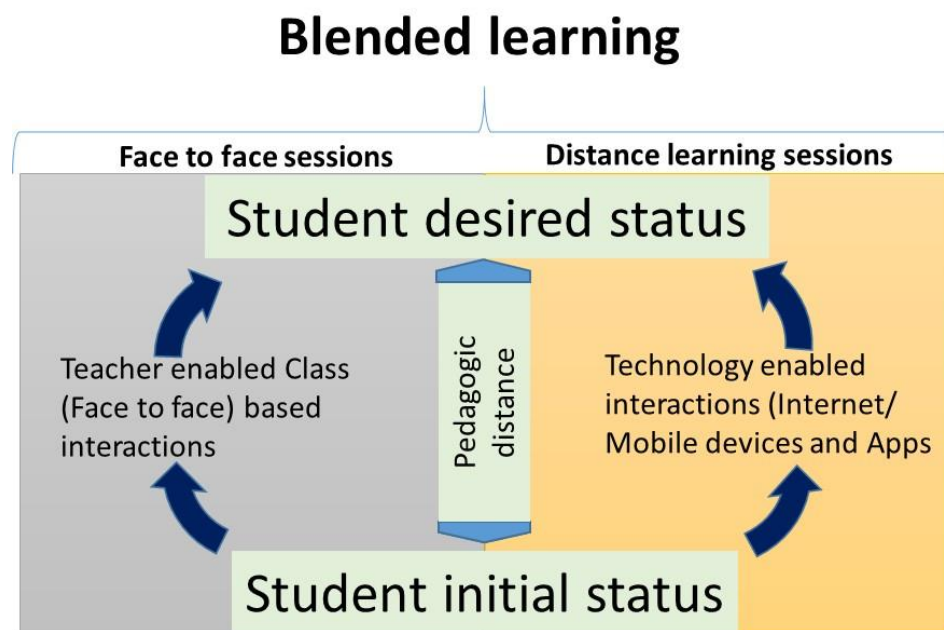


Figure 1: Framework describing relationships between transactional (pedagogical) distance, face-to-face sessions and technology-facilitated interactions in the blended learning model.

### 2.1 MOBILE LEARNING

#### 2.1.1 Definition of m-learning

For the purpose of this study Kukulska-Hulme's definition for m-learning or m-ICT (10) is used to understand the topic. According to Kukulska-Hulme's model, there are three terms used with mobile technology include: 'Ubiquitous' dating from late 1980s, and referring to the embedding of mobile technologies within the social framework of daily activity and relationships with the physical environment (10), pervasive computing refers to the expansion of interaction with one device to a network of embedded devices through which individuals or groups may carry out activities together. The two, ubiquitous and pervasive aptly describe mobile devices and their use relevant to the e-BSN

program. The third type is ‘ambient’ technology which is devices that are integrated with our natural spaces and ready to respond to needs of the student’s. The latter are not the subject of this study.

Mobile learning is a term that refers to student mobility while engaged in educational activities beyond the precincts of a classroom using portable, lightweight devices that may fit in a pocket or the palm of one’s hand. Examples include: cell phones, smartphone’s, tablet PCs, laptop computers and personal media players. The devices can be used for communication and collaboration, teaching and learning (10).

Mobile devices have the advantage of spontaneous access to information and ability to communicate instantaneously. Mobile technology can be used as a bridge between formal and informal learning (16). The development of tasks and student support requires an investment of time and human skill. Use of mobile devices has come to fulfill earlier predictions on cost and utility for learning (10).

Most mobile devices are designed for use at work or in social settings and need adaptation for application in education or training, or blending it with other forms of delivery and support (17). Mobile phones are the most popular and widely used device providing simple personal information management. They are often equipped with Bluetooth for sharing documents and a camera. The mobile phones allow sharing of different media types across the platform. Students can reduce isolation felt during placements by using their mobile devices for professional support (18).

#### 2.1.2 Global context of m-learning

In a survey done in Canada, mobile devices were mainly used to access drug information (73.5%), serve as point-of-care reference and for calculations (57.9%), take notes (51.6%), search (46.5%) and read (50.2%) journal articles, find clinical practice guidelines and as an aid in differential diagnosis (19) .

The use of tablets for learning varies between undergraduate, graduate, and doctoral students. Using five different focus groups, Fischer *et al.* showed that the use of tablets revolved around: consumption of media which includes reference to literature, creation of media (such as answering exams) and collaboration among students including communication on social matters (20).

In Spain, using a questionnaire and focus group discussions, the tablet was demonstrated to be useful for processing information, gaining generic competencies, accessing and creating content among students (21). Siemieniecki and Majewska highlighted various roles tablets play in learning in universities including: helping to improve acceptance of the learning process, support students access solutions, improve reading skills, encourage communication in the learning context beyond the classroom and stimulate creativity (22).

In Iran, a survey among 73 emergency medicine residents, revealed that students were more likely to visit non-academic sites on their mobile devices. Most students accessed internet using smart phones and spent about 1-2 hours online. Most of the time (> 75%) was spent on non-academic websites (23).

However, on the African continent, mobile device use for education looks very different. Hennessy et al. (2017) indicate six main problems for mobile learning in Africa. These include: Teachers and students have different levels of access to electricity or affordances for smart phones; supply driven initiatives are misplaced; mobile learning pedagogical skills among lecturers are absent; student attitudes and lecturers are poor; mobile devices are incompatible with the university learning management systems and policies that only make such devices optional in the curriculum (24,25).

Kinley *et al*, (2013) exposed existence of a mismatch between the opportunities presented by new technologies and the intention of faculty members at African universities to implement them (26). A few possible reasons for this might be that technology develops too quickly for faculty and students to keep up and effective curriculum development takes time and research. The implementation of technology should be to the benefit of the student. Technology should help them attain the learning outcomes more effectively and one should not just implement technology for the sake of implementing technology.

Biddix *et al* (2016) showed that few studies have been carried out on how faculties make use of m-ICTs for learning, how m-ICTs are integrated into the teaching activities of modules and most critically, how m-ICT usage effects the educational performance of students (1).

Wu *et al*. (2012) expressed a critical need for coherent and reliable research on faculty implementation of mobile devices to understand their effective use and the focus of most m-learning research has only been on students as consumers and users (27). Therefore, understanding how students in Africa use tablets for their work, as proposed in this study, is the first step towards a pedagogical understanding of an increasingly mobile-enhanced learning environment especially as it has been shown that there is a mismatch between faculty and student expectations of m-learning (28,29), and this has implications for implementation.

### 2.1.3 Mobile learning in higher education

While years ago, e-learning was developed for the computer, today, it is designed with the mobile phone. For purposes of this study, “Mobile learning” can therefore be defined as the current default method of accessing e-learning content designed on adult learning (andragogic) principles(30). Content is accessible anywhere.

Although mobile devices were primarily designed for communication, they now play a key role even in education at all levels (31). Rapid advances and innovations in the mobile applications have changed the way students interact with information. With growing importance of mobile devices, effort has been made to develop a theoretical framework to support research into the evolving entrenchment of mobile devices in the teaching/learning context.

The model of m-learning is underpinned by constructivism. As a learning theory, constructivism is the construction of knowledge by the learner, which often, but not always, is achieved through interactivity, and which may or may not be characterized by usefulness. Conradie (2014) suggested twenty-first century, constructivist-based pedagogy should shift the role of faculty from educator (i.e. explaining, demonstrating and correcting) to facilitator of self-directed learning opportunities, capitalizing on the student’s ability to create connections and develop personal networks enabled by Web 2.0 environments (32).

Advances in Mobile technology have afforded better support for learning on a mobile platform and in virtual spaces. However, conceptions of teaching in general and specifically in Mobile Learning are as individual as the lecturers (33). Some place the teacher or the content at the center while others on the student and attempt to develop a view of the relations based on facilitation of understanding or by intellectual formation.

Various views of e-learning have been projected (34). For example, the associationist's perspectives are based on causal history and posit that mental processes can be explained in terms of the association of ideas. If anything, repeat performance will lead to behavioral change.

The cognitive envisages a cooperative approach between the students and their teacher while use of the real experience makes up the situated view which is widely applied in health profession training (35). The situated view includes mentorship and coaching. These conceptions affect trainer perspective over the utility of such technology as mobile learning in training.

From the perspective of the conversational theory, room to collaborate and personalize learning makes m-learning an attractive consideration (36). Mobile Learning also allows continuous updating and overcomes practical limitations associated with traditional methods of teaching. Additionally mobile devices can be used as cameras, to transmit information on the go and for voice communication.

## 2.2 BLENDED LEARNING AND THEORETICAL FRAMEWORK OF STUDY

The main components of blended learning are; direct interactions with the facilitator or preceptor, interactions with each other and accessing content or information through the mobile devices. Blended learning as exemplified in the e-BSN provides is an excellent opportunity to assess how mobile devices modify engagement between the lecturer and student (transactional distance) comparing class setting and the distance learning settings (See Figure 1). This also forms the theoretical framework used in this study.

Blended learning is defined by Thorne as “the most logical and natural evolution of our learning agenda”(39). It suggests an elegant solution to the challenges of tailoring learning and development to the needs of individuals. It represents an opportunity to integrate the innovative and technological advances offered by online learning with the interaction and participation offered in the best of traditional learning. It can be supported and enhanced by using the wisdom and one-to-one contact of personal coaches” (39). Blended learning is considered among the most engaging approaches to training because learning is situated in settings of real practice (40).

Blended learning consists of three main parts (**Error! Reference source not found.**): the traditional face to face, multimedia technology-based support and individualized coaching. Blended learning seeks to combine the best of e-learning and traditional approaches to training (41). The traditional face to face sessions concern an expert delivering information to novices. The larger the class sizes in a session, the more impersonal the experience. In blended learning, the objective is to provide the student with greater flexibility and control over their learning (42). Blended learning has evolved into an important training model overcoming several shortcomings associated with class based methods of delivering learning (37,38). Blended learning allows training to be tailored to the needs of the students.

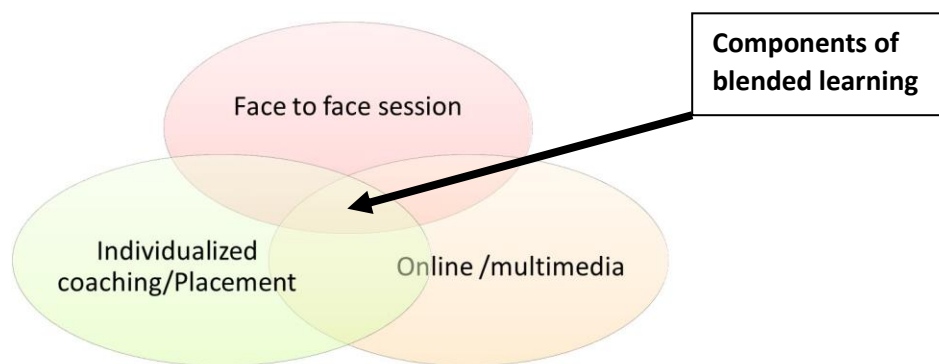


Figure 2: Illustration of the core components of blended learning.

In blended learning, face to face sessions provide the informative level building core knowledge for the profession. The knowledge is used to develop the stem of the nurse as a future practitioner, the formative phase of learning. The distance learning facilitates extension of this formative phase facilitating acquisition of skills that go beyond knowledge and skills in the profession. These skills enable the trainee to function in the environment where other nurses and professions are expected to make a difference in the provision of healthcare. The experiences students undergo in this model of training is expected to challenge their previous assumptions and knowledge leading to changes of their worldview, this is termed transformative learning. The goal of transformative learning is to build attributes for teamwork and problem solving using available resources, all key in a nurse (43).

### 2.3 EVALUATING USE OF MOBILE DEVICES IN BLENDED LEARNING

Different frameworks have been developed to identify and categorize the components of m-learning (44), including the framework for the rational analysis of mobile education (FRAME) illustrated in **Error! Reference source not found.** (17), the Helsinki University of Technology model (45), the conceptual framework for m-learning design requirements model (46) and the Pedagogical Framework for Mobile Learning (47). The methods used to measure the elements used to constitute the frameworks used survey tools. The key dimensions assessed vary slightly dependent on whether they focused on for example the student, the facilitators or the technology (Figure 3).

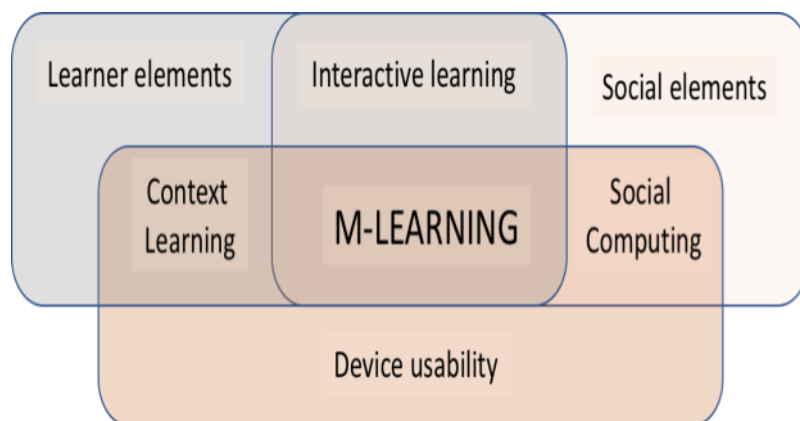


Figure 3: The frame model (Koole, 2006)

Since the purpose of this study was to assess the student perspective of the utility of mobile devices, the FRAME model by Koole was considered most suitable. The FRAME model looks at; acceptability of mobile devices for learning and requires consideration of human factors such as usefulness, cost, reliability and compatibility with other elements peculiar to the students affected by age, culture gender and other individual factors (47). Based on the FRAME model, m-learning is evaluated using the six dimensions; overall utility, instructor attitudes, system quality, information content quality, service quality and supportive issues.

In evaluating the system, Menchacha and Bekele determined that success of any form of Distance learning (DL) in which m-learning falls is dependent on a well-developed student support system for teaching and learning within which the quality of the instructor, his or her attitude to towards the technology, teaching styles, and control over the technology are pivotal factors (48). There is also a correlation between how interactive the instruction is and level of student satisfaction and success which in turn is a subjective summation of interactive experiences by the student.

## 2.4 DISTANCE LEARNING SESSIONS IN BLENDED LEARNING

Distance or e-Learning component of blended learning refers to the period where the student and faculty are physically separated by but enabled to interact using technology. In the past, focus was on content. However, today, there is greater interest in the interactions (49). Information is now more widely accessible and the shift in priorities for educators has been necessitated by the advances in information technology.

The most important factor determining success of blended learning is student satisfaction (37). The face to face session involves the student and the teacher focusing on knowledge transfer. Although various techniques are used by the teachers from traditional lectures: problem based learning, flipped class, tutorials, practical demonstrations and bedside teaching, student perception developed during face to face sessions has the greatest impact on the overall perception of the blended learning experience (50)

Initially, access to internet and multimedia was through cabled connections and storage devices such as CDs and DVDs. However, advancements in technology have afforded increasing access through wireless communication and more significantly, the mobile networks. Students and lecturers can now connect to

each other using different forms of communication and a wide variety of devices including laptops mobile phones as examples. Determinants of what is used include cost, convenience, content and utility.

In professional courses of nursing at University of Nairobi, the distance-learning component is a form of mentorship. It is guided support with specific objectives and evaluated as an integral part of the training. Students are supported using internet resources and direct access to the mentors or field supervisors. The exact structure and organization of the blended learning varies from institution to institution (37). Overall, the beauty of blended learning is that it enables four key elements highly valued by any student: integrate feedback, active learning, a personalized approach to learning needs of the student and allow each student to focus on what is most relevant to them (51).

Elements of instructional importance in blended learning include: stage setting, team teaching, consistency, timely posting of materials, time spent on each task, active engagement of students, prompt in cooperation of feedback, brief review of online material in face to face sessions and user friendliness of technologies employed (52).

Student motivation and interest in the course is important and a responsibility of the teachers (37). Students like it when facilitators take feedback and use it immediately to improve the sessions including fine tuning lesson delivery plans such as time adjustments, reorganizing items in the lecture or order of activities. Students also preferred greater active learning and application during face to face sessions (42).

Students find blended learning challenging when they have to deliver multiple assignments at the same time. They dislike it if several concurrent subjects require short preparation times. They also feel more affected when they are unable to keep up with the pace of the online material thereby affecting their ability to make meaningful learning. Student also dislike it when lecturers do not refer to the online material and instead cover new material, when discussions are unstructured, in-class sessions regurgitate online content (42).

Kassab et al evaluated academic achievement, experience and self-directed learning among medical students from the Royal College of Surgeons in Ireland, Medical University of Bahrain (RCSI Bahrain) in a blended learning curriculum. The student course experience questionnaire (SCEQ) was used, with an added e-Learning scale for experience, motivated strategies for learning questionnaire (MSLQ) for self-paced learning end of course scores for Academic achievement and path analysis for relationships between the study variables. The perception developed during face to face sessions affected student motivation. No relationship was found between SCEQ and the other components measured (53).

At the Wisconsin-Madison, student perception of the use of blended learning was evaluated in the four-year Pharmacy course, using a focus group in each of the years, one to three. The discussions were recorded and transcribed. Content analysis was used to analyze the transcripts (52). Herbert also evaluated blended learning as a cross-sectional qualitative study using content analysis of three focus groups to evaluate students' perceptions of blended learning. This approach enables deeper appreciation of challenges and enhancers of blended learning (54).

However, a glaring gap is noted. It is noted that in all these studies student interactions or student teacher interactions were not evaluated. There is no deeper exploration and focus on student-teacher



and student-student interactions to establish elements of importance in shaping the learning context. Further, there was also no specific focus on the gadget used in accessing the online content.

In this study, the elements and their relationships with learning are explored. After looking at the blended learning design context and players, there is focus on the tutor student and other students triage for the rest of the concept in blended learning. There is also an effort to understand on how this technology is received in an African context.

## 2.5 STUDENT TEACHER INTERACTIONS

Student-lecturer interaction in any type of learning is very important to achieve effective delivery of the curriculum (55). In blended learning, the time for interaction is often shorter and therefore understanding the contribution these interactions make to learning is even more critical. Student perceptions, expectations, interpretations behavior and the associated emotions have an important bearing on the learning outcomes (56,57). During face to face classes, students have opportunity for more fun, observation of facial expression, strengthening relationships with teachers and building social and emotional skills for networking. The face to face classes are more stimulating for kinesthetic students compared to online learning (58). During the face to face sessions, the teachers will augment learning if they employ active methods that engage students in the process.

## 2.6 TEACHER PRESENCE IN BLENDED LEARNING

The quality of the online component of blended learning is very important in determining the success of the entire program. The community of inquiry framework is often used to understand and study online and blended learning. The three components that make up the community of inquiry are: 1) social presence, which describes the degree of connectedness achieved among the participants, 2) cognitive presence, which refers to the students' critical and higher order learning skills, and 3) teaching presence (59).

Teaching presence can be defined as "the design, facilitation, and direction of [student] cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes" (59). It consists of content design, facilitation, and activities that enables appropriate cognitive and social engagement for effective online learning (60). Teachers play a crucial role in the success of online learning since they contribute to the social and cognitive growth among their students. Optimal learning is therefore a convergence of teacher presence, the virtual learning environment and the broader educational context as illustrated in the Figure 4(61).



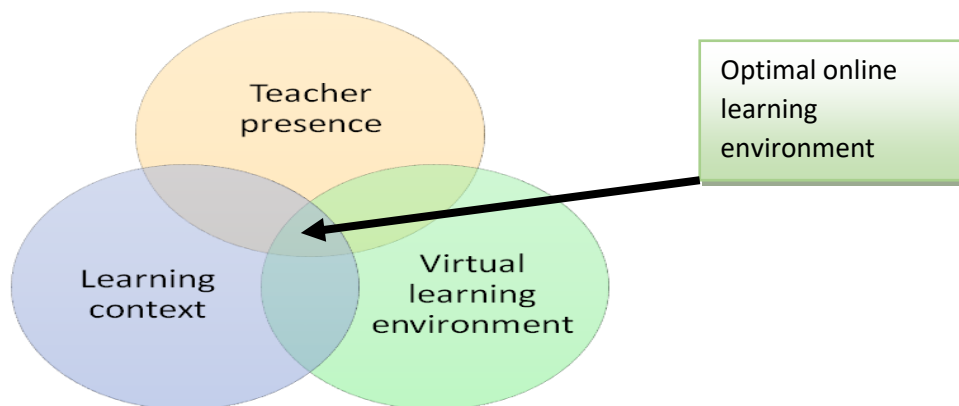


Figure 4: Factors of an optimal online learning environment.

Optimal learning happens when there is convergence of teacher presence, broader learning context and virtual learning environment.

During face to face sessions, students pick-up verbal, non-verbal (visual cues) from their teachers. The same type of contact is needed in the online or distance learning portion of blended learning. The teacher's leadership role during the face-face session deepens discussion important in the construction of knowledge (61). Further, in both the physical and virtual class, positive and timely feedback by the teacher to the students is important for the students since it motivates and reduces anxiety (60). It significantly affects perceived ease of achieving learning goals (transactional distance). Teaching presence is often measured using a survey tool developed by Arbaugh and may combine a quantitative and qualitative approach (62). Next is an exploration of transactional distance in the context of blended learning.

## 2.7 THEORY OF TRANSACTIONAL DISTANCE

Transactional distance was first described by Michael Moore in his paper "Theory of Transactional Distance" (63). Distance is seen as a pedagogical phenomenon and not as a geographic measure. Moore developed the theory by studying teaching and learning using technology. At its core, transactional distance theory elaborates on the formation of structure, dialogue and learner behavior (autonomy) caused by peculiarities of the way and process decisions were made by instructional designers. It reflects the risk of misconception or misunderstanding (64). Dialogue describes the extent and type of interaction between the program, students, and teachers. Structure refers to design and methods of delivery while autonomy represents the extent of self-directed learning and goal setting by the students (65).

## 2.8 TRANSACTIONAL DISTANCE IN BLENDED LEARNING

In his works, Moore highlighted the importance of interaction. Interaction is a primary measure of the performance of distance education and the means by which support and engagement occur (45). Moore's tools helped to determine how the separation of the student from the tutor may create a psychological and communicational gap termed the transactional distance (63). Both tutor and student need to acquire behavioral patterns to overcome the interaction challenges. The perception of what

makes up the education experience was termed the transactional distance by Moore in his proposed transactional theory (64,66).

Measurement of these different elements may be achieved using quantitative survey with a scale or qualitatively to determine levels of dialogue, structure and student autonomy (67). Using Moore's theory, at least four quantitative tools validated for statistical validity and reliability have been developed by Zhang *et al* 2003, Wengrowicz *et al.*, 2014 Swartz *et al.*, 2015 and Paul *et al.*, 2015.

The first is Zhang's Scale of Transactional Distance. It focuses on challenges student's face when engaging with the virtual learning platform. It measures: Students and Students (TDSS), the Transactional Distance between Students and the Teacher (TDST), The Transactional Distance between the Student and the Content (TDSC), and the Transactional Distance between the Student and the Instructional Technology (TDSI). It is correlated with Student satisfaction as a surrogate measure for Transactional Distance and comprises 31 elements (68).

The second is Relative Proximity Theory. It is modified from Zhang's Scale and uses a five point Likert Scale. It functions best as a pre –post intervention comparison. This scale measures transactional distance between an actual and desired state (69). The third is the revised Scale of Transactional Distance: Modified from Zhang's Scale, it has 12 elements and is easier and faster to apply (70).

The fourth is Coll-TD Scale: It is built on six sets of variables developed using Michael G. Moore's Theory of Transactional Distance. The six variables are: Communication, Student-Student, Student-teacher; Understanding; Student-Student, Student-teacher; Prior Attitude toward Collaboration, and student satisfaction). It uses 40 elements (71). In this study, the qualitative approach was the most applicable given time and practical limitations.

Using a dual scale from individualized to socialized and from low to high transactional distance and additional interpretation by Yeonjeong Park, there are four types of mobile learning generated . These four categories are summarized in table 1.

Table 1: Summary of types of transactional distance (Kukulska-Hulme, 2005)

Type of m-learning	Dialogue	Structure	Student autonomy	Transaction distance
High transactional distance socialized	More psychological and communication liberty with their instructor or institutional support	More group learning or projects where they communicate, negotiate, and collaborate	Delivery of learning materials or the rules of activity through mobile device	Transactions mainly Student-Student
High transactional distance individualized m-learning	More psychological and communication space with the instructor or instructional support	Tightly structured and well organized content and resources	Students receive the content and control their learning process in order to master it	Transaction mainly Student-Content
Low transactional distance socialized m-learning,	Less psychological and communication space with the instructor	Loosely structured instruction	Work together in a group as they solve the given problem and try to achieve a common goal	Engage in social interaction, negotiation, and frequent communication naturally
Low transactional distance individualized	Less psychological and communication space	Loosely structured and undefined learning	Individual students can interact directly with	Instructor leads and controls the learning

m-learning	between instructor and student	content	the instructor	to meet individual students' needs, maintains student independence
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Students project different abilities of coping with an education experience including planning, use of resources, and self-evaluation. The less the dialogue and flexibility in a program the higher the transactional distance. The importance of dialogue and student autonomy is higher at the start to midpoint of the course.

Transactional distance theory is still applicable in designing different types of Distance learning (DL) and mobile learning (m-learning) is one possible approach that converges instructor, peers and resources virtually and at the point-of-care (10). Next is focus on content in blended learning.

## 2.9 CONTENT IN BLENDED LEARNING

The formal reason for encouraging student to use mobile devices was to increase the ease of accessing course content via the internet. Student interaction with content is an important parameter by which any form of distance learning or blended learning needs to be assessed. Additional factors to be taken into consideration include: ease of access, ability to manipulate, synthesize, and communicate the content with each other and their tutors. In addition, getting feedback promptly and the ability to communicate with classmates to create a learning community are two other important parameters (49).

While it is known what is needed in designing online content, some interactivity could be achieved by including videos, interactive multimedia and targeted tasks. Course designers need to include assignments that use the content in shared activities to promote online communities of practice. By design, teachers are expected to regularly interact with the students to create the impression of a face to face interaction (49).

Students desire greater interaction among themselves and reactions to inclusion of a tutor in their social platform is not always perceived positively. It may even reduce participation by the students (49).

Students expect content to be clearly structured with easy tools for navigation. The content should build from simple to complex, separate “must know” from “good to know”, use animation and quizzes to improve interactivity. The sessions should deliver manageable amounts of content (in an hour), have smaller class sizes and have tutors supporting synthesis and knowledge evaluation (72).

While optimizing content for a science course, the team from Monash University noted that well thought out design and logical layout makes a big difference on student perception of content. Students will be more positive about using the content. Topic headers should be more informative over what to expect in the content and phrased in friendly language. The same material or topic of content should also be accessible in more than one way (73).

Students have described online content to be motivating to read, offering flexibility and convenience on when and where to access it (54). Today's student desires more targeted material, easy to access, entertaining and with minimal psychological and financial costs. Further, the material should be intellectually stimulating and relevant (73).

## 2.10 E-BSNE-BSN MEDIA IN BLENDED LEARNING

Social media can be defined in different ways, however, for this study, the term social media refers to an application used for interaction among people through the internet or mobile networks. It enables informal exchange of information among masses and driven by ordinary people. The shared material may be text, pictures, audio or video (74). It is also described as online applications contributed and explored by users (75). Social media are highly popular applications for interaction on mobile devices and therefore of key interest in this study.

Globally, over 90% of students use social media to share information, create knowledge and consult on learning matters. Highest correlation for use of social media by medical students was associated with usefulness and innovativeness (76). Social media have been observed to improve knowledge as seen from exam scores, expression of empathy and development of critical writing skills(76). Social media also enhances student engagement and exchange of feedback (75). Despite growing popularity of social media use among students, integration by teachers is low and believed to be partly due lack of knowledge on how to apply it in instructional design (77,78).

Informal use of social media by students enhances efficiency of communication, facilitates small group learning, exchange of information related to resources and collaboration among peers (79). Among medical students from Afyon Kocatepe University in Turkey, usage of social media was 93.4% while 89.3% was for professional purposes driven mainly by usefulness and innovativeness of the application (76). Social media platforms are also where professionals are now first exchanging on new information, innovation and educating each other (80). Research on the content shared and the nature of mixed use of social media by students, nature of exchange with each other and with their teachers during blended learning is however scanty.

## 2.11 CONCLUSION

In this chapter, the meaning of mobile learning, the components of blended learning and the channels for interaction necessary for learning to occur relevant to the current study are explored. "Transactional distance is introduced as a concept of perceived pedagogical distance between the initial state and desired state by a student resulting in four broad types based on structure, dialogue and student autonomy. Finally, the role of student connectedness, the theoretical underpinnings of mobile learning and the rise in importance of social media use are elaborated..

### 3 CHAPTER THREE METHODS

In this chapter, the design and roll out of the study which makes use of a mixed survey questionnaire (quantitative) and conducting of focus group discussions (qualitative) is described. The chapter also describes the method of sampling, data collection, management, data analysis and how ethical considerations were factored into the study.

Student perceptions of the six dimensions that make up mobile learning in the context of the blended e-BSN program at University of Nairobi is evaluated. The six dimensions are; Overall utility, Instructor attitudes, System quality, Information content quality, Service quality and Supportive issues. Data was collected on: student's perceptions of the mobile device interphase as a tool for student support; transactional distance arising during face to face and during mobile device mediated distance learning as experienced by the students and on use of social media in the triage between teachers, students and content.

The choice of a mixed method approach allows for triangulation of quantitative (questionnaire) and qualitative data (focus group discussion) (15). Strategic organization administration of the questionnaire and conduct of focus group discussions was used to improve accuracy of information collected and to gain a more complete understanding of the subject.

#### 3.1 STUDY DESIGN

This was a cross-sectional study using the convergent parallel design (15). In this method, both quantitative and qualitative data are gathered in parallel. The two datasets are analyzed separately, compared and interpretation made to determine if the results support or contradict each other. The comparison of the two datasets provides a means to establish convergence of the data sources (Figure 5).

In this study, the first component was a quantitative arm based on a questionnaire administered to students (Appendix 3). The second arm was a qualitative component which involved three focus groups with students sampled from first, second and third years (Appendix 1). The study surveys were tallied and descriptive statistics compiled under the convergent parallel design of mixed methods approach to research in education (81).



Figure 5: Convergent parallel design used in the execution of the study

The focus group discussions were transcribed and coded. Each interview was coded by two lecturers independently and the codes merged. The final codes were negotiated by the research team and consolidated codes grouped into networks or themes.

### 3.2 STUDY SITE

This study was conducted at Amref Africa health training center during the face to face sessions of the e-BSN program.

### 3.3 STUDY POPULATION

In the quantitative arm, a survey was carried out on all 386 students in the e-BSN program who were eligible. The qualitative aspects of the study were covered by three focus group discussions with one group from each of the academic years (Years one, two and three).

#### 3.3.1 Eligibility criteria

##### **Eligibility criteria for quantitative data**

All students registered in the e-BSN program.

##### **Exclusion criteria for quantitative data**

Those not currently registered in the e-BSN program

##### **Eligibility criteria for qualitative data**

All students registered on the e-BSN program

##### **Exclusion criteria for qualitative data**

Persons not participating in the e-BSN program.

### 3.4 SAMPLE SIZE DETERMINATION AND SAMPLING TECHNIQUES

#### 3.4.1 Quantitative component

Universal sampling was applied, whereby all 386 students currently enrolled in the e-BSN program were eligible to participate.

#### 3.4.2 Qualitative component

The e-BSN course has three levels: first, second and third year students. One focus group comprising between 8 to 12 students, was conducted for each level in the qualitative part of the study.

### 3.5 RESEARCH INSTRUMENTS

#### 3.5.1 Quantitative data

In order to gather information about the student's perspective of; the overall utility of the tablet, instructor attitudes, tablet system quality, quality of the content, quality of the support and the kind of service for those using the tablet, a survey was developed.

The sample population for the questionnaire consisted of 386 undergraduate students enrolled into the e-BSN program at the School of Nursing, University of Nairobi. The sample was drawn from the first year class, second year and third year. Student attitudes to the introduction of the devices and other related technology into the course were assessed.

The data collection tools based on the Framework for the Rational Analysis of Mobile Education (FRAME) were developed for use in assessing the effectiveness of mobile devices for distance learning (17) and methods derived from Biggs (1987) and John-Steiner and Mahn (1996) (82–84). The tool is a quantitative questionnaire to determine the student's perspective measuring six dimensions using 32 items with a specific focus on mobile device usage and perceived implications.

The components of the original tool contain 73 items covering six dimensions; Demographic questions, Overall utility, Instructor attitudes, System quality, Information content quality, Service quality and Supportive issues. However, to improve the chances of students filling questionnaire, it was essential to minimize the length and therefore number of items. Areas considered for reduction by the expert panel were those concerning service quality and supportive issues. To ensure that face, criterion and construct validity were maintained, the items retained were checked by a panel of social researchers in the College of Health Sciences.

### 3.5.2 Data management and quality assurance of quantitative data

Data cleaning and validation was performed and the data exported into Statistical Package of Social Science (SPSS, version 17.0; SPSS, Chicago, IL, USA). Backing up of files to compact discs and USB devices was done regularly to avoid loss. Confidentiality of the data was effected by storing all data in password controlled files and directories, which was only be accessible to the principal investigator.

### 3.5.3 Qualitative data

In order to determine the students' perspective of the mobile devices' contribution towards improving the learning experience, elements from Yeonjeong Park's and Kukulska-Hulme's four categories of mobile learning as a modification of Moore's transactional theory tool was applied to develop the focus group guide and thereafter to analyze student satisfaction using student-student, student-content and student-teacher transactional distances as predictors of satisfaction. Due to limitations in time and considering the amount data to be collected, it was decided that this component be integrated in the qualitative tool to avoid creating a merged and excessively loaded questionnaire. An interview guide was used for collecting the qualitative data from students.

Collection of qualitative data was achieved by conducting three focus group discussions with 26 e-BSN students (year 1 (8), year 2 (9) and year 3 (9)). Students volunteered to be part of the focus group discussions and were asked to give consent for participation. The focus groups ran for approximately 40 minutes each. The students were encouraged to comment freely on the themes using semi-structured questions on their general beliefs, perceived satisfaction, attitudes, and effectiveness of the instructors, course and the use of mobile devices. The Interview Guide was pretested before printing the final version.

As a lecturer in the University Of Nairobi School of Pharmacy, there was always the risk of the researcher developing conflicted perception during the student focus groups discussions. To minimize this risk, reflexivity was applied. During the focus group discussion the researcher often shared feelings and experiences with the students to help motivate participation. This technique helps to overcome the

natural tendency to conduct interviews in the same way we carry out clinical consultations (85). This was important during data collection and interpretation.

#### 3.5.4 Data collection technique

After obtaining ethical approval from the Stellenbosch University and University of Nairobi Ethics and research committees, the research team carried out interviews with the participants during the face to face session held in the first two weeks of the semester. In addition, the confidentiality of the participants was ensured and written informed consent was obtained from every participant. For the qualitative component, all of the participants the conversations were tape-recorded.

#### 3.5.5 Data management and quality assurance of qualitative data

All data from the in depth interviews were transcribed. Data were entered by volunteer research students and cross-checked by the investigator to ensure accuracy and completeness. Interviews were transcribed within 72 hours of the interview to capture all verbal interactions during the interview and to avoid loss of information.

The names of the interviewees were kept confidential by the investigator. Hard and soft copies of data were stored under lock and key only accessible by investigator. All data from the questionnaires and the in-depth interviews from Microsoft Word were entered into Microsoft Excel 2010 worksheets.

### 3.6 DATA MANAGEMENT

#### 3.6.1 Quantitative data

Data from the reports was analyzed using Statistical Package of Social Science (SPSS, version 17.0; SPSS, Chicago, IL, USA). Descriptive statistics were generated and determinants related to satisfaction with the use of the tablet for m-learning explored using the analyze function for descriptive statistics for all variables from the six dimensions in the questionnaire. Correlations between items in the subscale were determined using bivariate analysis and significance determined based on Spearman's correlation coefficient.

As part of the data management process, missing values were assessed to determine if the values occurred in a random way. A non-significant Little's MCAR test,  $\chi^2(62) = 134.427$ ,  $DF = 112$ ,  $Sig. = .073$  where  $p > 0.05$  revealed that the data were missing completely at random (Little, 1988). When only a very small portion data are missing and completely at random (e.g. less than 1% overall), a multiple imputation using the expectation maximization algorithm is applied and provides unbiased parameter estimates and improves statistical power of analyses (86). Missing data were imputed using missing values analysis within SPSS 17.0 (87).

The mean is computed for each groups' data using the transform compute multiple variable option in SPSS to generate the aggregate for each of the six categories of interest in the model for evaluating a mobile application in learning based on a modification of the FRAME model (Koole, 2006) used on the 62 participants in the survey.

Where two or more factors were to be combined to give a composite score, a Cronbach's analysis was conducted to establish internal consistency reliability (88,89). The factors with an estimate below .70 were disaggregated and analyzed separately.



The data was then used to generate summaries of data in form of histograms and correlations (Spearman's).

Figure 6 is a schematic presentation of the management of quantitative data in this study.

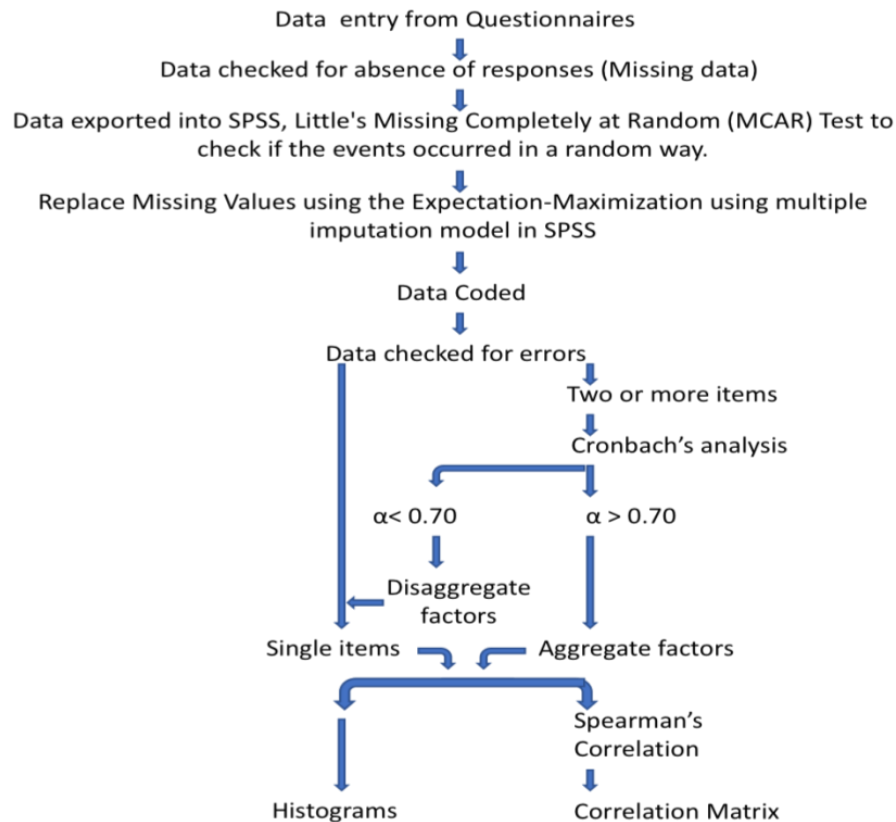


Figure 6: Schematic showing how data were managed and processed

### 3.6.2 Qualitative data

Deductive thematic analysis was used to structure analysis of the interviews manually. The major themes were generated from the responses to the interview guide (Appendix 1). The main categories emerging from critical evaluation of the focus group discussions and participants' responses to the interview questions were aligned along themes. The themes were used in the results and discussion in this thesis. The categories depict each group's (Year 1, Year 2 and Year 3) context and perspective. This process involved coding and identifying patterns in the data: recurring ideas, perspectives and descriptions. The final analysis for this study sought to develop connections, comparison and narratives around the key emergent themes.

## 3.7 ETHICAL CONSIDERATIONS

Ethical approval was sought from the University of Stellenbosch Research Ethics Committee (SU-HSD-002602): Human Research and in Kenya at the Kenyatta National Hospital/University of Nairobi, Ethics Review Committee (KNH/UoN-ERC).

Informed consent (Appendix 2) was sought from all the key informants from whom qualitative data was collected after adequate explanation of the study requirements. Participants were provided sufficient information to decide if they are willing to participate in the study. The participants were offered the option to withdraw at any point in the study. Those that agreed to participate were given an informed consent form to sign.

Participants derived no direct benefits by participating in this study. However, the findings from this study will be used to inform the School nursing or other institutions about the strengths and areas to improve during implementation of the mobile learning support for similar trainings of e-BSN.

During the study, participants were allocated a random number. The names of the respondents were concealed and confidentiality of information upheld. Electronic records were password protected, while digital recordings were destroyed after transcribing and verification of the data.

### 3.8 CONCLUSION

In this chapter, the development of the survey as a quantitative tool and organization of focus group discussions as the qualitative tool is described. Sampling, data collection management, data analysis and ethical considerations have been provided. In the next chapter, the data is processed and discussed based on histograms under three main categories of: social media platforms, content and blended learning

## 4 CHAPTER FOUR

### RESULTS AND DISCUSSION ON ONLINE CONTENT AND UTILITY

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In this study, a survey and focus group discussions were used. The student perspective of the process and outcomes of learning and instruction were evaluated using a 32 item questionnaire and three focus groups.

In this chapter and into chapter five, data from the survey and relevant aspects of the focus group discussions on student perceptions of five dimensions that make up mobile learning in the context of the blended e-BSN program at University of Nairobi is analyzed. Data collected on: student's perceptions of the mobile learning using mobile device as interphase tool for student support; transactional distance arising during face to face and during mobile device mediated distance learning as experienced by the students and on use of social media in the triage between teachers, students and content is processed. The quantitative data was coded and analyzed using univariate and bivariate methods in SPSS 18. The qualitative data from the focus group was transcribed manually and emerging themes coded.

During the interpretation, results from both the questionnaire and the focus group discussion were integrated to gain a better insight into the perspective of the students on the topic. The major themes that emerged are under blended learning, interactions on social media platforms, teacher presence, content on mobile learning devices and transactional distance (how the nature of dialogue, structure and student autonomy affect ease of learning)

#### 4.1 SETTING

The questionnaires were distributed within the classes during the face to face sessions of the BSN program is hosted at the Amref Africa campus. Stratified sample was derived also from the three groups to provide a focus group from each of the classes year 1 (8), year 2 (9) and year 3 (9). Data was collected between February and August 2017.

The method of content analysis was used to evaluate the data. Open coding for latent and manifest themes was used to identify create initial categories. Repeated analysis helped to refine the categories into the major themes. Four major categories emerged including: WhatsApp, blended learning, content, teacher presence.

## 4.2 DEMOGRAPHIC RESULTS

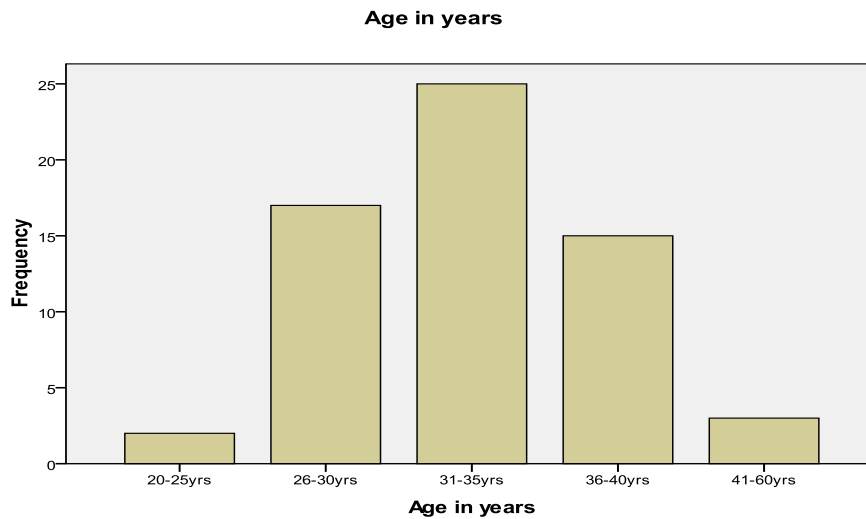


Figure 7: Age distribution of study participants in student survey on use of tablet in the e-BSN program at University of Nairobi.

The majority of the students enrolled for the e-BSN program were in the age range 31-35 years which is also the mean of the population sampled. This is not a surprise considering the e-BSN is a mature entry course to enable those who have been in service to upgrade from a diploma to the degree. The students are evenly distributed around the mean age of 33 years (Figure 7).

### 4.2.1 Gender distribution

Out of the sample of 62 students, 49 (79%) were female and 13 (21%) were male (Figure 8).

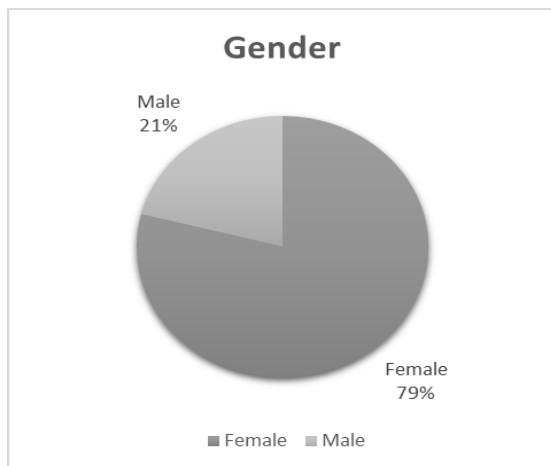


Figure 8: Gender distribution of participants in student survey on the use of the tablet in the e-BSN program at University of Nairobi.

## 4.3 EVALUATING PERCEPTIONS ON SIX DIMENSIONS OF MOBILE LEARNING

The questionnaire consisted of 32 items arranged into five groups. Each item was based on a five point Likert-type scale. For each question the respondents were asked to indicate their rating where: 5 = Strongly agree, 4 = Somewhat agree, 3 = Neither agree nor disagree, 2 = Somewhat disagree, 1 = Strongly disagree.

In this section below, an attempt is made to evaluate m-learning on the six dimensions; overall utility, instructor attitudes, system quality, information content quality, service quality and supportive issues. How the students responded to the questionnaire and identify unique theme they raised in the focus group discussion is related to the scale in the questionnaire. The responses of the students are summarized in histograms to generate a visual of distribution. The histogram is analyzed by describing the mode, range, number of peaks and skewness. Where more than one question make a scale, as described earlier, the arithmetic mean is obtained and reduced to a Likert scale out of 5. The data is then projected on histogram combining the items that make up the scale.

#### 4.4 UTILITY OF TABLETS AND OTHER MOBILE DEVICES

This section describes the utility of mobile devices under the sub-headings: Overall utility of the tablet as a learning aid (Overall utility of tablet); Student perspective of the utility of the tablets and other mobile devices for learning (Student perspective); Still prefer to use the tablet as a supportive tool (Still prefer tablet even if optional); Instructor behavior towards use of mobile devices (Tutor attitude).

##### 4.4.1 Overall utility of the tablet as a learning aid (Overall utility of tablet)

A Cronbach's analysis was conducted on the overall utility subscale of the student survey consisting of two items. It was found that the alpha level was .747 which indicates that the items in the subscale had sufficient correlation of inter-item reliability (Figure 9).

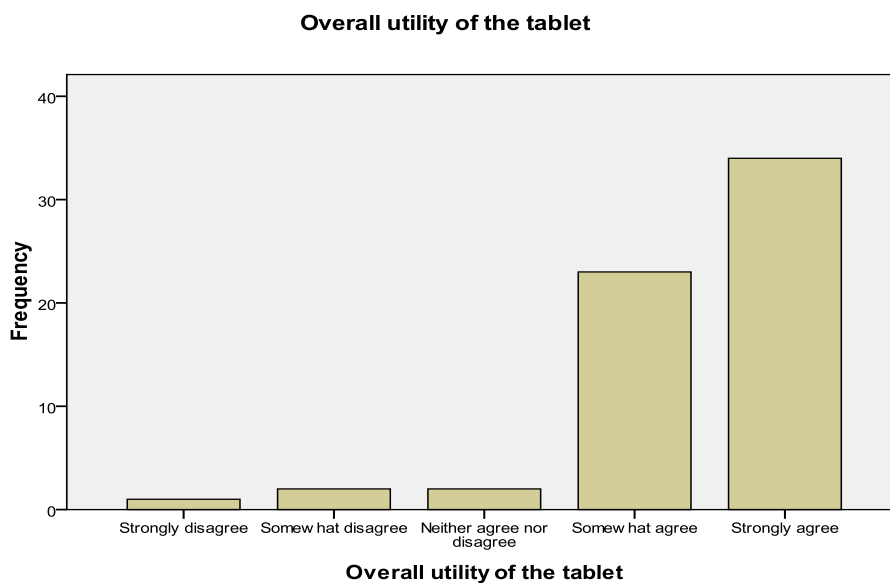


Figure 9: Student perception on the overall utility of the tablet in the e-BSN program at University of Nairobi.

The plot of the data is asymmetrically distributed. It is left skewed since the frequencies tail to the left. The peak is centered on respondents indicating they strongly agree that the tablet is useful as an aid to learning. Overall most respondents have a positive impression of the utility of the tablet as a learning aid. This was illustrated in the response:

Y3 interviewee 3: *“For me I would say the tablet, is like reinforcement. I would prefer when the lecturer teaches and then the tablet would kind of add on it good like a thing you add after a lecture.”*

#### 4.4.2 Student perspective of the utility of the tablets and other mobile devices for learning (Student perspective)

A Cronbach’s analysis was conducted on the student’s perspective subscale of the student survey. It was found that the alpha level was .695 which indicates that the six items in the subscale did not have an adequate level of inter-item reliability. However, analysis revealed that after exclusion of the item, “I have previous experience with use of a tablet for learning”, the value changed significantly from .695 to .744 indicating an improvement in the internal consistency reliability among the remaining items (Figure 10). The plot of the data is symmetrically distributed between 3 (Neither agree nor disagree) and 4 (Somewhat disagree). It is partly left skewed (Skewness value of -0.609) since the frequencies partly tail to the left. The data has one peak and is therefore unimodal. The peak is centered on respondents indicating the tablet is partially useful as an aid to learning.

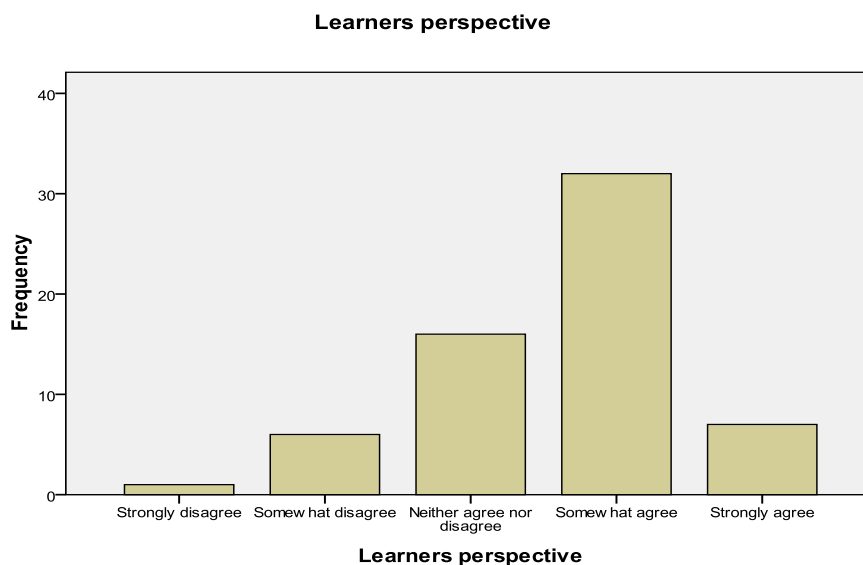


Figure 10: Student perspective on the utility of the tablet and other mobile devices specifically as learning aid in the e-BSN program at the University of Nairobi.

Overall most respondents have a moderate partial positive impression of the utility of the tablet as a learning aid from a student perspective in relation to managing study time, communication with classmates and instructors and in the possibility of replacing face to face sessions.

Examples of some of the responses related to the students’ perspective are:

Y3 Interviewee 4: *“I would say it is a supplement that I now would not be able to do without because it has been like a ...it motivates you to learn. You could be like in a matatu (Taxi)... It is easy to remove the tablet and start reading; .... The screen of a phone is very small but the tablet is quite bigger to communicate easily with either the lecturer or even be able to access the information.”*

#### 4.4.3 Still prefer to use the tablet as a supportive tool (Still prefer tablet even if optional)

The plot of the data is asymmetrically distributed. It is left skewed (Skewness= -1.429) since the frequencies tail to the left. The data has one peak and is therefore unimodal (Figure 11). The peak is centered on respondents indicating the students strongly agree that even if the use of the tablet was optional, they would still prefer to use the tablet as a supportive tool as it helps their performance in the module. Overall most respondents have a positive impression of the utility of the tablet as a supportive too in their performance.

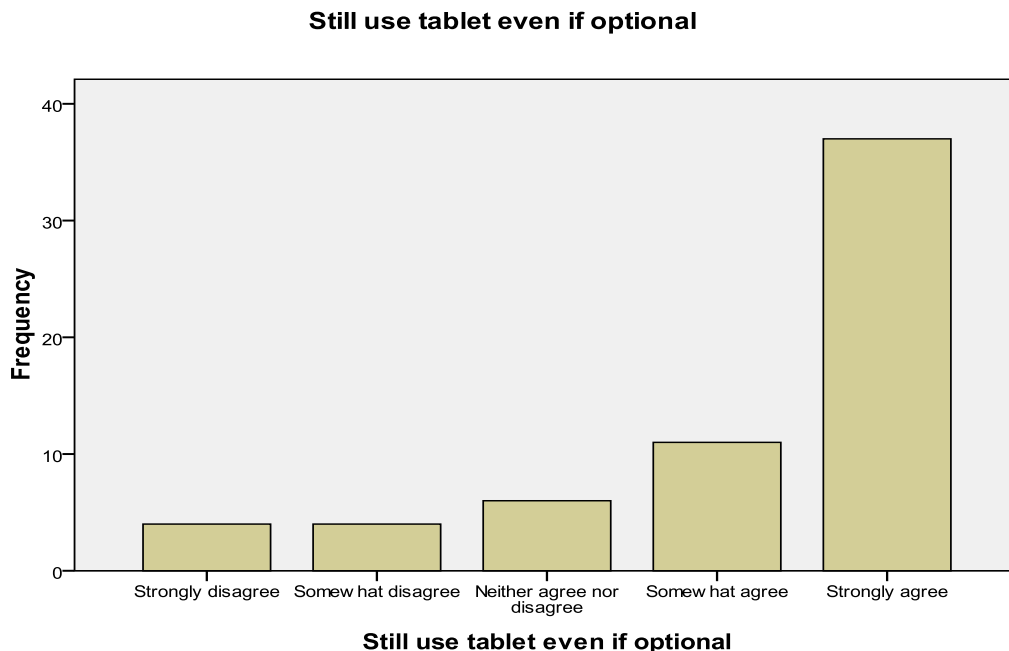


Figure 11: The students' opinion indicating preference to still use the tablet provided as a learning aid in the e-BSN program at the University of Nairobi even if it were made optional.

Some of the students said the following:

Y3 Interviewee 7: *I think it is useful, I can refer to the notes after the lecture although the lecture is still very important because if you have the notes."*

And

Y3 Interviewee 4: *"I would say it is a supplement that I now would not be able to do without because it has been like a ...it motivates you to learn. It is easy to remove the tablet and start reading; the other thing is that you can be able to access the lecturer who taught you the topic because you can be able to send a mail."*

#### 4.4.4 Tutor attitude (Instructor behavior towards use of mobile devices)

A Cronbach's analysis was conducted on the Instructor behavior towards use of mobile device (tutor attitude) by students. It was found that the alpha level was .815 which indicates that the four items in the subscale have an adequate level of inter-item reliability (Figure 12). The plot of the data is asymmetrically distributed between 3 (Neither agree nor disagree) and 4 (Somewhat agree). The peaks

are centered on respondents indicating 3 = Neither agree nor disagree, 2 = Somewhat disagree. There is a wide spread of the opinions as to whether instructors; communicate more, respond more promptly to questions and concerns, make learning sessions more conducive for learning, enjoyable and encouraged students to interact with each other students.

In relation to the tutor attitude, some of the students said:

Y1 Interviewee 1; *"I think it is the communication with the lecturers that is poor, it is not the gadget that has a problem, as she said,, sometimes you send questions to the lecturer and they don't respond, so it is the lines of communication, I think that line is not there."*

Y1 Interviewee 3: *"Yes, it is very important, in as much as they are busy, they should try and create a time in the week where we are free to ask questions so that we know if it is a Wednesday we will know we are for example supposed to communicate with our biochemistry teacher, so that we don't have to yah because we know they are busy but have one hour in a week"*

The responses indicate that students perceptions of the tutors' behavior towards use of mobile devices are quite varied ranging from low to high. Overall most respondents have a moderate partial negative to positive impression of the tutors' support of the tablet as a learning aid from a student perspective.

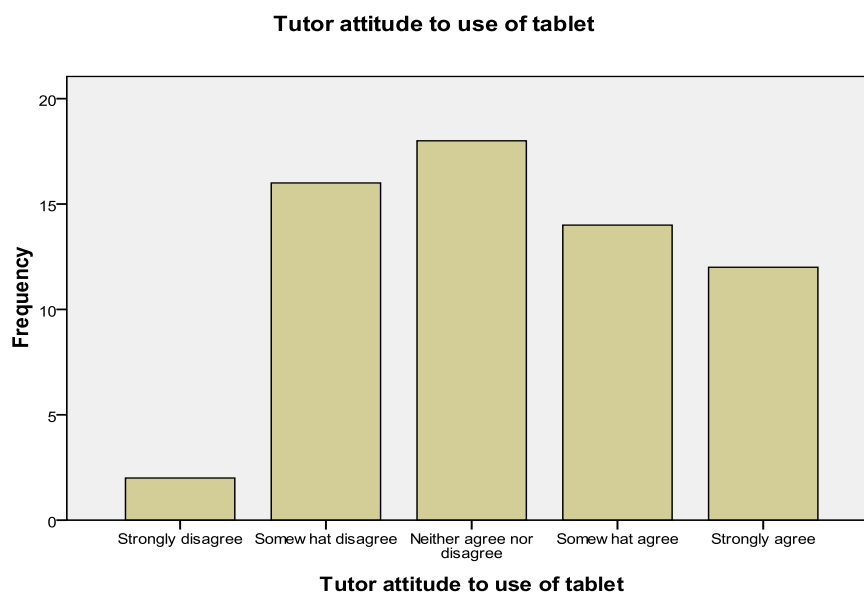


Figure 12: Student perception of the lecturers' behavior to the use of the tablet (tutor attitude) as a learning aid in the e-BSN program at the University of Nairobi.

Taking into account the responses on the five scales; overall utility of the tablet, student perspective on the utility of the tablet as a learning aid, preference to still use the tablet even if it was made optional and perception of the lecturers' behavior to the use of the tablet as a learning aid, the focus group discussions on the tablets use to run the social media application of WhatsApp captured the student perspective in their deliberations.



## 4.5 CONTENT

This section describes content on mobile devices under the sub-headings: Information content quality; Lecture notes on the tablet as main learning materials (Tablet as main notes); The content covered in the course is wide enough (Tablet content wide enough); Utility of multimedia tools on tablet (Multimedia usage).

### 4.5.1 Information content quality

A Cronbach's analysis was conducted on the Information content quality subscale of the student survey (Figure 13). It was found that the alpha level was .521 which indicates that the three items in the subscale did not have an adequate level of inter-item reliability. However, analysis revealed that by deleting any one of the items did not improve the value of the Cronbach's alpha level. The data for each of the three items was therefore analyzed separately.

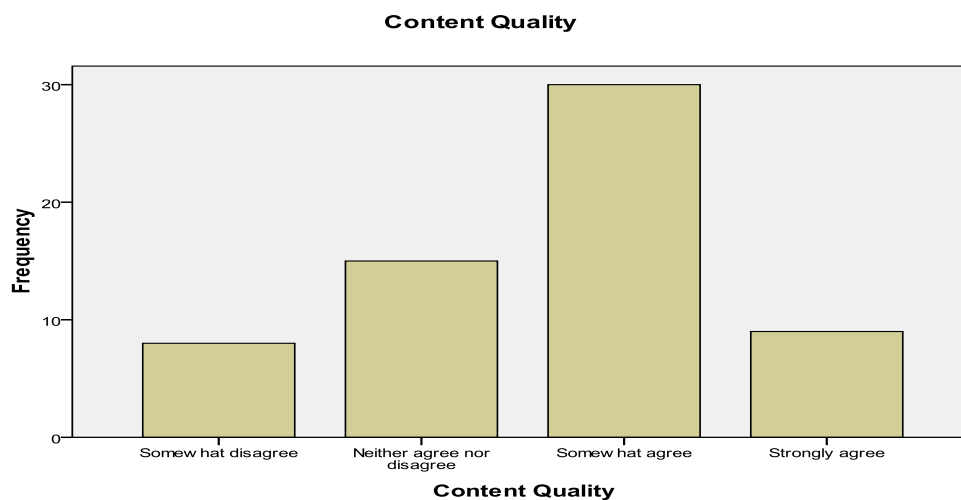


Figure 13: Student perception of the quality of the content in the tablet provided as learning aid in the e-BSN program at the University of Nairobi.

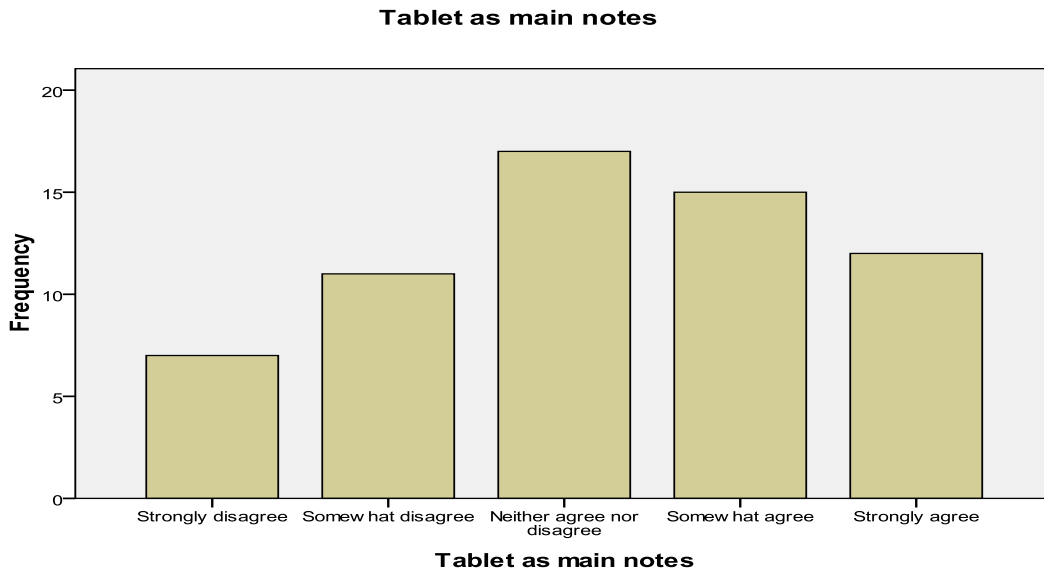
### 4.5.2 Lecture notes on the tablet as main learning materials (Tablet as main notes).

The plot of the data is asymmetrically distributed around 3 (Neither agree nor disagree) and 4 (Somewhat disagree). It is partly left skewed (Skewness value of -0.194) since the frequencies partly tail to the left (Figure 14).

The data has one peak and is therefore unimodal. The peak is centered on respondents indicating and indifference over the utility of the tablet as a primary reference for notes. Overall most respondents have a moderate positive impression of the utility of the tablet as main method of accessing notes for learning.

Y1 Interviewee 7: "The tablets have allowed reading on the go, like in Nairobi, there is a lot of jam, like it takes me one hour from corner, it takes me 1 hour even though it should take 5 minutes, so the advantage is that I don't have to carry a book, I just carry my tablet while I am travelling, I am able to

*read my content, in my work place I do a lot of night shift so it sorts me out, so when I am not busy, I am able to go through the notes”.*



*Figure 14: The students' perception of the utility of the content in the tablet as the main source of notes in the e-BSN program at the University of Nairobi.*

This is illustrated by the student in the following response during the focus group discussions:

#### 4.5.3 The content covered in the course is wide enough (Tablet content wide enough)

The plot of the data is asymmetrically distributed around 4 (Somewhat disagree). It is strongly left skewed (Skewness value of -0.710) since the frequencies tail to the left (Figure 15). The data has one peak and is therefore unimodal. The peak is centered on respondents indicating that the content of the course material is wide enough. Overall most respondents have a positive impression of the breadth of material covered in the course.

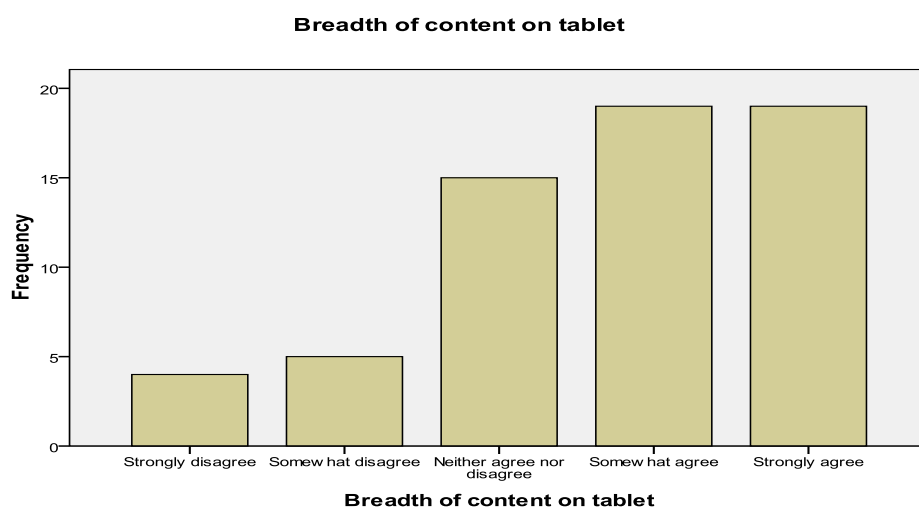


Figure 15: The students' perception as to whether the content in the tablet provided as a learning aid in the e-BSN program at the University of Nairobi was wide enough.

#### 4.5.4 Utility of multimedia tools on tablet (Multimedia usage)

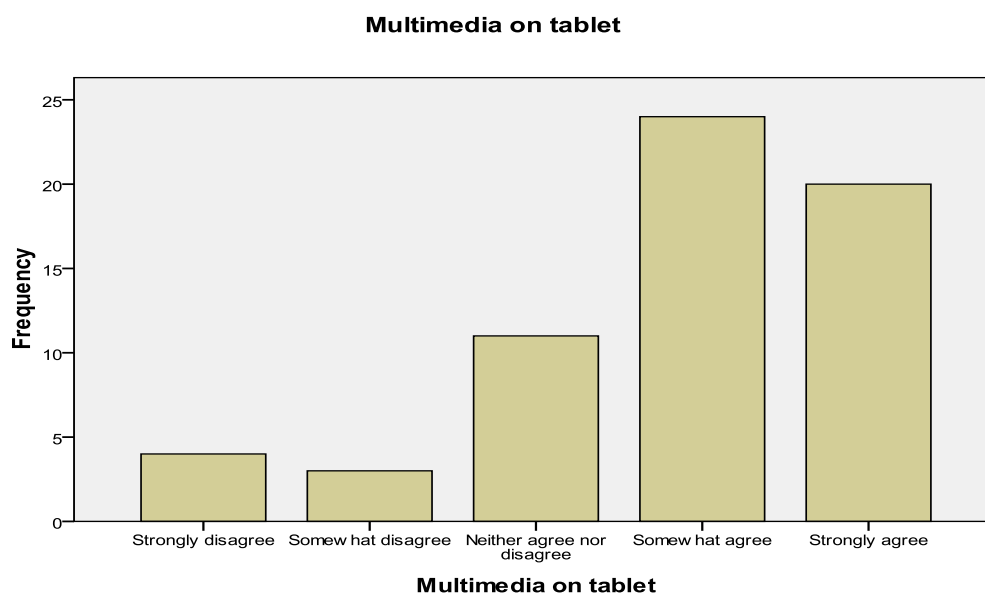


Figure 16: The students' perception of the multimedia used in the content loaded in the tablet provided as a learning aid in the e-BSN program at the University of Nairobi.

The plot of the data is asymmetrically distributed around 4 (Somewhat disagree). It is strongly left skewed (Skewness value of  $-1.049$ ) since the frequencies tail to the left (Figure 16). The data has one peak and is therefore unimodal. The peak is centered on respondents indicating they that the students find the multimedia tools in the tablet (flash animations, simulations, videos, audios, etc.) very useful.

Overall most respondents have a strong positive impression of the multimedia aspect on the user interphase of the tablet.

The responses to the four dimensions namely; the quality, utility as the main source of notes, whether it was wide enough and perception of the multimedia used were elaborated collated well with what was gathered during the focus group discussion on content.

When the use of the tablets is analyzed, notes in the tablet are essentially a form of symbolism including diagrams, links or even videos. These are all forms of object-based representation of information which is impersonal. It appears the information in this symbol form does not write into memory in the same manner it would if it were given in a physical class with other classmates. It therefore appears that these symbolized forms of information cannot achieve the enrichment that is present in the physical class.

Y3 Interviewee 2: *"I would think the same, I would require somebody to talk to me about the content, introduce the content, tell me what it is all about then I will go and find out. Now ... when we have this tablet, actually, the information we have ...it is very easy for me. I only need the teacher to introduce then I get the information, the content that is there but unfortunately, it doesn't come out. But the few notes that we have if you happen to have it, it is very easy because you read it anywhere, you read it in the matatu (taxi) , as you wait in the queue you know, wherever you go so it becomes very very convenient but still myself, personally, I would require the teacher to talk to me. I like the blended, there is no way I do without the blended to have the class only or the tablet only. I like the blended more. Meaning I have to attend the classes and I have to do my own personal readings..."*

The real class provides students with all the variations which may probably be the context (packaging) involved in writing information into memory (90). It is known that memory is enhanced when there is emotional arousal during the encoding process (91). This formation of linkages to strengthen memory is not new and has been used in identifying relationships and patterns to extract data from networks (92).

Y3 Interviewee 4 when commenting about the importance of the face to face versus use of tablet only had the following comment: *"When you have that lecturer or teacher talking to you, there are even some words that you would say you know they are coming out the statements that actually stick because they are live then they are coming out you never forget But in the video, somebody it has you know that person you know you can decide I am looking there and he is talking and a word may pass but when we are talking me and you, there is a lot of connection"*

Despite our attempt to vary the content using the different forms of representation, there is still no comparison to the effect a real lecturer has on the student's experience. The students said that even if one introduces videos, that still does not make up for the physical contact with a real lecturer in the face to face sessions.

Y3 Interviewee 5: *"Face to face is unique in its own way as a student, I need to feel like a student, At home I am swayed around with a lot of things and even at work or whichever place, so it kind a gives you some kind of a discipline and then again in face to face you get hints at times things of things to come based on the voice, body language. Some people..., the way they are presenting they can hint that this place is very valuable than these other one, so even your reading you know where to go depending on how good your eye reading is."* Based on the observations made during the interviews, it may be concluded that talking to students about human issues of immediate relevance to their social context

combined with academic knowledge has an effect on the student's attention and their memory of what was discussed. The social issues seem to help in the packaging of the academic information into memory. It is clear that the packaging of information using nonacademic images of persons is generated in context and spontaneously during the face to face sessions (91).

During the development of e-content as happens in UoN, the writers are required to use conversational language in the attempt to make the content more engaging. Now reflecting on the students' comments about their need for human interaction, this is a symbolic attempt to replicate the class environment, but one may begin to ask if this really does achieve the goal. Does it really give a feeling that the reader is in a class? From the responses by the students, this is still not achieved.

It may now be realized that this is still a far cry from the desired simulation of a real class. The main challenge is how to replicate the other human elements which happen in a real class like the distraction and observation, listening or touch or sense of mood and other enriching attributes that make up the desired environment for optimal learning (93).

There is conflict between the natural need for variability by students and the static nature of e-learning material. E-content is characterized by uniformity or consistency. This is the default nature of the process of content development and its dissemination (94–96). Here it is observed that variation and change are what is preferred by the adult students (97). In that case, is it really possible to provide variability in the online environment and allow for human elements to be infused into the space? This belief may already be in place and can be confirmed using a study on the behavior and management of student initiatives in the social platforms such as WhatsApp or Facebook. Those in academia may need to evaluate the way information is relayed using these platforms. The other challenge is how to catalogue the information in such a way that one may find it when they need it.

Y3 Interviewee 6: *"One thing is that personal contact is more strong (stronger) than any gadget. Naturally if somebody is close to me or somebody I can see the real person it is better, and the emotion, the teachers will do things that will clique, but just a video here, aiya (alarm)..., I may not even feel interested yeah."*

The advantage with organized information is that one will be able to go back to a particular page and reread the content. The second study may need to find out how the students would like to have the material or information organized if they wanted to refer to it again later. In the traditional way information is organized, it is readily catalogued. If one needs to check something they read before, they will be guided by certain cues like the logical arrangement of content, titles, chapters, page numbers and even an index with key word searches.

On two occasions, the students complained about repeating what they felt they were good at and that lecturers in the face to face sessions could pick it up and skip that component in a real class. This emphasizes learning what they need. During the discussion about the use of WhatsApp, it brought out the need for prompt and appropriate feedback in a non-intimidating informal environment. The joy of engaging in the forum was evident during the interviews where the students broke out in laughter when asked if they had a special way of keeping in touch with each other beyond the class.

Year 3 Interviewee 1: *“Aah, I learn when the teacher is teaching, .... then I go to look at it in the tablet, I will understand it better ..... If I am to learn from the tablet alone, then I will need something to guide me, ...”*

Whereas adult students value variations in methods of teaching and presentation, there was no direct interview on this matter but they did mention important elements that highlighted appreciation of variety. Examples included activities in class by colleagues, meetings beyond classroom, variation of presentations by lecturers and sharing of materials on the social platform. Next is an exploration of how the structure of the program (Blended learning) may have modified the students' perspective of the learning experience.

## 4.6 BLENDED LEARNING

In this subsection we describe blended learning under the following subheadings: Prefer to take this module totally online (Want course fully online); Face to face sessions; Teacher presence

### 4.6.1 Prefer to take this module totally online (Want course fully online)

The plot of the data is asymmetrically distributed. It is right skewed (Skewness = 1.275) since the frequencies tail to the right. The data has two peaks and is therefore bimodal. The larger peak is centered on respondents indicating they strongly disagree taking this module completely online from home without having to come to the face to face lectures (Figure 17). The second center with a much lower proportion of respondents indicates they neither agree nor disagree to having the course fully online.

Overall most respondents would not wish to have the course offered fully online. The discussion in the focus group as related to their perspective on blended learning and teacher presence illustrates some of the student perspective.

Year 3 Interviewee 1: *“Aah, I learn when the teacher is teaching, it is easier for me, if the content has been taught to me in class then I go to look at it in the tablet, I will understand it better but after it has been introduced in class....”*

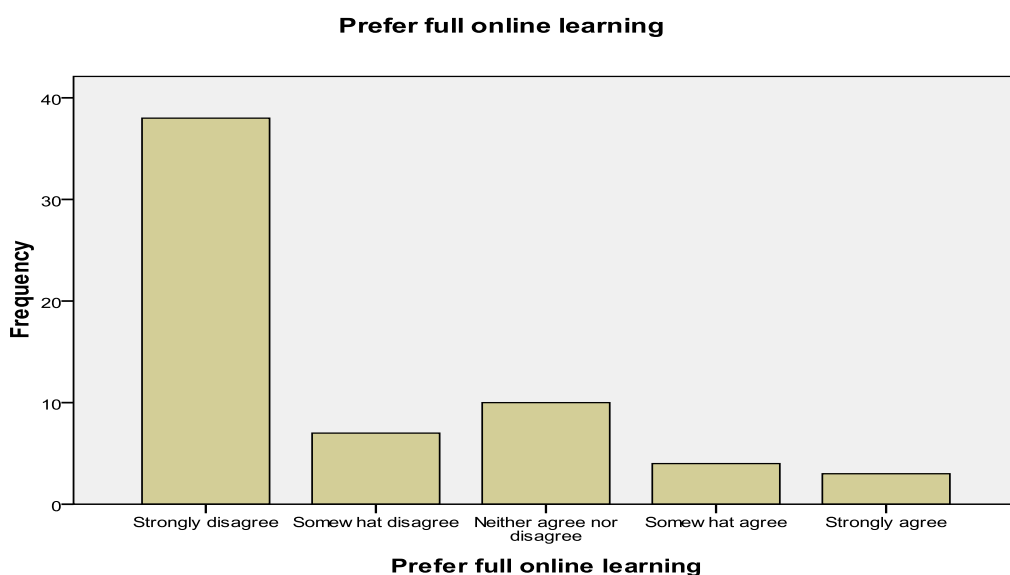


Figure 17: The students' opinion indicating if they believed the tablet provided as a learning aid in the e-BSN program at the University of Nairobi could completely replace the need for face to face learning.

#### 4.6.2 Face to face sessions

During the focus group discussions, the students expressed strongly the need to have a physical presence of the lecturer. When probed further, they say among others, that they experience a feeling of connectedness with the lecturer in the class. This connection was achieved by eye contact, reading body language and sensing voice and tone of voice among other attributes. This physical connection was important. The students illustrated how important it was to meet as students in class during the face to face sessions. The students said that during the face to face classes, there was a form of engagement for the student that happened while watching and listening to one of their classmate respond to a question or contribute to the class discussion. They said they were able to better remember the discussion or the subject better because of these little 'distractions'.

Y3 Interviewee 3; *"When you have that lecturer or teacher talking to you, there are even some words that you would say you know they are coming out the statements that actually stick because they are live then they are coming out you never forget But in the video, somebody it has you know that person you know you can decide I am looking there and he is talking and a word may pass but when we are talking me and you, there is a lot of connection"*

It appears there is something enriching about this involvement in a physical class. This context created an important packaging that made it easier for the students to understand and thereafter recall information. That diversion for the student from the lecturer to activities around the students appears to play a role in the learning session. The variations of stimulation may help facilitate refreshing of the memory and thus make a more efficient step in committing information to memory (90).

On reflection, this illustration implies that critical knowledge needs to be accompanied by other coding which is person related or social in meaning. Personal experience and social context have been

identified as important enhancers of memory and later recall (98). There may therefore be a stronger memory of material that is person-associated rather than object or symbol based (written or literal).

Y3 Interviewee 7: *“I believe seeing is believing so the more I see the activities during a class room session, I get to believe ...or rather, I get to internalize more than when I am just watching a video. This looks like an artificial thing, the video, but now the natural thing or this interaction you will remember...you will remember there was a Cornelia in class, she said this, so you are able to understand and I think generally that is the thing.”*

In education, the degree of engagement by students will vary for reasons beyond the control of both the teacher and the students. The face to face session may allow immediate realignment of strategy by the teacher and thus keep the students on the trail. Further, there may be students who naturally gel in with the lecturer and there are those who will not get the emotional blending experience (99). It may be speculated that this will eventually affect whether the student will remember knowledge in that environment or not. Table 2 illustrates some of the factors that were projected to influence what was learnt based on the data gathered during this study.

Table 2: Illustration of factors projected to influence what was learnt.

Perceived to incentivize learning	Perceived not to incentivize learning
Associated sensory perception (seeing, hearing, smelling, body language)	Absence of physical teacher
Use of human or familiar persons to illustrate	Use of nonhuman /Abstract illustration
Variation of stimulation	Monotony of communication
Relation to own social context	Not related to own social context

So how can the enrichment that contributes to the simulation of a real class experience be replicated? This will remain a challenge for all those who will be attempting to design non-human mediated forms of support for learning. There are situations where students are unable to proceed with task execution until they engage with the teacher (100). After the engagement, the students begin to find flow of actions that overcomes inertia that riddled them previously. This engagement gets the student reinvigorated and there is a leap in the intensity of exchange between the student and his supervisor.

Year 2 Interviewee 8: *“Like immunology, he would say he had no laptop but we remember more of what we learnt in that lecture than we did in the others he would you come here, you are the a , you come, you are the b, and you, the c and so when you are alone, it is like a YouTube.”*

Y2 Interviewee 3: *“You remember it so well.”*

Academic sessions are often devoid of social context natural to the students. The assumption is that the facts make up the key content. This is contradictory to the way the students present their preference. The information the students most naturally take up is that knowledge which is contextualized in forms that use a familiar social or human situation. In one example given by the students, they highlighted how they could remember a lecture given on the physiology of clotting. The lecture on clotting was chosen since they explained it as an example of a topic that was perceived as complex from earlier



courses. In the example, the participants said that often only a few could recall it without some aid. However, the lecturer who taught clotting created a model of the cascade using classmates acting as blood cells. The steps of the reactions were arranged using familiar persons to represent the reactions in the order they occurred.

This demonstration using fellow classmates was given as an example with a long lasting duration in memory. They could still remember the lecture very vividly despite having taken the class over a year prior to the time of the interview. Analyzing this more deeply, one can see that the features of using humans in an animation had profound effects on memory.

What are the elements that make this so? It may take us back to the example of a classmate who is answering a question or who is getting a response to a question leading to better memory of a discussion and its meaning is easier to recall long after the teaching was done. The abstract steps in the illustration are now associated with a human. The classmate in focus is in turn heavily coded in memory by a rich history of social information based on all engagements where the student associates with that classmate.

In the process of storing the information on clotting, the student therefore replaces abstract symbols with a physical human attribute. In turn, this social coding in the form of the classmate clearly led to easier and more vivid recall. Therefore, if the stored information is easier to recall, what is the role of the extra packaging that has accompanied the 'dry' information many regard as academically appropriate? It implies that our expectation of overload of information to convey the knowledge is contradictory. The packaging does not complicate recall but actually makes it easier.

#### 4.6.3 Teacher presence

By their very nature, it is difficult to replace a physical teacher with anything online (101). Often what is needed is a blended learning course rather than a course that is entirely online.

Rovai found that the experience by students varied more due to the way pedagogy in the course was designed and less due to the type of e-learning system used (102). Taking this human aspect into account should definitely inform every attempt to take learning to an online platform.

Y3 Interviewee 3: *"When you have that lecturer or teacher talking to you, there are even some words that you would say you know they are coming out the statements that actually stick because they are live then they are coming out you never forget But in the video, somebody it has you know that person you know you can decide I am looking there and he is talking and a word may pass but when we are talking me and you, there is a lot of connection"*

There is as yet no way to quantify the element of social or human packing in our development of e-learning material. It may be the next challenge for those who are working on a new frontier of technologies used to support learning beyond the class or as a complement to the teacher. As academics, there is need to develop a culture where effort is made to communicate the "dry" facts and use of formal language as the correct method to represent knowledge. Taking this analysis a little deeper, academic writing becomes impersonal and detached from the humanness of those who are communicating by neglecting the personal experience out of what is been relayed to the reader.

There is need to understand how to best get the students tuned to taking in new information. There is the concept that spreads humans as kinesthetic, auditory or visual students and combinations of these

in different ways (103). If the design of the learning environment whether in class or online is taken into consideration, the task becomes more complex if the assumption is that one can assemble the parts and organize them artificially. However, on the flipside, if how students have used the social platform such as WhatsApp is evaluated, there may be the solution. This may have not only the factual information needed to relay to the students, but in addition, allow the class to be in this interactive space rather than the academic room which may be described as dry or flat in human or social terms.

It therefore appears that the students want information packaged in a way that connects with their context. This context is based on human experiences in their lives. The students have expressed that there is a kind of connection they make with their lecturers when they have the face to face sessions. This connection was not the same in each class. There were some classes where this connection was more than others. In cases where there was “good” connection, the students allowed the lecturers into their social learning space in the WhatsApp group.

There appears to be some form of synthesis that takes place when the students import the academic staff into their social space. This process is very context specific but appears to make the academic content more palatable. Within this space, the academic material also becomes easier to assimilate into the bank of memory where in academic terms is considered “learnt”, where the measure in this case is the ability to recall at a basic level and apply at the higher levels. The students also suggested that it was essential that the material be introduced to them by the lecturer in the short face to face session for them to thereafter carry out construction using the notes or content provided using the e-platform for the remainder of the knowledge prescribed in the curriculum.

Having this knowledge however gives two options to the teacher. One is to attempt to artificially process the learning material available on the tablet to this level. The second approach would be to allow the students to use the tablet to carry out the synthesis on their own as they are currently doing. The facilitator could then follow it up with design of assessment that will encourage and reinforce this as a form of teaching and learning integral to the curriculum.

The current method of assessment is limited to the first form of knowledge which essentially is to regurgitate as given rather than to synthesize and evaluate the meaning after the students have digested it and assimilated it with their own attributes to its individualized meaning. In essence, this means the function of assessment is to evaluate if the meaning at the end of the process is the same as that intended by the teacher. The action that follows the outcome of the assessment is thus to correct misconceptions or to proceed to the next phase of the learning or training. The advantage with this approach of teaching and learning is that the progression is student centered. Progression is thus not expected to be uniform among students. The first strategy may more closely lend itself to the four component curriculum design method (4CD) (104) while the second may be what is used in the problem based approach to teaching and learning.

The entire discussion confirms the tenets that are well known to constitute the preferences of adult learning. While the entire information contained in the curriculum may not be immediately relevant to the adult nurse taking the program, they glean out what they feel brought them back to school. In this respect, they still will only focus on what they want to learn (97). The only challenge is the competing need to learn what the teacher wants to examine. They relayed the reading of emphasis in the lecturer’s voice and body language as essential components of the face to face sessions.

The blended learning was intended to maximize on learning through problem solving based on the actual working situation. The students participate directly in the professional work where they apply what they have learnt immediately. The students are able to determine their own pace of progress during the distance learning sessions. They are able to balance between work family and study. This was one of the big motivations for taking the current course as offered by the University of Nairobi and Amref. The blended program therefore allows for greater personalization of the process of undertaking the training. This is an important attribute for those designing courses for adult students.

In this chapter, a description is made of how the data was managed and discussed results for each of the six dimensions measured in the survey. Through this, the hidden and powerful role of human interaction as an integral part of the class has been revealed the interactions between students and tutors and among students themselves (Section 4.6.2 qualitative data). There is an emerging important role for social media platforms in forming student support networks with tutors and among the students. In the next chapter, the results and discussion on system quality, transactional distance in the context of the e-BSN and correlations between the responses by students shall be evaluated.

## 5 CHAPTER FIVE

### RESULTS AND DISCUSSION ON SYSTEM QUALITY, CORRELATIONS AND TRANSACTIONAL DISTANCE

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This chapter concerns students' perceptions of system quality, correlations and transactional distance. The results are presented in summaries in form of histograms. The results on the student perspective of the mobile device as a student support aid; system quality, transactional distance in the context of the e-BSN and correlation in the students' responses to questions in the survey on the use of the tablet is discussed. Next, the researcher elaborates on findings on System quality, later, Transactional distance and social media.

#### 5.1 SYSTEM QUALITY AND SUPPORT

In this section, the students' opinions considered are if there is: better navigation and finding of information, student interaction, less encountering and better resolution of errors during use. Also taken into account are; greater utility of the tablet in revision and utility of the help menu, continuous access to learning content and impression of format on the user screen. The perception on the guidance the students have received from University/Amref on how to use the tablet and whether the tablet helps them to cut-down their expenditure on such items as paper, communication (i.e., phone) and transportation is also analyzed.

#### 5.2 SYSTEM QUALITY (SYSTEM QUALITY)

This subsection discusses system quality under the following subheadings: System quality; service quality (Student guidance); Tablet is helpful in cutting-down expenditure (Tablet saves costs).

A Cronbach's analysis was conducted on the System quality subscale of the student survey. It was found that the alpha level was .883 which indicates that the nine items in the subscale have a highly adequate level of inter-item reliability (Figure 18). The plot of the data is asymmetrically distributed between 3 (Neither agree nor disagree) and 5 (Strongly agree). The opinions are on whether there is; better navigation and finding of information, student interaction, less encountering and better resolution of errors during use, greater utility of the tablet in revision and utility of the help menu, enabling continuous access to learning content and impression of format on the user screen. The responses indicate that student's perceptions of the system range from no opinion to high. Overall the respondents have a positive impression of the system on the tablet as a learning aid.

Y2 Interviewee 4: *"Like for example I remember when we were learning about biotransformation...something in pharmacology and someone drew a diagram to explain the processes (in WhatsApp) so that one you remember obviously."*

Y2 Interviewee 2: *"The medical courses, the content is a lot so like when I compare what I learnt in my previous training, for example what we covered today was theatre nursing, the material is much more complex and not easy to cover within the time"*

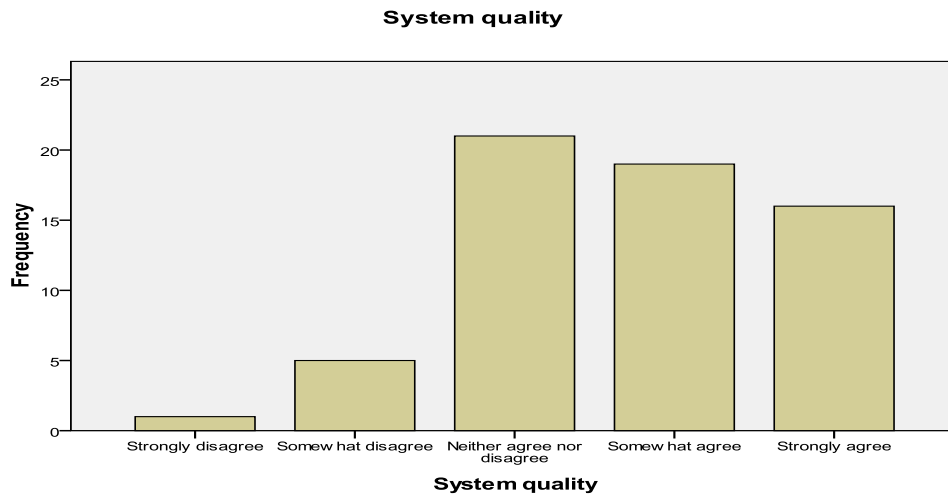


Figure 18: Student perception of the quality of the system used in the tablet provided as learning aid in the e-BSN program at the University of Nairobi.

#### 5.2.1 Service quality (Student guidance)

For the item on service quality, the respondents felt that the guidance they received from University and Amref staff on how to use the tablet was sufficient.

The plot of the data is asymmetrically distributed around 3 (Neither agree nor disagree). It is partly left skewed (Skewness value of -0.411) since the frequencies partly tail to the left. The data has one peak and is therefore unimodal (Figure 19). The peak is centered on respondents indicating that the guidance the students have received from University/Amref on how to use the tablet was good enough. Overall most respondents have a positive impression of the student support provided.

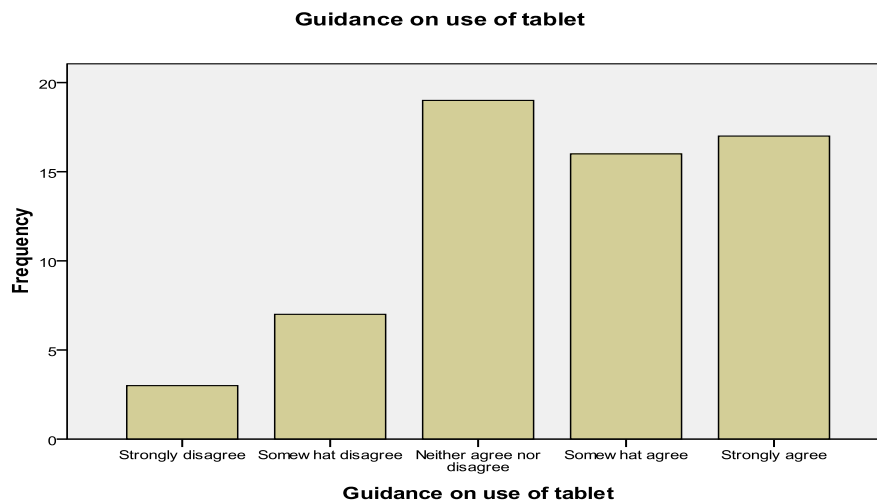


Figure 19: The students' perception of the user guidance provided by the administrators of the tablet provided as a learning aid in the e-BSN program at the University of Nairobi.

### 5.2.2 Supportive issues

A Cronbach's analysis was conducted on the Information content quality subscale of the student survey. It was found that the alpha level was .556 which indicates that the three items in the subscale did not have an adequate level of inter-item reliability (Figure 20). However, analysis revealed that by deleting any one of the items did not improve the value of the Cronbach's alpha level. The data for each of the three items was therefore analyzed and discussed separately.

### 5.2.3 Tablet is helpful in cutting-down expenditure (Tablet saves costs)

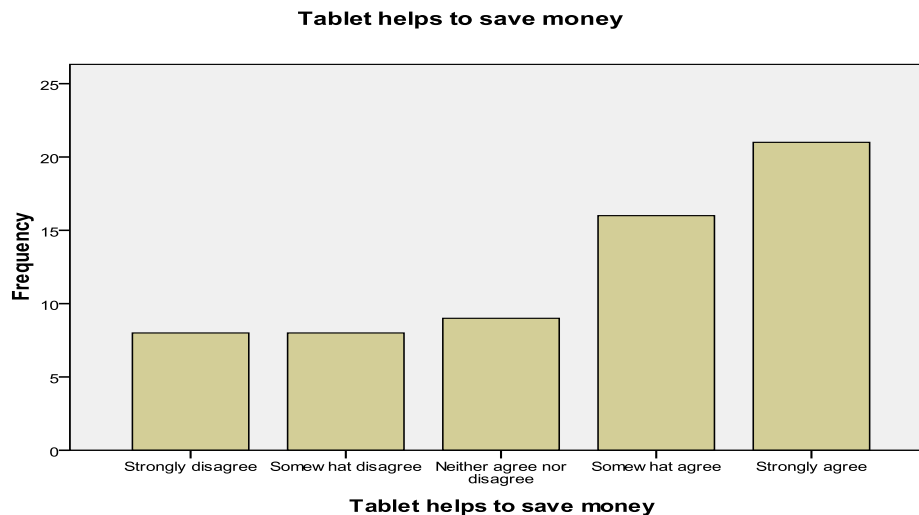


Figure 20: The students' perception over the reduction on expenditures as a result of using the tablet provided as a learning aid in the e-BSN program at the University of Nairobi.

The plot of the data is asymmetrically distributed (Figure 20). It is left skewed (Skewness= -.591) since the frequencies tail to the left. The data has one peak and is therefore unimodal. The peak is centered on respondents indicating the students strongly agree that the tablet helps them to cut-down their expenditure on such items as paper, communication (i.e., phone) and transportation. Overall most respondents have a positive impression of the utility of the tablet in cutting costs related to the training.

Y2 Interviewee 1: *"So for me I will say that the problem is about the bundles, sometimes you have to download content so you have to think about the cost of the bundles ... and I feel it"*

## 5.3 CORRELATIONS (SPEARMAN'S)

In this section, SPSS software is used to pair the 12 scales and items from the questionnaire to find out how similar the way a student scored one scale or item was to the way the scored the other scale or item when paired. The 12 scales and items are; Time on computer or internet, Tutor attitude, System quality, Content quality, Student guidance, Student perspective, Still prefer tablet even if optional, Want course fully online, Tablet saves costs, Tablet as main notes, Tablet content wide enough and Multimedia usage.

A good map should project these relationships using different thicknesses to show how similar the scoring is to each other. Special software is required to simplify this kind of map. For illustration sake, simple arrows are drawn manually to demonstrate a sketch of the output based on the data gathered using the quantitative tool, a map of how the 12 scales correlate is summarized in Figure 21 and Figure 22. The summary table for this data is available in appendix 4.

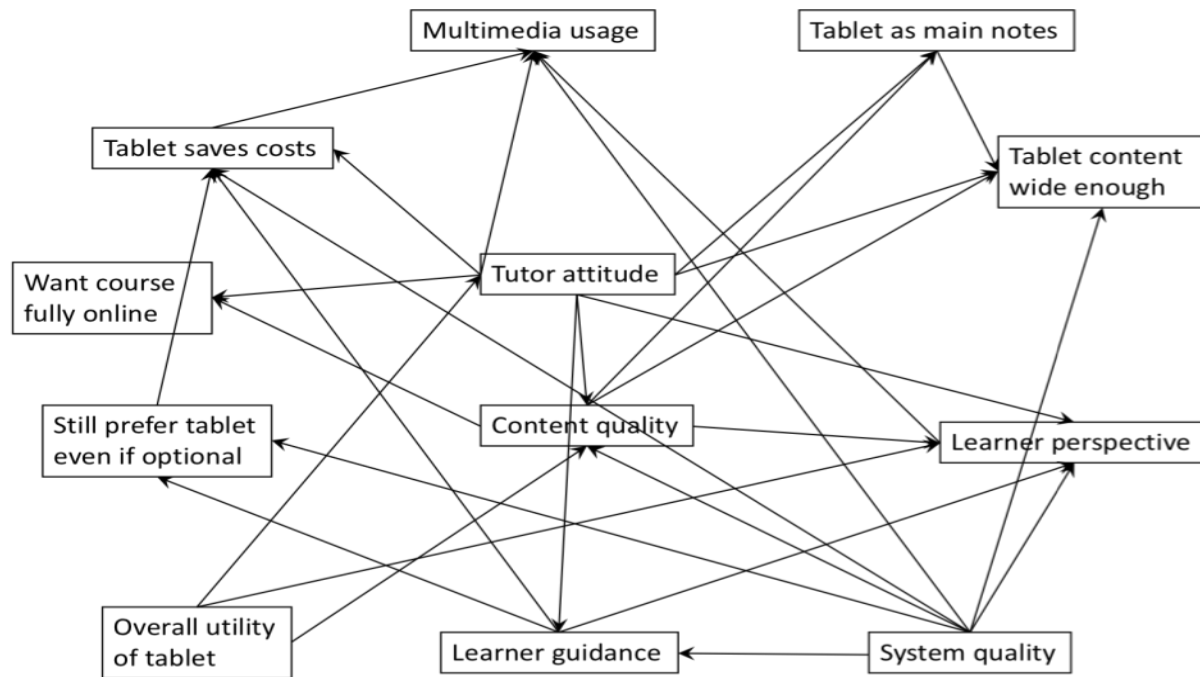


Figure 21: A map summarizing the spearman's correlations of significance beyond  $P >> 0.01$  between subscales used to establish student perception of the utility of the tablet provided as a learning aid in the e-BSN program at the University of Nairobi.

With reference to Figure 21 evaluating correlations between subscales, it reveals that the time spent on internet using the computer subscale (Time on computer or internet) was positively correlated with the amount of time spent on the tablet (Time on tablet) subscale.  $r(61) = .597$   $P >> 0.01$  as expected. Since those likely to use the internet are more likely to be using it on the mobile devices as well. Similarly, perceptions about tutors attitude to the use of tablet by students (Tutor attitude) and their overall view of the utility of the tablet (Overall utility of tablet) were positively correlated:  $r(61) = .419$   $P >> 0.01$ . This may suggest that students' perceptions about the lecturer in relation to use of tablets tend to match their own sense of its utility as a learning aid.

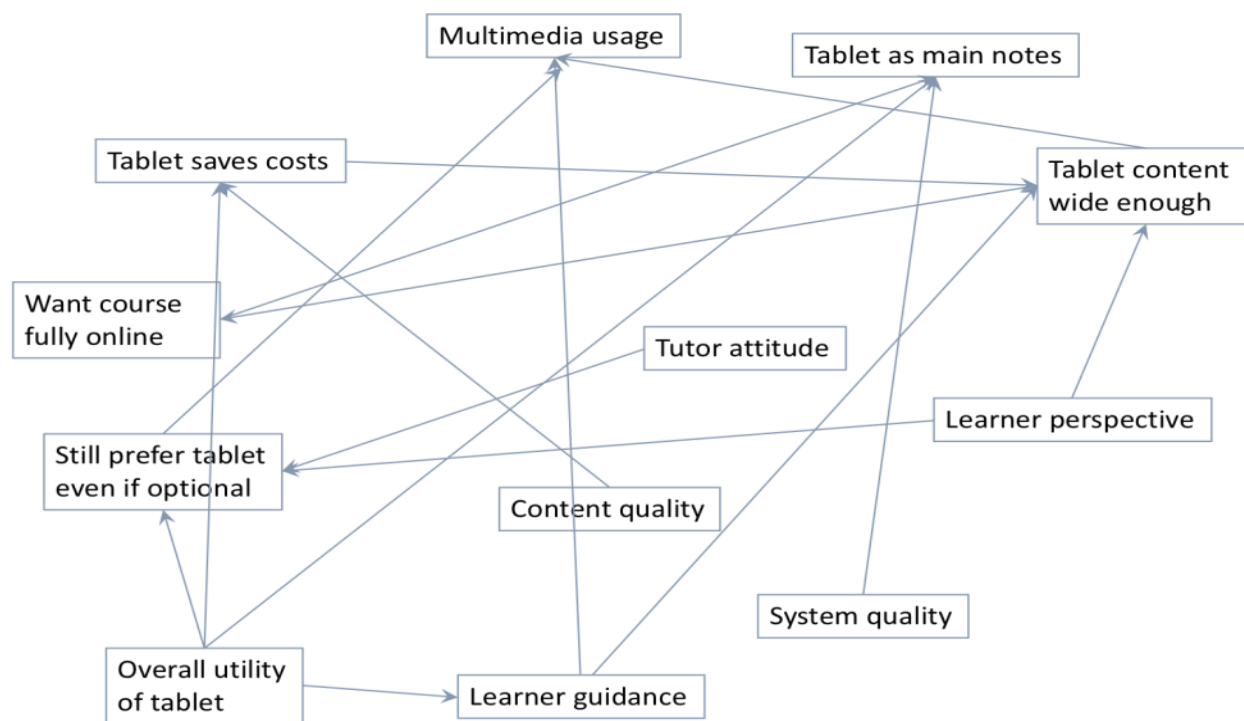


Figure 22: Map summarizing the correlation significance beyond  $P > 0.05$  between subscales used to establish student perception of the utility of the tablet provided as a learning aid in the e-BSN program at the University of Nairobi.

There is a positive correlation between quality of the tablet platform (System quality) subscale and: overall view of the utility of the tablet (Overall utility of tablet)  $r(61) = .583$   $P > 0.01$ ; perceptions about tutors attitude to the use of tablet by students (Tutor attitude)  $r(61) = .570$   $P > 0.01$  subscales. The perception of the quality of the content in the tablets (Content quality) varied positively with: Tutor attitude  $r = .601$ ; System quality  $r = .546$ ; Overall utility of tablet  $r = .370$ , all with  $P > 0.01$  also as expected. This indicates that the perceived attitude of the lecturer to the utility of the e-content available in the tablet affected the students' attitude to its utility. Administrators in the university should invest time and effort in getting faculty to embrace use of the e-content via the tablet during the adoption of e-learning components.

Student support when learning to use and troubleshooting (Student guidance) showed greatest correlation with: Tutor attitude  $r(61) = .397$  but a more significant co-variation with the perception of the systems quality (System quality)  $r(61) = .587$ . A lower but significant correlation  $P > 0.05$  was found with overall view of the utility of the tablet (Overall utility of tablet)  $r(61) = .311$ .

The students perspective of the utility of the tablet (Student perspective) positively correlated with a  $P > 0.01$  for: Overall utility of tablet  $r(61) = .608$ ; Tutor attitude  $r(61) = .550$ ; System quality  $r(61) = .592$ ; Content quality  $r(61) = .518$ ; Student guidance  $r(61) = .441$ . The quality of the system, its content and student support when learning to use and troubleshooting (Student guidance) are vital for an overall positive student experience when using the tablet just as expected. Previous experience with use of the tablet was surprisingly not consistent in its effects on the students' perspective of the utility of the tablet during this survey and was left out of the analysis.



While responding to whether they would still want to use the tablet even if it was optional (Still prefer tablet even if optional) a positive correlation  $P > 0.01$  was found with: System quality  $r(61) = .442$ ; Student guidance  $r(61) = .474$ , indicating the importance of the quality of the system and student support when trouble shooting in determining if students would continue using the tablet as a learning aid. A lower but significant correlation  $P > 0.05$  was found with: Overall utility of tablet  $r(61) = .311$ ; Tutor attitude  $r(61) = .271$ ; Student perspective  $r(61) = .317$ .

When asked if they would like to have the course fully online (Want course fully online), the quality of content (Content quality)  $r(61) = .365$ ,  $P > 0.01$  was found to have the greatest correlation also. A lower but significant correlation  $P > 0.05$  was found with: Tutor attitude  $r(61) = .293$ ; Student perspective  $r(61) = .251$ . This is quite telling for those developing the e-based programs specifically on the completeness of the notes, quality and breadth, innovative design and inclusion of multimedia in the content.

In regard to the perception as to whether tablets makes economic savings, correlation  $P > 0.01$  was most with: Tutor attitude  $r(61) = .369$ ;  $r(61) =$  System quality  $r(61) = .463$ ; Student guidance  $r(61) = .476$

Student perspective  $r(61) = .381$ ; Still prefer tablet even if optional  $r(61) = .646$ . A lower but significant correlation  $P > 0.05$  was found with: Overall utility of tablet  $r(61) = .318$ ; Content quality  $r(61) = .297$ . The highest correlation was found among the opinion towards utility of the tablet even if it was made optional implying that intrinsic valuing of the tablet was a key factor. However, quality of the system and support in learning to use or trouble shoot by the institution were also important.

In order for the students to use the tablet as the main form of notes (Tablet as main notes), it is found that a strong positive perception of tutor attitude to use of the e-content availed in the tablet (Tutor attitude)  $r(61) = .430$  and the quality of the content (Content quality)  $r(61) = .737$  play an important role. A lower but significant correlation  $P > 0.05$  was found with: Overall utility of tablet  $r(61) = .285$ , System quality  $r(61) = .293$ ; Want course fully online  $r(61) = .270$ . It emerges that administrators should pay special attention to the quality of the content and seek to ensure faculty embrace the e-content prior to its use in teaching. Multiple strategies can be employed to achieve both in the process of developing the e-content.

When the students were asked if they felt the content of the course available on the tablet was wide enough (Tablet content wide enough), the students showed positive correlation  $P > 0.01$  in their response to: Tutor attitude  $r(61) = .377$ ; System quality  $r(61) = .388$ ; Content quality  $r(61) = .758$ ; Tablet as main notes  $r(61) = .386$  where the quality of content showed the most significant correlation with their perception of the completeness of the content. A lower but significant correlation  $P > 0.05$  was found with: Student guidance  $r(61) = .281$ ; Student perspective  $r(61) = .308$ ; Want course fully online  $r(61) = .322$ ; Tablet saves costs  $r(61) = .280$ .

As for the perspective of multimedia used in the content (Multimedia usage), positive correlation  $P > 0.01$  was seen in their response to: Tutor attitude  $r(61) = .462$ ; System quality  $r(61) = .479$ ; Student perspective  $r(61) = .579$ ; Tablet saves costs  $r(61) = .384$  and Content quality  $r(61) = .608$  where the quality of the content was most correlated to the use of multimedia. Concurrently, it matches the student perspective of the utility of the tablet and perception of the system quality. All these elements should influence the design phase in making of e-content by faculty. A lower but significant correlation

$P > 0.05$  was found with: Student guidance  $r(61) = .305$ ; Still prefer tablet even if optional  $r(61) = .319$ ; Tablet content wide enough  $r(61) = .284$ .

## 5.4 TRANSACTIONAL DISTANCE

For purposes of this section, use of the term transactional distance refers to the effort or cost in a pedagogical perspective required for engagement between a student and his facilitator in the context of learning situation. Based on additional interpretation by Yeonjeong Park, there are four types of mobile learning generated (47) using a dual scale from individualized to socialized and from low to high transactional distance. The e-BSN program is evaluated on the three dimensions of structure, dialogue, and student autonomy to determine the type of m-learning as summarized in Table 3 based on these three elements of transactional distance modified from Moore (47,63).

Table 3: The three elements of transactional distance in e-learning modified from (Moore, 1993; Park, 2011)

	Structure	Dialogue	Student autonomy
<b>Unit of analysis</b>	Curriculum	Student teacher communication	Student roles
<b>Definition</b>	Degree of student centeredness	Flow of information to improve learning outcomes	Extent of self-directedness
<b>Focus</b>	Rigidity or flexibility of structure	Extent and type of communication	Range and type of autonomy
<b>Constructs</b>	Content, teaching and assessment	Type and extent of personalized communication	Setting goals and performance
<b>Range</b>	Rigidity to flexible structure	Deep, Free frequent informal to formal rare and impersonal	Fully autonomous to fixed
<b>Transaction distance</b>	Distance increases with increasing rigidity	Distance decreases with frequency, depth and freedom	Distance decreases with student centeredness

## 5.5 STRUCTURE

The students reported satisfaction with the blended design of the e-BSN curriculum as this allowed them to access their information via the tablet from anywhere and at any time. This was deduced from the following comments:

Y2 Interviewee 7: *"It is better compared to others considering you can do other things as you continue to learn and you can access what you want to learn wherever you are without you having to carry a whole bag with books walking them to work so nobody will know whatever you are doing so it is actually good"*

The e-BSN program is organized for delivery over 8 semesters which is equivalent to two and a half calendar years. Although the students have the option to stagger the semesters, the tradition by majority is to attempt to complete in the shortest time possible which implies taking the semesters in accordance with the regular calendar. Course units available for selection each semester are already predetermined. There are no choices to be made by the students. The spirit of the program was to provide a self-paced student centered approach to the upgrading by the nurses.

However, a number of limitations reduce flexibility and thus lead to a highly structured curriculum in relation to the proposed model by Moore. These limitations may be explained based on several factors. The target of the e-BSN program was enrolled nurses who were already working. The trainees have a limited amount of time that they can take away from work to attend such trainings. The calendar of training had to minimize the amount of time spent on the face to face program while achieving the greatest impact in preparing the trainees for the distance component of the course. The final program also needed to take the teaching calendar of the University of Nairobi into consideration. The calendar at University of Nairobi was initially on trimesters of 11 weeks transitioning into semesters of 16 weeks at the time the program was initiated.

By default, the rolling out of the program was therefore highly controlled since it was on a test basis. There have now been three cohorts that have graduated. It may be important to review the experience to document what lessons have been learnt, what needs to be improved and implement the recommendations as part of the continuous cycle of improvement.

## 5.6 DIALOGUE

Within the element of dialogue, the communication between the student and the lecturers is examined. The students indicate in their interview variable behavior among the lecturers. Communication between the lecturer and students is not standardized within the program. By design, the course anticipated regular interaction between the students and the lecturers but the feedback implies this has not been to the extent envisaged for a blended program. There are a few reasons to explain this observation as elaborated during interviews with some of the lecturers.

One key is that lack of sufficient understanding by lecturers on how to engage with students not physically present. The majority of the lecturers from University of Nairobi College of Health Sciences do not have experience of teaching students in a distance model. Although the faculty were involved in developing content and taken through theory guiding the development of content, there was not sufficient time given to re-orientation of the staff on practical aspects they were to encounter during the actual teaching and specifically on how to initiate and maintain dialogue with students once the face to face sessions were completed.

Since there was asynchrony of timing between the student and lecturer, the use of a distance component in this program will need the designers to explore some additional methods to overcome the effects of asynchrony on dialogue between students and their facilitators. The students were expected to be with clinical mentors during the distance sessions but clearly, the consultation with lecturers is important in the learning process. The interaction plays a bigger role than relaying information.

The school of nursing will need to develop an intervention that addresses this unmet need among the students while protecting the personal space of the lecturers. One approach is to partly schedule online discussions such as Skype calls in which synchronous communication with a large number of students will reduce the randomness of interaction. The use of Skype calls would also overcome the risks associated with individualized calls outside working hours that are largely resisted by lecturers as it interferes with their personal time. Some of the lecturers also said it was culturally challenging to maintain formality while taking phone call beyond working hours with students.

One surprising discovery was that although the students were expected to use the tablet as a tool to access the key learning materials for the course, the lecturers were still oriented to providing lectures with notes and evaluating the students largely based on their personal notes. This may be suggesting that the online content may be at variance with what the students are expected to read in preparation for evaluation at the end of the semester or quarter. Some of the lecturers did not explicitly refer to the online content. This may also have created the impression that the online content was additional material and not critical during the evaluation.

## 5.7 STUDENT AUTONOMY

Student autonomy looks as the freedom from the perspective of the student to set goals, to determine how to execute the program and how to evaluate that the goals have been achieved. Similar to other programs offered by the University of Nairobi, the design, the goals were established by the University of Nairobi, Nursing Council of Kenya. Additional information was provided by Amref Africa based on the experience gained during the upgrading of nurses from certificate to Diploma level.

During interviews with the students, it was disclosed that some felt aspects of the evaluation failed to take their experience and previous training into consideration. Some examples include aspects of nursing process and psychology. The students felt the scope and depth of content did not change when compared to the diploma training and thus should be removed from this program. This sentiment was raised as a weakness in the evaluation although it was mainly a challenge that informs a review of the goals of the training and selection of content.

The role of social media on the triage between students, content and teachers on the mobile devices is explored next.

## 5.8 CONCLUSION ON TYPE OF TRANSACTIONAL DISTANCE IN THE E-BSN PROGRAM

Based on the evaluation of findings and using the four types of transactional distance (Kukulska-Hulme's, 2005) in table 1, m-learning in the e-BSN program can be categorized as Low transactional distance socialized m-learning. The m-learning dialogue has less psychological and communication space with the instructor, there is loosely structured instruction and as for autonomy, learners work together in a group as they solve the given problem and try to achieve a common goal. Learner autonomy is mainly through engagement in social interaction, negotiation, and frequent communication during physical meetings and using social app. In the dimension of dialogue, the transactions are mainly Student-Student.

## 5.9 SOCIAL MEDIA

### 5.9.1 WhatsApp

The importance of student connectedness has been cited as an important element previously (105). It appears to be significant in bringing the students out in to a new space where they feel they are 'now in the subject'. This connects with the behavior in the social media platform like WhatsApp. The students shuttle themselves into the different groups, where they say they are able to share freely academic and non-academic information.

In the WhatsApp space, the students said they felt free to be themselves. They are able to determine rules of engagement and to a great extent these were very flexible to their needs. WhatsApp provides a liberal space for engagement. This space is where they felt free to be themselves.

Y1 Interviewee 5: *“There are situations where we communicate only among some of our classmates like for example some of us have another WhatsApp group when we have finished from these classes those of us in the city we are able to meet even during those other times to discuss so maybe that one we share even more than the one for the whole group”*

In this space, the students shared social events, jokes, comedies, news or even gossiped about any current matters as it came to their mind. They were able to comment about any matter they had experienced during the face to face. Formation of classroom communities has been evaluated. Creating communities of practice is integral in adult learning and happens in diverse ways during the learning sessions (106).

In the context of the e-BSN, the formation of these groups was inevitable going by the variable nature of tutor engagement:

Y1 Interviewee 4: *“I think it is the communication with the lecturers that is poor, it is not the gadget that has a problem,...”*

And

Y3 Interviewee 7: *“Yeah like he said you don’t have to wait for a lecturer to finish teaching, you go online and google and search on your own, there are times you have WhatsApp and other online means of communication, you can WhatsApp him and he can send me his answer. Maybe he can do a question and I can send me his answer and we can combine the answer by Friday”*

It has been found that the more personal and open students are with each other, the stronger the feeling of connectedness they achieve with its positive effects on performance in the course (102). The finding is in agreement with Thoms and Eryilmaz’s findings where students achieved higher levels of course learning, developed a stronger course community, interacted more and had higher overall levels of satisfaction using online social networks as compared to the formal Learning Management System software (106).

Table 4 illustrates the perceived use of social network groups in promoting sharing during learning.

Table 4: Use of social network groups in sharing during learning

Perceived to incentivize communication during learning	Perceived not to incentivize communication during learning
Social proximity	Formal communication
Personal contact	Mainly academic matters
Free to share social matters	Administrative matters
Having common social matters such as workplace, home, residence	

### 5.9.2 Interactions on WhatsApp

Evaluating the Student-Student transactions, it is clear that the social medium WhatsApp has totally transformed engagement among students. There were different levels of interaction within the student groups (Figure 23).

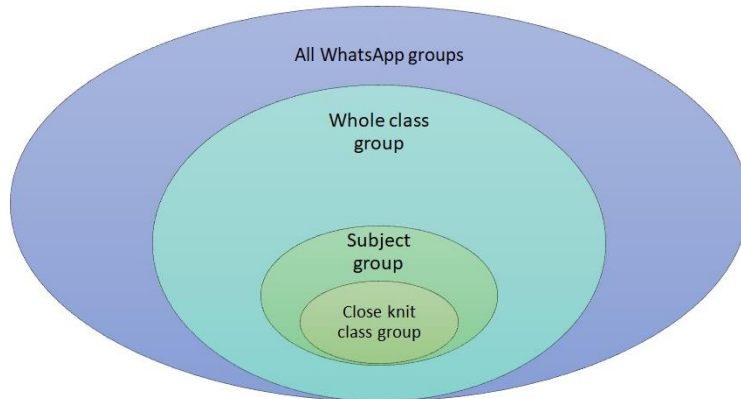


Figure 23: WhatsApp formation of groups in the e-BSN class at University of Nairobi

There are whole class groups on WhatsApp that served as a general platform to communicate information related to the program or subject of interest to all or aspects of social information such as weddings, deaths or graduations would be shared. In this group, lecturers were generally not included.

The other whole class groups were subject specific. In this whole class grouping, inclusion of the lecturer would be highly dependent on the personality of the lecturers. The class group is used to deal with matters related to the course during the time it is taught. The students use this platform to elaborate and build knowledge specific to the course but some digression was noted similar to that in the general group.

The students also mentioned creating smaller groupings based on closer linkages within the classes. Some of the groupings were based on shared or common factors such as geographical vicinity, having learnt or trained together in a previous course, going to the same church or shared social forums from elsewhere. Such groupings allowed much more flexibility on matters shared and had much larger social exchange. The engagements were deeper, more personalized and diverse. In this forum, the members shared more intimately and frequently. The grouping was also considered to more crucial than the larger forums by its members.

The members used the smaller group to coordinate physical meetings used to carry out discussions and revision for exams. The content of this group tended to cover all the material covered or shared in the other groups formed using WhatsApp by the class. In this grouping, no lecturer was involved. This also helps to give credence to the cultural barriers that may be important in determining transactions between students and lecturers observed in relation to the aspect of dialogue discussed earlier.

The last formation within the WhatsApp social platform was smaller and more transient, this was a group composed of a few individuals, mainly two members. The group was primarily to cover an assignment or shared project. The group would be dissolved immediately the assignment is completed. Again, the depth of communication is very focused on the task at hand. The members of the group may

not necessarily share membership within the other sub-groupings of the class. This type of group also does not include a lecturer.

Based on the forgoing discussion, it is clear that there are a variety of ways the students have engaged and a large part of the transactions between students is supported by the social media platform such as WhatsApp. Universities and their faculty may need to integrate the use of the mobile social platforms such as WhatsApp in developing goals of the training. They need to design materials taking into account how social platforms work. Students may help the lecturers to design the material so that it is more amenable to integration on the social platforms in the manner or style culturally feasible in their context by involving students during content development.

The students have clearly led in deploying the social platforms for increased student-to-student transactions. The use of social media has become a vital aspect of this communication. Faculty may be able to use this platform to their advantage, but research is needed to determine if the success of the platform was due to its being student-initiated. The University of Nairobi could explore ways to take advantage of the spontaneity in the use of social media as a method of engagement among students to innovate a mechanism to support its use for teaching learning and even evaluation.

## 5.10 CONCLUSION

In this chapter, the student perspective of the system quality and established where correlations exist between responses to the survey questions by the students in relation to the e-BSN program is discussed. Further the pedagogical distance (transactional distance) arising out of the nature of the program's organization and the way students have adapted and devised unique applications of social media to support their learning needs beyond the formal structures of the program are explored. In the next and final chapter, the key findings are highlighted and recommendations from the data obtained in this study are made.



## 6 CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

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### 6.1 CONCLUSION

The current study sought to understand the students' perspectives of how the intentional and formal integration of the use of mobile devices as learning aids has impacted on the teaching process, learning and interactions among students in the e-BSN program at the University of Nairobi. This study has attempted to gauge the extent of acceptance of the technology, perceptions of the content available online through mobile technology and what role students applied the innovation in the context of the e-BSN program. The key findings were related to utility of the mobile devices to access content in the blended learning context, utility of mobile content and use of social media.

The blended model used in the e-BSN program was very popular among the students. The initial face to face sessions are important for memory and contextualization of learning material. The students code information using human or social context during the class. They also establish a sense of connectedness with the teacher and the associated content as it is imaged while in the class. This initial process appears important later when the students use mobile devices to access content and share it using the mobile platform. The role of culture has had an influence on how students consult, beyond the classroom.

Overall, mobile devices were highly valued by the students. The students are engaged through the mobile devices. In relation to the system quality, support and transactional distance, blended design of the e-BSN program was considered the best approach by students. The quality of the system, its content and student support when learning to use and troubleshooting (Student guidance) are vital for an overall positive student experience. Previous experience with use of the tablet was surprisingly not consistent in its effects on the students' perspective of the utility of the tablet.

Evaluating correlations between subscales reveals that the most time spent on internet was likely to be via a mobile device. Students were more likely to use a mobile device even if it was not mandatory if their tutors projected positively about the technology, there was good technical support and if the content was well designed. The overall utility of the tablet and tutors attitude to use of mobile devices have a bearing on students' perceptions of quality of the tablet platform. Previous experience with use of the tablet was surprisingly not consistent in its effects on the students' perspective of the utility of the mobile device.

Quality of content and specifically on the completeness of the notes, quality and breadth, innovative design and inclusion of multimedia and attitude of tutors are important in the decision to learn fully online. This is important to remember when developing materials for the e-based programs.

Use of mobile devices was considered an economic saving if tutors were positive, the systems was of good quality and technical support was provided. Investing in good quality and comprehensive content would likely increase use of mobile devices as the main reference during learning. Use of multimedia significantly affects student perception of the quality of content

The quality of the content is highly related to: completeness of the notes, quality and breadth, innovative design and inclusion of multimedia are important. Further, intrinsic valuing of the mobile devices was a key factor.



Based on the findings and types of transactional distance in table 1 (Kukulska-Hulme, 2005), the m-learning in the e-BSN program is categorized as low transactional distance socialized m-learning. The e-BSN is characterized as having limited psychological and communication space with the instructor. Instruction is loosely structured and transactions are mainly Student-Student. The students work together in a group as they solve the given problem and try to achieve a common goal. Learner autonomy is mainly through engagement in social interaction, negotiation, and frequent communication during physical meetings and using social app.

A large part of the transactions between students is supported by the social media WhatsApp running on the tablet and other mobile devices to achieve a sense of connectedness. The importance of student connectedness has been cited as an important element in bringing the students into the subject space where they feel their learning is supported..

On the WhatsApp space, the students felt greater independence to determine their engagement. It has been found that the more personal and open students are with each other, the stronger the feeling of connectedness they achieve with its positive effects on performance in the course. The social issues shared on the tablet seem to help in the packaging of the academic information into memory. A strong aspect to the physical class is its ability to provide students with all the human variations needed to help in the recall of information. It is known that memory is enhanced when there is emotional arousal during the encoding process. This enrichment is associated with involvement in a physical class. On reflection, this illustration implies that critical knowledge needs to be accompanied by other coding which is person related or social in meaning.

Personal experience and social context have been identified as important enhancers of memory and later recall. The information the students most naturally take up is that knowledge which is contextualized in forms that use a familiar social or human situation.

This study has exposed an additional dimension that social media such as WhatsApp may enrich students' engagement with learning materials, between themselves and with those who facilitate learning. The challenge faced by program administrators may be explained by the inadequate preparation of faculty during their induction into the program.

## 6.2 RECOMMENDATIONS OF THE STUDY

Findings from the study have helped to assess the students' perspective of the effectiveness of the mobile devices as a learning aid. The students have devised their own solutions and developed multiple ways of using mobile devices and social media platform to support their learning. Student and faculty feedback on the use of the tablet have suggested there is need to improve faculty appreciation of the role the devices play in day-to-day communication between students and how faculty and administration could use it to improve student teacher engagement and management of the course.

The perceived attitude of the lecturer to the e-content available in the tablet affected the students' attitude to its utility. Administrators in the university should invest time and effort in getting faculty to embrace use of the e-content via the tablet during the adoption of e-learning components. Course leaders need to explore how they can embed social media within the design of trainings and have continuous system improvements taking feedback as critical information for continuous system improvement.

Further research needs to be conducted to document what the students perceive as the situations that enabled the most learning rich environment to be created. Faculty in the e-BSN program, like most faculty across the globe, are yet to devise models to take advantage of social media as a teaching and learning tool.

The majority of the lecturers from University of Nairobi College of Health Sciences need to increase their skills in supporting students in a distance model and specifically on how to initiate and maintain dialogue with students once the face to face sessions were completed by increasing their use of the platforms accessible on mobile devices.

Additional research should be done to map out the nature and determinants of multiple engagements from the perspective of transactional distance in this training to establish if there is a relationship with learning. Such findings will greatly help those involved in curriculum design to optimize the moments that contribute most to learning and thus make use of resources more efficient to achieve greater quality of training. The school of nursing at University of Nairobi provides one rich environment for such a study since it runs both a full time and a blended approach to the same training concurrently.

Aspects of the curriculum and the evaluation loaded on the tablet by the e-BSN program need to take their experience and previous training into consideration. Examples include aspects of nursing process and psychology where the scope and depth of content was similar to the diploma training. It emerges that administrators should pay special attention to the quality of the content and seek to ensure faculty embrace the e-content prior to its use in teaching. Based on the correlations in my data, it may be possible to optimize how the blended programs in nursing or other similar trainings is designed and delivered.

### 6.3 ASSUMPTIONS

Sufficient numbers of students and staff in the e-BSN program at the School of Nursing were willing to take part in the study.

The responses by each of the groups representing the different personnel in the program and the different classes are uniform throughout the population they represent, and therefore the findings are representative of those within their respective categories.

### 6.4 LIMITATIONS

This program is executed as a work-based training. The students have more than one person from whom they will be learning. This study has not interrogated the students in order to understand how the engagement during clinical preceptorship altered their view of knowledge and practice. It also has not explored how transactional distance impacted on relationships between lecturers and students during the distance learning sessions.

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## APPENDIX 1 FOCUS GROUP DISCUSSION GUIDE

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My name is Kefa Bosire. I am a student at the University of Stellenbosch in South Africa. As part of my training in Health Professional education, I would like to understand what it is like to be a student undertaking the Bachelor of Science Nursing degree in the way it is organized between Amref and the School of Nursing of the University of Nairobi. This study has been approved by the ethical committees of the Stellenbosch University and University of Nairobi Ethics and research committee.

Please feel free to comment in any way that you would like. Your opinion is what matters. Everything you say will be kept confidential. No identities will be used in the report. However, I will record the meeting so as to ensure I am able to get a true reflection of what was said when typing out the report.

Let us take time to know each other's names and where we are working. You may like to say what you also do. Thank you.

To help us cover the discussion I would like to suggest we go as follows;

1. How satisfied do you feel with the way you are learning in the e-BSN program?
2. Could you please share your thoughts about the use of the tablet to support your learning?
3. Please comment about your learning experience during the face to face sessions compared to when you are using the tablet away from the school
4. Please comment in your opinion about the contribution the tablet has made to the interaction you have with instructors in the periods beyond the face to face sessions
5. What is it that you liked most about the use of the tablet in the program?
6. What is it that you would suggest be improved about the use the tablet?
7. Is there any other matter you would like us to note that has not been captured?

Thank you for your participation. This information you have provided will be used to improve this program and inform others that would like to try it.

## APPENDIX 2 CONSENT FORM



UNIVERSITEIT • STELLENBOSCH • UNIVERSITY  
jou kennisvenoot • your knowledge partner

### STELLENBOSCH UNIVERSITY

#### CONSENT TO PARTICIPATE IN RESEARCH

Tablets as a mobile learning device in the e-Bachelor of Nursing Sciences program at University of Nairobi

Student questionnaire

You are asked to participate in a research study conducted by Kefa Ogonyo Bosire (B. Pharm, M. Pharm, PhD) from the Centre for Health Professions Education at Stellenbosch University. The results of this research will contribute to a dissertation and a research publication. You were selected as a possible participant in this study because of your experience in the e-Bachelor of Nursing program at the School of Nursing University of Nairobi.

#### PURPOSE OF THE STUDY

To determine the e-BSN students' perspective of the utility of tablets as student support intervention at the University of Nairobi.

#### PROCEDURES

If you volunteer to participate in this study:

You will be provided with a brief description of what the study is about and what information we would like to collect from you.

You will be asked if you are still interested in taking part in the study and provided with a form where you will sign to indicate you agree to continue participating in this study.

You will be given a questionnaire or be asked to respond to questions as a way of helping you provide us with the information needed for this research.

At the end after answering the questions, you will be given a chance to ask about any matter or get clarification on any item that you wish to understand from the questions you have been asked.

You will then be free to leave if you are satisfied and feel comfortable with all that has been covered in the interview.

In this study, you may either answer a questionnaire as an individual or answer questions as part of a focus group.

The questionnaire should take about 5 minutes to complete.

If you are part of a focus group, the discussion guided by the questions will take about 45 minutes.

You will only need to participate once during this study.

The venue for the answering the questions will in a building used for learning during the face to face sessions.

#### POTENTIAL RISKS AND DISCOMFORTS

During the time you will be participating in this study, you may be asked questions based on your opinion or perceptions related to the use of tablets to support learning. We anticipate this will not in any way interfere or expose you to any undue harm. However, in case this happens, you can always withdraw from the study without any negative consequences.

#### POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Although there may not be any direct material benefit to you by participating in this study, the results will benefit many others where the report from this study will be applied to improve such programs

#### PAYMENT FOR PARTICIPATION

You will not receive any payment for your participation in this study.

## CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of protected access to the office where interview documents will be kept. The computers used are password protected and all recordings will be copied into a written form and the original recording destroyed. No number or name will be used during the making of records for this study. All publications made from the information provided will be done in an anonymous way.

## PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so if further participation appears to affect your safety.

## IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact **Principal Investigator:** *Dr. Kefa Ogonyo Bosire, +254713542111, kogonyo@yahoo.com*

**Supervisors:** Dr. Rose Richards, Email: [rr2@sun.ac.za](mailto:rr2@sun.ac.za) University of Stellenbosch, Capetown

Mr JJ van As, Email: [janus@sun.ac.za](mailto:janus@sun.ac.za) University of Stellenbosch, Capetown

**Ethics Committee (Kenya):** Prof. A. N. Guantai Tel: [+254 722636427](tel:+254722636427), University of Nairobi – Kenyatta National Hospital Ethics and Research Committee

## RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [[mfouche@sun.ac.za](mailto:mfouche@sun.ac.za); 021 808 4622] at the Division for Research Development.

**SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE**

The information above was conveyed to me by the researcher in English and I am in command of this language. I was given the opportunity to ask questions and these questions were answered to my satisfaction. I hereby consent voluntarily to participate in this study. I have been given a copy of this form.

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Name of Subject/Participant

---

Name of Legal Representative (if applicable)

---

Signature of Subject/Participant or Legal Representative

---

Date

**SIGNATURE OF INVESTIGATOR**

I declare that I explained the information given in this document to the subject/participant. He/she was encouraged and given ample time to ask me any questions. This conversation was conducted in English and no translator was used.

---

Signature of Investigator

---

Date

## APPENDIX 3 STUDENT QUESTIONNAIRE

B.1. Demographic questions		
	Please enter your age.	
	Please enter your sex.	
	Please enter the amount of time you spend on the computer or Internet per day.	
	Please enter the amount of time you spend on the computer or Internet for educational purposes per day.	
	Please enter the amount of time you spend using the tablet per day.	

In this section of the questionnaire a five point Likert-type scale item is used. For each question please indicate your rating where 1 indicates strong agreement and 5 indicates strong disagreement with the statement.

1 = Strongly agree

3 = Neither agree nor disagree

4 = Somewhat disagree

2 = Somewhat agree

5 = Strongly disagree

B.2. Overall		
	The tablet helps me to follow what I am learning much better.	
	Overall, I find the tablet very useful in my learning.	
B.3. Student's perspective		
	I have previous experience with use of a tablet for learning.	
	I can better manage my "study time" and complete assignments by using the tablet.	
	The tablet makes communication easier with instructors for me.	
	The tablet makes communication easier with other class mates for me.	
	I find the tablet is a very efficient tool for learning.	
	The tablet has replaced my need for face to face learning sessions	
B.4. Instructor attitudes		
	The instructor communicate more with students since the tablet was introduced for learning	
	The instructor responds promptly to questions and concerns via the tablet.	
	Accessing the internet using the tablet is conducive and enjoyable during my learning.	
	The instructor encourages us to interact with other students by using the internet.	
B.5. System quality		
	The navigations on the tablet are easy to use for e-learning.	
	The tablet has increased my interaction with students by chat, forums, discussions, etc.	
	My experience while using the tablet has been free of any error messages	
	When I encounter an error it is quickly solved.	
	I can find required information easily on the tablet.	
	The tablet is a good tool for revising notes.	
	The help option is very easy to use.	
	The content is accessible 7 days 24 h on the tablet.	
	Fonts (style, color, and saturation) are easy to read in both on-screen and in CD versions.	
B.6. Information content quality		

	Lecture notes on the tablet are my main learning materials.	
	The content covered in the course is wide enough.	
	I find the multimedia tools (flash animations, simulations, videos, audios, etc.) very useful	
B.7. Service quality		
	The guidance I have received from University/Amref on how to use the tablet was good enough.	
B.8. Supportive issues		
	If the use of the tablet was optional, I would still prefer to use the tablet as a supportive tool as it helps my performance in the module.	
	I would prefer to take this module totally online from home without having to come to the face to face lectures.	
	The tablet helps me to cut-down my expenditure such as paper cost, communication cost (i.e., phone), transportation cost, etc.	

## APPENDIX 4 CORRELATIONS (SPEARMAN'S)

Table 5: Summary of the correlation significance beyond  $P > 0.01$  between subscales used to establish student perception of the utility of the tablet provided as a learning aid in the e-BSN program at the University of Nairobi.

		Correlation Coefficient	Sig. (2-tailed)			Correlation Coefficient	Sig. (2-tailed)
Time on computer or internet	Time on tablet	.597**	0	Tablet saves costs	Tutor attitude	.369**	0.003
Tutor attitude	Overall utility of tablet	.419**	0.001		System quality	.463**	0
System quality	Overall utility of tablet	.583**	0		Student guidance	.476**	0
	Tutor attitude	.570**	0		Student perspective	.381**	0.002
Content quality	Overall utility of tablet	.370**	0.003		Still prefer tablet even if optional	.646**	0
	Tutor attitude	.601**	0	Tablet as main notes	Tutor attitude	.430**	0
	System quality	.546**	0		Content quality	.737**	0
Student guidance	Tutor attitude	.397**	0.001	Tablet content wide enough	Tutor attitude	.377**	0.002
	System quality	.587**	0		System quality	.388**	0.002
Student perspective	Overall utility of tablet	.608**	0		Content quality	.758**	0
	Tutor attitude	.550**	0		Tablet as main notes	.386**	0.002
	System quality	.592**	0	Multimedia usage	Tutor attitude	.462**	0
	Content quality	.518**	0		System quality	.479**	0
	Student guidance	.441**	0		Content quality	.608**	0
Still prefer tablet even if optional	System quality	.442**	0		Student perspective	.579**	0
	Student guidance	.474**	0		Tablet saves costs	.384**	0.002
Want course fully online	Content quality	.365**	0.004				



Table 6: Summary of the correlation significance beyond  $P > 0.05$  between subscales used to establish student perception of the utility of the tablet provided as a learning aid in the e-BSN program at the University of Nairobi.

		Correlation Coefficient	Sig. (2-tailed)			Correlation Coefficient	Sig. (2-tailed)
Student guidance	Overall utility of tablet	.311*	0.014	Tablet content wide enough	Student guidance	.281*	0.027
Still prefer tablet even if optional	Overall utility of tablet	.311*	0.014		Student perspective	.308*	0.015
	Tutor attitude	.271*	0.033		Want course fully online	.322*	0.011
	Student perspective	.317*	0.012		Tablet saves costs	.280*	0.027
Want course fully online	Tutor attitude	.293*	0.021	Multimedia usage	Student guidance	.305*	0.016
	Student perspective	.251*	0.049		Still prefer tablet even if optional	.319*	0.011
Tablet saves costs	Overall utility of tablet	.318*	0.012		Tablet content wide enough	.284*	0.025
	Content quality	.297*	0.019				
Tablet as main notes	Overall utility of tablet	.285*	0.025				
	System quality	.293*	0.021				
	Want course fully online	.270*	0.034				