



**UNIVERSITY OF NAIROBI
SCHOOL OF COMPUTING AND INFORMATICS (SCI)**

**M-LEARNING SUPPORT SERVICES FOR CORPORATE LEARNING
CASE FOR A KENYAN CORPORATE INSTITUTION**

BY

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ABSTRACT

The purpose of this research study was to reduce attrition rate on e-learning by introducing learner support service through M-learning application for corporate learners in a corporate institution in Kenya and also evaluating the effectiveness of the learner support services on retention rate. In order to fulfill this purpose, a prototype was developed with online learning, mobile learning and administrative learner support modules. The members of the institution were able to Enroll for courses, take courses online/offline, download courses, take quizzes at the end of the course, receive communication from administration on reminders and notifications and they were also able to participate in discussion forums. After that an evaluation took place. Responses on student support services were investigated through a mixed method approach that uses both qualitative and quantitative data collection and analysis methods. Data collection took place in three distinct phases. In the first phase, there was investigation to check time the learners spent in the office, availability of portable devices, usage frequency, internet connectivity, willingness to use mobile application for M-learning, was done through entry questionnaires, as well as investigation of organizational e-learning setup through interviews with the administrators. In the second phase, a questionnaire was administered to two groups of learners, the experimental group and the control group in order to collect data about demographic information on information dissemination on devices, learner aspect and application usability, interaction aspect, content delivery, interaction and competency aspect in M-learning in comparison to the existing E-learning management system. Out of 70 questionnaires which were distributed to randomly selected learners on M-learning and E-learning, 60 usable questionnaires were returned. In the third phase, follow-up interviews were performed with administrators to gain an in-depth understanding of participants' M-learning support services experience and to triangulate questionnaire data. The results of this study revealed that the more learners were able to enroll for more courses, and take quizzes within deadlines, lower number of no dropouts were recorded on M-learning; this was stimulated by learner support services that were built into the mobile application for M-learning, Notification and reminders that were system triggered or sent by the administrators to the learners. It would appear that the large gap of missing learner support services on the current Learner management system has been filled up by M- learning support services. Summarily, M-learning has contributed to learner retention and effectively improved learner performance, this is by learners getting more time to study, take up more courses and participation in discussion forums, making the organization keep more skilled staff and gain a competitive edge.

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DEDICATION

This thesis is dedicated to my mother who taught me that even the largest task can be accomplished if it is done one step at a time

DECLARATION

The material presented in this research project is the original work of the candidate except as acknowledged in text. It has not been previously submitted, either in part or whole, for a degree at this or any other University.

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This research has been submitted for examinations with my approval as a university supervisor.

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ABBREVIATIONS

SMS: Short Messaging Service

PDA – Personal Digital Assistant

ODL: Open and Distance Learning.

WWW: World Wide Web

LMS: Learner Management System

SMS: Short Messaging Service

DLICC –Framework for device, learners ability, interaction content delivery and competency development

GLOSSARY OF KEY TERMS

E-learning: is defined as the provision of education or training electronically, online.

M-Learning: According to Leonardo da Vinci (1994) Mobile learning as the provision of education and training on personal digital assistants (PDAs), smart phones and mobile phones, thus eliminating wired computers and laptops from the field.

Learner support services: These are parts of a distance or electronic learning system which are additional to the provision of course content. Keegan, D (2002).

CHAPTER 1 INTRODUCTION

1.1. Research Background

Thing's research department observes that in today's new economy, corporations are beginning to view training as an investment. The knowledge and skills of the corporation's employees are now being held on equal basis with the corporation's monetary assets. Knowledge is now seen as a commodity. As a result of this shift, annual spending on formal training has increased within corporations. With this increase in funding has come an increase in the demand to show accountability for these outlays and to demonstrate that these training initiatives bring tangible benefits to the corporation.

Following the demand to account for this training corporate training has moved from brick and mortar class session and now educational programs are developed using Information and Communication Technologies (ICTs) and delivered to learners through a variety of technical platforms, this comprises of e-learning and M-Learning.

Mobile technologies has made it possible to provide learning opportunities to learners that are either without infrastructure for access or business professionals who are continually on the move or too busy during business hours. Brown (2003). M-learning is a natural extension of e-learning and has the potential of making learning more widely accessible. With pressure emerging in escalating competition in a globalized market, rapid shifts in technology, most organizations have adopted the use of mobile phones and other mobile electronic devices as business tools.

1.2. Problem statement

The advent of e-learning was hailed as a marvelous opportunity for employees to access learning in ways that were previously not possible. However, in many organizations the concept of e-learning was quickly seized upon by management as primarily a cheaper way of training staff. No longer would they need to send them away on expensive courses and have them stay in expensive hotels; it could be done very cheaply and easily with the employees sitting at their desk – and doing their job at the same time.

The organization then set grand targets that all staff must achieve their online training every quarter, and the training managers were given a target of having staff achieve their online training. The result? Well, at worst, the employees didn't know the online courses were available, so didn't access them. At best, where employees did locate them, they found themselves starting the course and "dropped out", resulting in poor completion rates (Keegan, D (2003). The busy guys are busy working out of office; they are unable to access the e-learning course out of office; yet keeping up to date with the schedule for studying online courses at work is important. Online courses contributes to staff career growth as well as attainment of organization strategic objectives such as a skilled work force through continuing education, reduction of costs due to using e-learning instead of face to face learning and of course flexibility of learning for busy individuals who work in and out of office.

The e-learner attrition rate was increasing as e-learning system focuses on course content delivery and lacks learner support services like reminders, course registrations, update on courses offered online, schedules and expected target completion dates. The consequence of the above problems resulted to human resource department having incomplete records for training reports and managing human resource, the staff failing to meet their objectives as defined in the score cards and the organization failing to meet it strategic objectives. This is in spite of having with them powerful devices such as smart phones, iPads, touch tablets etc everywhere they go, which can carry details of their schedules and progress on various course units, reminders of assignments due among other services.

1.3. Objectives

The overall reason for carrying out the research is to use M-learning and apply learner support services to address the problems of e-learning in a Kenyan corporate institution. This involved the following specific objectives:

- To investigate learner support services and M-Learning.
- To develop a mobile application that interacts with the e-learning content management system to provide learner support service that will:-
 - *Allow for course registration*
 - *Remind the learners of their course schedules*
 - *Show course progress on enrolled course*
 - *Provide minimal access (snap shot) to the e-learning courses for quick revision and take quizzes online*

- *Give feedback results to the learner and update human resource records on e-learners studying progress and performance.*
- Assess effectiveness of learner support services to e-learning.

In general, to use the developed application to provide learner support services through the mobile application connected to a corporate e-learning system and assess its effectiveness to corporate e-learning.

1.4. Research Questions

- Will M-learning support services assist human resource department have learner's complete courses within stipulated time?
- Will M-learning avail the content to the learners outside the organization?
- Will M-learning application improve learners course and quiz take up?

1.5. Problem Justification

The development and adoption rate of mobile technologies are rapidly increasing on a global scale and M-learning (mobile learning) is consequently emerging concept that these organizations may adopt for staff learning.

This solution has enabled the organization to:-

1. Have training course information available outside the confines of the organization intranet.
2. Training departments can now track staff performance on training and continuously send reminders to staff on the go, to take the courses and quizzes.
3. The training department has been able to work within its budget constraints. Alex Rex (1978) says that M-learning saves time without decaying learning benefits; that it minimizes travel costs; he goes on to that it minimizes time away from work; (Cantwell, Steve 1993) goes on to say that it is more cost effective; Chabrow, Eric R. (1995) adds that it can meet the needs of a geographically disperse employees.
4. This has addressed e-learner drop out which was experienced at organization.
5. The organization will meet its strategic objective by having skilled and talented personnel and at the same time have a competitive advantage over its competitors.

1.6. Research Assumptions

1. It was assumed that courses are developed for use on PCs (including notebooks) and that nearly all course parts should be accessible from mobile devices.
2. It was also assumed that most frequent operating systems for mobile devices are Symbian OS, MS-Windows mobile and Android. Each of these three different major operation systems co-exists in several similar versions in the set of devices in current use.

1.7. Scope of the study

This study was carried out at a corporate organization in Kenya.

The application performed the following functions:-

- Allowed the learner to access course content from learner management system via a mobile device.
- The administrator was able to carry out the following rudimentary administrative tasks from Learner management system:-
 - ✓ Added new users to new courseware
 - ✓ Sent out reminders for course registration and deadlines
 - ✓ Checked students' progress
 - ✓ Responded to learners queries
- Allowed the learner to enroll for and access minimal courses materials from their mobile device
- Allowed administrator and learners and learners and other learners to interact

The application was not going to perform the following functions:-

- Creation of the Learner management system
- Creation of content on learner management system and on m-learning
- update courses onto the Learner management system

CHAPTER 2 LITERATURE REVIEW

In this section, a description E-learning, M-learning and learner support services is done. A review of challenges facing e-learning, in-depth description of learner support services and their roles is also discussed.

2.1. Introduction

The widening penetration of mobile services overtaking landline connections, increasing levels of band width, flooding of enriched handsets, decreasing user charges, and a growing tech-savvy learner population have a pushing effect on educational institutions to exploit the potential of the mobile technology for teaching-learning purposes besides being used as an effective communication means.

Mobile based learning, also called M-Learning, has been constantly evolving with added features, in spite of its shortcomings in terms of small screen size, short battery life and uneven network access. The cascading of traditional learning to e-learning and then to M-learning has a correspondence to the 'societal evolution' as suggested by Keegan (2002).

Learning delivered or supported solely or mainly by handheld and mobile technologies such as personal digital assistants (PDAs) and smart phones (Traxler 2007, Okunbor and Guy, 2007) has been picking up very quickly due to the access at 'any time, any place'. M-learning uses a collection of tools – Short Messaging Service (SMS), learning from audio (iPods, MP3 player, Podcasting), Java-based quizzes, collection of pictures and video (using camera phone) – which could be used by the tutors and instructional designers.

2.2. E-Learning

The wondrous developments of technology during the Industrial Revolution brought about, for the first time in history, the possibility of distance education. These developments writes the German scholar Peters (1973) were particularly important in transport and communication.

The first distance educators

- Separated the teacher and the learner.
- Separated the learner from the learning group.
- Used a form of communication mediated by technology.

And still claimed that the essence of the education process was maintained intact.

According to Keegan, D (2002) these systems attempted to replace interpersonal communication, and the intersubjectivity between the teacher and the taught, which is the essence of the educational transaction, by an apersonal form of communication mediated by technology.

E-learning is electronic learning. It means the provision of education and training electronically, on the Internet and the world wide web. Keegan, D (2002). It is the use of technology to enable people to learn anytime and anywhere. E-Learning can include training, the delivery of just-in-time information and guidance from experts.

Today e-learning has been widely adopted for academic learning and to a greater extent by the corporate world for internal training and continuous skills development. Søren Nipper (2005) identifies two trends in e-learning which he calls the Instructional Design in which the focus is on the materials and the Collaborative Learning in which the emphasis is on interpersonal interaction with tutors and fellow learners. Nipper goes ahead to discuss that most organizations that have implemented e-learning have only adopted the Instructional Design, where Learner management system delivers the content only without learner support services, this is the typical case with most Kenyan organizations that have implemented e-learning system. We therefore look at the challenges facing e-learning with regard to learner support services.

2.3. Challenges faced in E-learning learner support services

E-learning opportunities in organizations have skyrocketed in popularity. Every year, more corporations are starting e-learning programs .Much of this increase is due to the demands of the learner audience who are intrigued by electronic learning, mostly because they face a number of obstacles that make conventional, brick-and-mortar options unviable:

Indeed, intensity and frequency of learning problems usually multiply when the learning takes place at a distance in isolation from the instructor and other students (Galusha, 1997). Nonetheless, there is some evidence to suggest that among problems distance or e-learners encounter, some are within the power of the organization to remove through different support services (Morgan & Tam, 1999; Paul,1988). This further suggests that identifying support services that can assist learners to overcome these problems requires an investigation of these problems in the first place.

Moore (2003) proposed a framework to classify learner support problems presented in e-learning settings. Accordingly, there are three kinds of learner support problems.

- First are the *learner generated problems*, usually stemming from the:
 - Adult lifestyle, which prevent learners from behaving according to the expectations or requirements of the e-learning course offering.

- Inability to complete an course work and assesments by the due date as a result of employment duties, this includes people who work shifts, travel frequently on business and/or work long hour, family crises, or illnesses is the most common cases encountered by e-learners.
- Second are *institution generated problems*, usually arising from malfunctions in the administrative system such as:
 - Failure in delivering course materials on time
 - Conveniently scheduled programs offer limited course options
 - Untimely notification of test results.
- Third are emotional problems, which are difficult to identify because learners usually present these problems as external ones. A learner may not explain, or even recognize, “his or her insecurity in the learner role, defensiveness against the kinds of personal change that usually accompanies the learning, need for reassurance, and need for dependence on authority”. While these emotions are comparatively easy to identify and overcome in a face-to-face classroom environment, it is difficult to identify them in e-learning settings, and they present great difficulty for learners in sustaining motivation in the isolation of the distance environment.

Potter (1997) suggested that issues and barriers encountered by e-learners can be explained by various factors. He classified these factors under three main categories: personal, pedagogical (learning), and institutional factors.

- Personal factors are those concerning the individual’s psychological and physical environment. The learner’s self-esteem, motivation, belief about the value of education, prior educational experience, family commitments, and work requirements are some of the factors that fall into this category.
- Pedagogical factors are those that are related to teaching and learning elements such as course content, instructor(s), and other learner(s). Factors that fall into this category are the learner’s conception of knowledge, his/her orientation and interest in learning, the structure of the course, the practical value of the course, and the availability of the learning resources, academic assistance, interaction, and feedback.
- Institutional factors are those that directly involve the institution or organization. Included in this category are availability, quality, suitability, and timeliness of information about admission, registration, and other administrative components, and the way the institution communicates this information through orientation programs and counseling and advising of various kinds. Potter argues that either one simple factor or a complex interplay of various factors can be the source of an issue encountered by distance learners.

In a study of barriers to student persistence in distance education, Morgan and Tam (1999) found that e-learners take numerous factors into consideration before they decide whether to persist in an online course or program. They reported four types of factors: situational, institutional, dispositional, and epistemological factors.

- Situational factors are those arising from a learner's particular life circumstances, such as change in employment situation or marital status.
- Institutional factors are difficulties that learners experience with the institution, such as limited support services, insufficient or delayed feedback, or inflexible course structures.
- Dispositional factors are personal problems affecting the learner's persistence behavior, such as their motivation, confidence, and learning styles.
- Epistemological factors are obstacles caused by disciplinary content, such as the lack of prerequisite knowledge and of personal interest about the content.

Many distance educators recognize that without adequate support, e-learners who run into these issues are most prone to delay completion of their studies or to completely drop out of the program (Moore, 2003; Rowntree, 1992), typically range from 20 to 50 percent (Brawer, 1996; Carr, 2000; Eric, 1984; Kerka, 1995; Parker, 1999). The challenge for e-learning providers therefore, is not so much how to register learners for online courses, but how to retain them once they have begun. Ludwig-Hardman (2003). A learner support system that continuously evaluates the needs of the learners in relation to these factors should be in place to identify and overcome problems before and after learners face them (Tait, 1995). Therefore, In this study learner support services offered through mobile learning will be looked at as critical component for an effective retention and re-enrolment program.

2.4. Definition of Learner support services

Learner support in distance education is a fairly broad concept, and there are wide variations in how people and institutions conceptualize and define it (Robinson, 1995; Rumble, 2000; Sewart, 1993). The terms "guidance," "counseling," "advising," "support services," "student support," and "learner support" have all been used interchangeably throughout distance education literature to indicate a variety of activities, strategies, and administrative systems that are designed to support and facilitate the learning process Simpson, (2002). Because of such variation in terms and definitions, it will be helpful to begin with an examination of how learner support has been conceptualized in the distance education literature in order to provide a focus and a conceptual framework for the current study.

Tait (2000) defined learner support as the range of services both for individuals and learners in groups which complement the [mass-produced] course materials or learning resources that are uniform for all learners, and which are often perceived as the major offerings of institutions using ODL [Open and Distance Learning].

He regarded learner support as a subsystem, distinguishing it from the most well known element in distance education, which is the mass-production of instructional materials. The rationale for such a distinction, according to Tait (1995), is that the focus of the learner support is on individual learning of the student whether alone or in groups, whereas the focus of the mass-produced materials is on the mass of learners.

Mills (2003) defined learner support as “the totality of the provision by an institution to support the learner, other than generic teaching materials produced by instructional designers/course producers”. This definition also treats course material production and learner support as two distinct subsystems. Again, the underlying assumption for such a distinction is that learner support is designed to help an individual learn from the mass-produced teaching material, whereas learning materials are produced uniformly for the mass of learners. Mills made a distinction between individualized and generic learner support. Catalogs such as “Frequently Asked Questions” and “Learner Guide” are examples of generic material-based learner support, while one-on-one tutorial support (or feedback) is an example of individualized learner support.

Simpson (2002), like Tait and Mills, provided a system definition, describing learner support as all activities extending beyond the production and delivery of course materials that assist learners in their studies. Simpson classified learner support into two main modes: academic (or tutorial) and nonacademic (or counseling) support. Academic support provides learners with cognitive and meta-cognitive tools and resources needed for improving their performance in relation to the stated course objectives. Tutoring and feedback are two major academic support services provided in most distance education systems. Nonacademic support addresses the affective and organizational development of learners and assists them with their administrative needs such as registration and fee payment. Learner orientation, personal counseling, and technical support are some common nonacademic support services available in most distance education systems.

Moore (2003) suggested that learner support constitutes one of the four subsystems in distance education. Design, production, and delivery of instructional materials constitute one subsystem. The process of instruction constitutes another subsystem where instructors interact with individual learners to help them transform the mass-produced materials into personal knowledge. Activities under these two sets of subsystems are managed by an administrative subsystem. According to Moore, these three subsystems are not enough to make a distance education system run perfectly at all times for all learners. Therefore, a fourth subsystem, the learner support subsystem, is necessary as a “back-up safety net” for the individual learner who encounters unexpected and/or idiosyncratic difficulties that cannot be anticipated by course designers, instructors and administrators all the time.

Thorpe (2003) observed that with the advent of online technologies and computer-based programs, ODL institutions are integrating more and more online learning practices into their programs, and the distinction between learner support and course production is slowly blurring. Therefore, she recognizes the need for redefining the learner support in such a way that we can conceptualize it with less focus on system implications and more on identifying the functional essence of what distinguishes it from other elements of distance education. Therefore, instead of a systemic approach, she takes a functional approach and defines learner support as “all those elements [of distance education] capable of responding to a known learner or group of learners, before, during, and after the learning process”. With this definition, Thorpe recognized that the key function of the learner support is its responsiveness to a known learner or group of learners.

Robinson (1995) defined learner support in terms of its components. He observed that learner support has three important components: “The *elements* that constitute the system; *configuration* of these elements; and the *interaction* between these elements and the learners, which creates its dynamics”. Feedback, tutoring, assessment, personal contact between learners and support agents, peer contact, study centers, library resources, and materials (student handbooks etc.) developed to guide learners throughout their studies are the most-known elements of learner support. According to Robinson, learner support systems vary among distance education providers based on how these elements are configured as well as the level, intensity, and function of the interaction.

Reid (1995) suggested that there are two distinctive approaches to learner support in distance education: compensatory support services and complementary support services. The former approach views learner support as an add-on to instructional materials and other learning experiences, while the latter views it as an integral component of the entire teaching/learning process. Compensatory support services are reactive in nature, activated when there is a learner support problem presented in the system. Complementary support services are more robust, flexible, and learner-centered in the sense that these services are available all the time for all learners and their use is determined by the individual learner based on his/her academic, emotional, and/or situational needs.

Keegan, D (2002) defines the term ‘learner support services’ as those parts of a distance or electronic learning system which are additional to the provision of course content. He further says that Learner support comprises all the assistance provided by a distance education or an e-learning system which matches the facilities which a face-to-face system provides for the success of its learners, and that Learning support lists the assistance provided by the institution in the actual process of learning to ensure that the learning tasks are performed successfully.

It is a fact that the success of distance education depends largely on learner support services provided to its learners who encounter feeling of isolation, lack of peer-peer interaction, lack of proper intimation from training centre, lack of proper academic support and hurdle of distance from the study centre to list a few (Fozdar, Kumar and Kannan 2006).

In summary, from the above literature and at the broadest level, the terms “learner support” and “student support” are used in distance education or online learning literature to include a variety of activities, strategies, and administrative systems to support individual learner before, during, and after the learning process. This research takes this broad view of learner support and considers that support services should be complementary rather than compensatory

2.5. Role of Learner support services in e-learning

The importance of learner support in e-learning has been discussed from various points of view.

- The mostly cited benefit of learner support is its *positive effect on the issue of learner retention* (Paul, 1988; Simpson, 2002). While it has been well established that learner retention in distance education is a multivariate issue involving various interrelated factors and variables (Garland, 1993; Morgan & Tam, 1999), there is some evidence to suggest that learner support can play a significant role in assisting learners to persist (Potter, 1998). Mills (2003) argued that “a greater emphasis on more focused learner support could have the more lasting impact on retention rates if approached in a holistic manner and integrated fully into the learning process”.
- The value of learner support has also been discussed in relation to the trend towards a more *consumer-oriented approach to education*, where education is considered as a commodity to be consumed and learners as customers of services (teaching and learning services) and products (course materials) (Lentell, 2003; Rumble, 2000; Tait, 2003). With the proliferation of for-profit distance education providers, learners, as customers, now have more choices from which to choose. In order to become a competitor in such a competitive education marketplace, institutions have to meet the needs and expectations of learners so that they can attract more learners (Tait, 1995; Rumble).
- Support services have a central role in *meeting the unique and changing needs of the learners* and, therefore, might add a competitive edge to distance institutions when implemented effectively (Mills, 2003). In fact, it’s the quality of learner support services “which provides the competitive edge as more and more learning materials become available from a wide range of providers”.
- *Marketing*, another aspect of the consumer oriented approach to education—can also be promoted by learner support. Mills (2003) suggested that feedback from customers is one of the major driving forces in marketing, and also that collecting valuable feedback from customers requires a medium that encourages customers to interact with the company. He argued that in distance education settings, support services can serve for that purpose. The increased interaction between support personnel and learners through a well-designed learner support system can produce valuable feedback from learners about the program or, more specifically, about the

course. Such feedback can be used by course designers or administrative personnel so as to improve the quality of the courses or administrative processes, which in turn might have a positive impact on recruitment. In fact, based on his personal experience, Mills argued that this is already happening in British Open University.

- Another valuable aspect of learner support is that it can *contribute to the realization of the very basic premise of distance education*, which is widening access and learning opportunities for those who were never able to participate in formal education due to improvised socioeconomic backgrounds, poverty, distant geographical settings, family/work commitments, and disabilities of different kinds (Mills, 2003). The challenge that comes with the widening of access is that an increasing number of less-experienced, less-motivated, and more socially and economically disadvantaged learners will be participating in e-learning programs (Sewart, 1993; Mills). Educators and practitioners suggest that learner support has a major role to play here, as these are learner groups who need more individual support to cope with the difficulty of returning back to formal education with possibly less motivation and less educational experience

(Kenworth, 2003; Mills, 2003; Potter, 1998; Sewart, 1993). While learner support affords economic and social advantages for e-learning institutions, viewing learner support only in terms of its economic and social benefits overshadows the critical role of learner support in the academic success of learners (Brindley, 1995). Moreover, such a view is problematic in the sense that it shifts the focus of learner support from assisting current learners towards academic achievement to attracting more new learners (Brindley; Axelson, 2007).

Tait (2000) recognized the need to expand the view of learner support beyond the systemic and administrative processes. He offered a functional characterization of learner support that recognizes the pedagogic and motivational value of support services as well. He observed that learner support has three primary functions: *cognitive, affective, and systemic*.

- *Cognitive support* refers to facilitation of learning through mediation of standard and uniform elements of course materials for individual learners.
- *Affective support* refers to establishment of a supportive learning environment that increases learners' commitment and self-esteem.
- *Systemic support* refers to establishment of administrative processes and information management systems that are effective, transparent, and user friendly.

According to Tait, these functions are both necessary and interrelated. For example, in an institution that does not provide affective support, learners may feel isolated and drop out. This is more likely to occur no matter how qualified the systemic and cognitive support tools are. E-learning theories also recognize the pedagogic and motivational value of learner support. Garrison (1989) observed that learners need various forms of support to attain true control of the learning process. He argued that learner control is not only concerned with independence (freedom of choice about the place, time, pace, and methods of the learning), but also with the learner's proficiency (ability and willingness to learn independently, and availability of human and/or non-human support to guide and facilitate learning). He argues that "When intellectual and emotional support and guidance are needed, control

cannot be achieved by simply granting independence and freedom". True control is achieved only when a balance among independence, proficiency, and support is found. In his theory of e-learning, also known as "guided deductive conversation" or "empathy approach," Holmberg (1989, 1995) observes that motivation, study pleasure, feelings of belonging, and empathy between learners and those representing the organization are important components of effective e-learning. Learner support ("counseling support," as he referred), in Holmberg's view, has the potential to establish such personal relations and empathy between teaching and learning parties and, therefore, to strengthen learners' study motivation and promote their emotional involvement and study pleasure. This view has been confirmed by Brindley (2000), who found a strong positive relation between institutionally provided social support and learner satisfaction, including intention to reenroll.

2.6. Theoretical Frameworks for Learner Support

There are several factors that should be taken into account when planning a learner support system in e-learning settings (Brindley, 1995; Tait, 2000). In fact, it is because of this plurality of factors that there is enormous variation in how learner support systems are organized and administered in e-learning (Reid, 1995; Robinson, 1995; Sewart, 1993; Tait, 1995).

Based on their reviews on learner support, Dillon and Blanchard (1991) concluded that types of necessary support services in each institution vary according to interrelationships among the needs of the learners, the requirements of the content or course, the institutional context, and selected technology or media to deliver support services.

Tait (1995) attested to this variation by arguing that "social, cultural, economic and technological issues provide a range of factors in planning learner support which ensure that each institution has a unique task, and no general schemes can be drawn up on an international or even national basis".

Sewart (1993) followed the same line of reasoning and argued that a learner support system can only be conceived in relation to the country and context in which it is set and, therefore, the elements that make up course production, the same cannot be said for learner support services.

Based on this argument, he proposed a framework that suggests that learner support services should do the following:

1. Be constructed in the context of almost infinite needs of the clients.
2. Be dependent on the educational ethos of the region and the institution.
3. Be dependent on the dispersal of the student body, elements of recourse and the curriculum or product of the course production subsystem.
4. Be dependent on the generic differences in the student body which it has been setup to serve.

Brindley and Paul (2004) also proposed a framework that suggests effective learner support in distance or e-learning settings should do the following:

1. Personalize the learning process so as to be responsive to different individuals and groups (rather than relying on fixed elements such as course syllabus).
2. Encourage and facilitate interaction among and between student(s), faculty, tutor, institutional support person and academic content.
3. Exist to further the goals of a particular institution and serve the needs of its learners within its specific context.
4. Both facilitate learning within courses and address issues of student skill and personal development.
5. Evolve continuously to accommodate new learner populations, educational developments, economic conditions, technological advances, and findings from research and evaluation.
6. Involve a high level of inter-functional collaboration and seamless to the learner.

The most comprehensive framework for the development of support services in e-learning settings is provided by Tait (2000). Tait observed that there are six core elements that institutions should take into account in planning support services for e-learners: These six elements interact in complex ways, with tradeoffs among them. These elements are briefly described below.

Learner Characteristics

Meeting the needs and expectations of learners is a central concept in the development of effective learner support services (Clark, 2003; Tait, 1995). Identifying the needs and expectations of learners, however, requires an in-depth examination of the learners' world: their needs, skills, motivations, and aspirations. In the very basic sense, it requires answering the challenging question of "who is the learner?" Rumble (2000). Therefore, many e-learning providers and practitioners acknowledge that characteristics of learners in an e-learning system play a central role in the development of learner support services in that system (Brindley & Paul, 2004; Rumble, 2000; Tait, 2000). It is central in the sense that all other elements included in the framework are partly related to learner needs and capacities.

Tait (2000) suggested that the following are elements comprising the main relevant features of learner identity: gender, age, disposable income, educational background, geographical situation, special needs (e.g. disability), language, ethnic and cultural characteristics, and communications technology connectedness. While this list is quite extensive and identification of these elements

might provide useful information for the development of support services, it is not complete. As suggested by Rumble (2000), aggregated data about learners' demographic information such as age, gender, socio-economic status, educational background, and marital status, as well as other surface information such as home circumstances and access to different media, reveal not much about the individual learners themselves. Evans (1994, cited in

Rumble, 2000) suggested that individual students remain invisible and, therefore, in order to gain a complete understanding of their needs, one needs to talk to them individually.

Course or Program Demands

The special demands of a course or program is as important as the characteristics of the learners in planning support services (Dillon & Blanchard, 1991; Tait, 2000). While specific demands of a course or program are often shaped by a variety of factors, the most critical ones are those that are related to teaching and assessment. For instance, whether the assessment will be continuous or limited to one final assessment is an important consideration. If it is going to be continuous, then further decisions are necessary about who is going to undertake it: core tutors or part-time tutors. If the assignment is going to be limited to one final assessment, than further decisions are necessary about how to motivate learners to continue their studies between the tests. Moreover, courses that require learners to perform hands-on experiences or share their experiences with other students might necessitate face-to-face sections. At this point, further decisions are necessary about the place and frequency of face-to-face sessions.

Scale of the Program

Tait (2000) suggested that an organization offering a e-learning program of study with registration of less than 100 learners will need to employ different support strategies from an organization that accommodates more than 10,000 learners. For instance, in a large-scale, learners might well be scattered around the country or countries and, therefore, establishment of regional administrative offices might be necessary to address learner support issues locally.

Geographical Environment

Geographical considerations also play a crucial role in deciding the type and volume of support services (Sewart, 1993; Tait, 1995; Tait, 2000).

Technological Infrastructure

The majority, if not all, of the learner support activities require interaction between the individual student and the other parties who provide support. With their capacity to support two-way communication, there is no doubt that new information and communication technologies will alter the way e-learning providers deliver support services—in most cases making some services more accessible and better quality. Kenworth (2003). However, it is necessary to consider issues of accessibility when planning and developing learner support services to be delivered online.

Requirements of the Management

Each organization might have different organizational structure in place to manage support services. For instance, the center-periphery nature of large, e-learning systems often makes it necessary to deliver services through its regional offices, whereas small-scale e-learning systems often provide services centrally.

2.7. Defining M-learning

Individuals around the world carry a powerful computing device in their pockets and purses. They don't realize it, but today's mobile phones have the computing power of a personal computer from the mid-nineties, while consuming a fraction of the energy and are made at significantly lower cost. The other important advantage of this device is that it can be effectively used for m-learning.

M-learning or "mobile learning" has different meanings for different communities. Although related to e-learning and distance education, it is distinct in its focus on learning across contexts and learning with mobile devices.

According to Leonardo da Vinci (1994) defines mobile learning as the provision of education and training on personal digital assistants (PDAs), smart phones and mobile phones, thus eliminating wired computers and laptops from the field.

Keegan, D (2003) disagrees with the above definition of M-learning and says one of the characteristics of mobile learning is that it uses devices which citizens are used to carrying everywhere with them, which they regard as friendly and personal devices, which are cheap and easy to use, which they use constantly in all walks of life and in a variety of different settings, except education. He goes ahead to define Mobile learning (M-Learning) as the use of mobile and handheld IT devices, such as PDAs, mobile phones and tablet PCs, in teaching and learning.

The diagram below illustrates Keegan's perspective of the device mobility and functionality to define M-Learning.

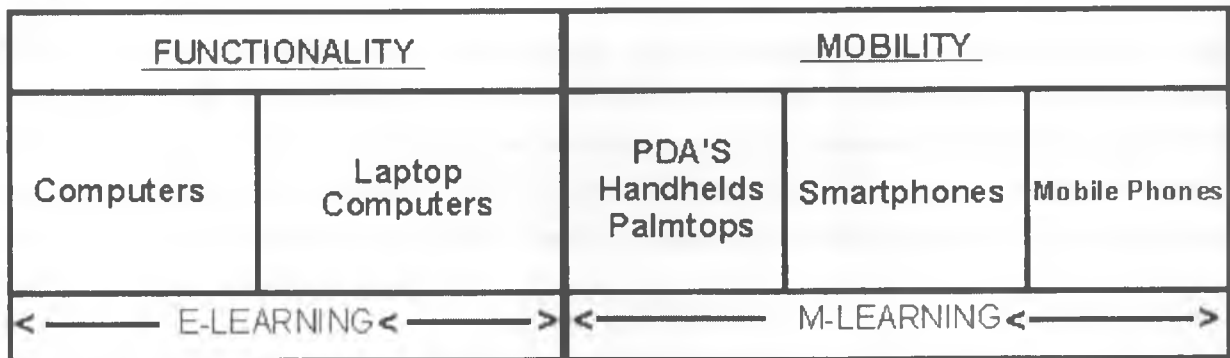


Figure 2.1 Functionality and mobility in a definition of mobile learning (Keegan, D (2003))

Mobile learning therefore can be defined as any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies. In other words, mobile learning decreases limitation of learning location with the mobility of general portable devices.

The justification of mobile learning comes from the 'law' of distance education research which states that 'It is not technologies with inherent pedagogical qualities that are successful in distance education, but technologies that are generally available to citizens'. Keegan, D (2003)

The success and impact of M-learning does not, however, solely depend on the technological developments and the possibilities they provide. The ability of educationists to design and develop didactical sound M-learning opportunities and learner support services that enhance learning is also imperative. It is therefore not only important to understand contemporary learning theory, but also to identify those services of mobile technologies that contribute to the optimizing of teaching and learning.

2.8. Mobile Learning

Only half a century ago, communication via telephone provided the ability to talk to someone from a distance. However, the capability of the telephone has expanded to include other features. Nowadays, mobile devices combine the features of traditional telephone, text messaging, a diary, wireless internet connection and certain telephones come with personal computer capabilities. Earlier research on the use of mobile phones in delivery of educational content was restricted to the features available on mobile phones. For instance, a study conducted in Africa showed the use of the short messages system in communicating with students across the continent. A study in Japan showed that students in Japan prefer to use the email function on their mobile phones. Therefore, when designing mobile materials for their English subject, the element of email is also included (Thornton and Houser 2005).

Designing content for e-learning differs from designing content for mobile learning. This may be due to many factors which include the physical factor. Lessons delivered using computers and the World Wide Web can be viewed using a 12–19 inch screen. Computers can hold large memory and classroom lessons can be conducted with computers as the main medium. This is known as computer aided learning. It is a norm to print materials from the internet but this might not be the case for mobile learning. In delivering lessons through mobile devices, there are a number of aspects that need to be looked into.

2.9. Theory of mobile learning

Designing materials to be uploaded onto technology-based media might require the use of a number of theories, namely learning theories and instructional design theories. Imitating the procedures of designing e-learning materials, where one would employ any of the instructional design models to ensure that the materials are designed with some discipline in mind, designing materials for mobile devices could use the same technique.

However, Sharples et al. (2005) mention that most of the learning theories widely used are based on the assumption that teaching and learning take place in the classroom. Since this might not be the case for today's process of teaching and learning, there might be a need to develop a theory of mobile learning.

In order to develop a theory of mobile learning, there are a number of crucial factors that need to be considered.

- ***For a start, there is the underlying assumption that learners are on the move all the time.*** Therefore, what they learn may not be restricted to what was stipulated in the program of study. When a learner learns a learning item in the classroom, they will then take the new knowledge with them outside the classroom. Once outside, informal discussions might take place with fellow learners that require the knowledge to be revisited and reflected on. When reflecting, there might be a need for the learner to investigate the matter further by downloading related materials from the internet. New knowledge is now formed. The process is non-stop and can be recursive. This is probably what Dewey (1916) meant when he said that all communication is educative.
- This relates to the second factor in postulating a theory of mobile learning, and that is ***to consider the learning that takes place outside the classroom.*** A study by Vavoula in Sharples et al. (2005) found that 51 per cent of everyday adult learning takes place either at home or in the office. Although the study does not provide a definition for learning or how learning was measured, it shows that a certain level of knowledge enhancement has occurred. The study further describes that learning takes place in various places: 21 per cent of learning happens outside the office at the workplace, 5 per cent of learning happens outdoors, 2 per cent happens at a friend's house, and 6 per cent happens at places of leisure. It is also reported that 14 per cent of learning takes place at other locations and 1 per cent occurs on forms of transport. The fact that only 1 per cent of learning takes place while learners are on the move indicates that mobile learning does not equate to physical movement. However, the study proves that learning takes place anytime and anywhere and it can take place outside the classroom environment. This provides opportunities for educationalists to provide formal content that can be learnt in informal surroundings.
- Thirdly, ***developing a theory of learning must enable successful learning.*** Successful learning is related to effective learning. According to the US National Research Council (1999), effective learning constitutes four elements: (1) learner centered, (2) knowledge centered, (3) assessment centered and (4) community centered. Learner centered deals with positioning learners at the centre of the educational process (Brindley 1984). Hence, learners are responsible for their acquisition of knowledge and the building of skills. Knowledge centered deals with the curriculum which is built on validated knowledge, taught effectively and efficiently. Assessment centered, on the other hand, focuses on evaluating learners' ability, diagnosing problems and offering guidance which may lead to success in learning. Community centered promotes the sharing of knowledge and learners supporting each others' learning. These four elements adhere to the socio-constructivist approach to the process of learning where learning is not a lonely journey but rather an individual effort with environment and community support.

- Finally, a theory of mobile learning must also *consider the use of ubiquitous technology and how the learning community is responding to it*. In the UK for the year 2005, a study revealed that 95 per cent of young adults aged between 15 and 16 owned mobile phones (*Daily Mail*, 15 February 2005: www.literacytrust.org.uk/Database/texting.html#fog). A similar study conducted in Malaysia revealed that 100 per cent of higher education learners aged between 18 and 21 owned mobile phones (Abd Rahman et al. 2009). Those studies further indicate that learners are equipped with devices that enable them to learn anytime and anywhere. They present educationalists and instructional designers with opportunities to design instructions that could be delivered using those devices.

The above argument leads to a conclusion that is presented by five questions posed by Sharples et al. (2005). These five questions act as a checklist for developing a theory of mobile learning:

- (1) Is it significantly different from the current theories of classroom, workplace or even mobile learning?
- (2) Does it consider the mobility of the learners?
- (3) Does it include informal and formal learning?
- (4) Does it view learning as a constructive and a social process?
- (5) Is learning analyzed as personal and mediated by technology?

Therefore, in designing a mobile framework for corporate learning, the theory of mobile learning has to be established before embarking on other issues. However, the features discussed so far have not been formulated into a tested theory as yet. As that is the case, one could argue that it might still be relevant to use existing theories of learning as the pillars for designing activities for mobile learning.

2.10. General Requirements for Mobile Learning

Learning happens not only within an organization's confines but learning can also happen anytime and anywhere according to the needs of the individual. Therefore, providing the avenue for mobile knowledge acquisition is vital.

Thus, including the elements of mobile learning in the design of a mobile framework is essential. In many instances, technologies can be seen as the supporting factor of learning. Sharples et al. (2000) outline a number of general requirements that have to be considered when designing mobile materials. The requirements include technology that is:

1. Highly portable – so as to support learning whenever and wherever;
2. Individual – the design should be able to support individual learning, cater for individual learning styles and be adaptable to learners' abilities;

3. Unobtrusive – learners should be able to retrieve knowledge without the technology becoming a deterrent;
4. Available – enabling communication with friends, experts and/or teachers;
5. Adaptable – the context of learning should be adaptable to situations and the individual's skills and knowledge development;
6. Persistent – able to manage the learner's learning despite the changes in the technology itself;
7. Useful – useful to learners for everyday chores;
8. User-friendly – easy for people to use and must not create technophobia among new users.

However, these requirements are not easy to meet. For instance, highly portable devices mean having devices that are light, easy to carry and are not restricted by network coverage. If a device is operated in a remote area, there should not be cases where learning cannot take place simply because the content cannot be downloaded. Although the issue of network coverage is real and serious in developing countries, as currently experienced in Kenya, ways should be sought to overcome technical problems of infrastructure.

2.11. M-Learning Case Studies

2.11.1 Case Study – M-learning using e-slates in Kenya

Eduvision project in Kenya, This project targeted Grade 5 pupils in rural Kenyan primary school. The project was to have access to satellite distributed content on handheld devices (called e-slate) or low cost hand held computers and laptops. E-slates contained all textbooks needed as well as calculator, dictionary and other supplementary reading materials.

Teachers were trained how to use e-slates and methodology prior to project start-up. Then teachers then trained students.

Short-falls on this project, despite having portable devices, is that

- Eduvision E-learning System Training Curriculum was created specifically for classroom use.
- Locations were tied into one-way broadcasts from Eduvision and are not connected to internet therefore no way to get feedback and finally from this project, there was no learner support services that was implemented.

2.11.2 Case Study – Using SMS technologies to support distance in South Africa.

University of Pretoria used sms technology to enhance quality of administration and academic support e.g. sending of general admin messages to students and students could send messages for academic support. This sms support is integrated into existing systems.

The following are some of the tasks that can be achieved:

- Student interaction with lecturer and lecturer responses
- reminders

- quizzes

Shortfalls of this project despite enabling learner support services through mobile phones.

- Learner support services were only delivered through sms platform which was limiting, the learners could call in to listen to short courses whenever they were outside the confines of the university.
- The sms support system could allow the students to take quizzes through sms, this was limited to availability of airtime, this meant that if they exhausted their airtime during the time they were taking the quizzes, they would not get feedback on their performance, similarly the lecturers would not have records of the same.

(Viljoen J-M, Du Preez, C and A. Cook (2005).

2.12.3C Didactical Framework

3C - didactical components of a learning arrangement is modified to fit this study, the model of didactical components outlined below tries to provide such a framework for specifying parts of a blended learning arrangement and their relative weight.

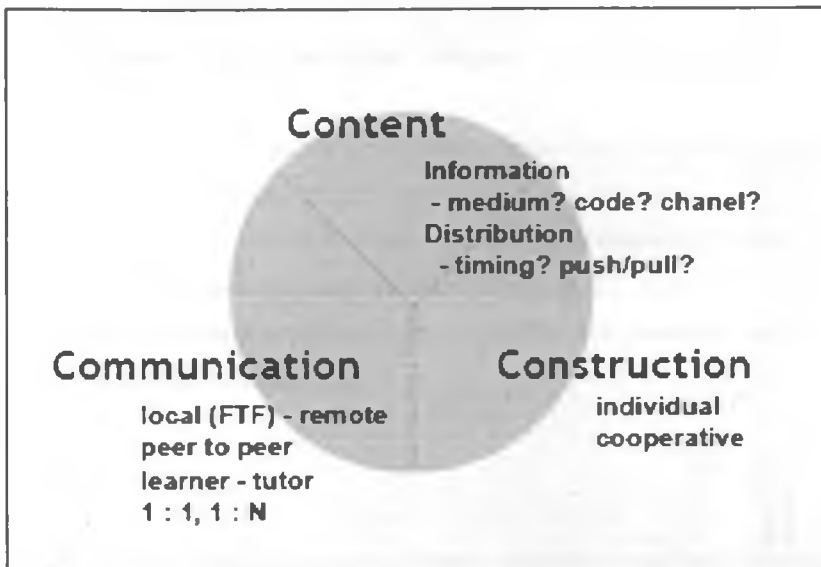


Figure 2.2 Components of a blended learning arrangement (Kerres, M. & C. de Witt, 2003)

According to the 3-C model, any learning environment consists of three components:

- i. *Content* component that makes learning material available to a learner.
- ii. *Communication* component that offers interpersonal exchange between learners or learners and tutors.
- iii. *Constructive* component that facilitates and guides individual as well as cooperative learning activities to actively operate on learning tasks (or assignments) with different degrees of complexity (from multiple-choice to projects or problem based learning)

With organizations aiming to reduce e-learning attrition by using M-learning and maintaining up-to-date records on individuals development progress, as discussed in the above literature conceptual frameworks for learner support services, it is important to focus on the learner ability as well as the devices that will be used for m-learning, the constructive component on Kerres model is also modified to competency development aspect, this blends in from Brindley and Paul (2004) the concept of facilitate learning within courses and address issues of learner skill and personal development which is critical in Corporate training and our study.

2.13. Conceptual Framework for the Study

The proposed framework to be used in this study describes **Device aspect Learner's ability Interaction Content presentation and Competency development (DLICC)** has the following components:-

1. **Device aspect:** Refers to physical features of the mobile device, should be capable of receiving data and has internet connectivity.
2. **Learner aspect:** Signifies the distinct features of an individual learner – learning preferences, willingness to learn.
3. **Interaction aspect:** Points to the features required for interaction or conversation between learners or administrators and learners, this is where we have e.g. reminders.
4. **Content aspect** – This will be minimal content presentation to an offsite-learner or enabling access to the LMS to an on-site learner through their mobile device.
5. **Competency development aspect:** This will be the component that facilitates and guides individual to take on self-assessments and quizzes.

2.14. Summary

In summary, this literature explains that many distance educators recognize that without adequate support, e-learners face several learner support challengers and this makes learners prone to delay completion of their studies or to completely drop out of the program. The challenge for e-learning providers therefore, is not so much how to register learners for online courses, but how to retain them once they have begun. "learner support" and "student support" are used in distance education or online learning literature to include a variety of activities, strategies, and administrative systems to support individual learner before, during, and after the learning process, learner support services have played a major role in ensuring learners not only experience satisfaction but also gives the learners the intention to re-enroll for other courses.

The "buzz" about corporate mobile learning grows louder with each day. Organizations no doubt recognize that mobile technology for learning has merit. Handheld devices have the potential to effectively "push" and "pull" information and deliver learning whenever/wherever employee needs arise. With most professionals in the organizations today carrying a powerful computing device in their pockets and purses, it is necessary to extend M-learning to these devices, since the learner is not at a fixed predetermined location, this gives the opportunity of these individuals to learn anytime anywhere taking advantage of the learning opportunities offered by mobile technology with the support of learner support services extended through mobile technology.

CHAPTER 3 METHODOLOGY

In this chapter, the research, design and development methodology is outlined.

Application Design And Development Methodology

3.1 Application Development Methodology

Agile Development methodology was followed iteratively.

- ✓ Requirements Analysis
- ✓ Architecture and design
- ✓ Development and
- ✓ Testing

Was carried out iteratively as a continuous process as defined in the agile development methodology. The reason for using agile development methodology is because it had iterations rather than phases and the output of each iteration was a working code that was used to evaluate and respond to changing and evolving user requirements, this saved time, considering the time required for this project to be delivered.

3.2 Design Framework

During the design of mobile learning application, it is considered according Sharples et al (2000) a number of general requirements have to be considered when designing mobile learning and learner support services.

The requirements include technology that is:

- (1) Highly portable – so as to support learning whenever and wherever;
- (2) Individual – the design should be able to support individual learning, cater for individual learning styles and be adaptable to learners' abilities;
- (3) Unobtrusive – learners should be able to retrieve knowledge without the technology becoming a deterrent;
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However, these requirements are not easy to meet. For instance, highly portable devices mean having devices that are light, easy to carry and are not restricted by network coverage. If a device is operated in a remote area, there should not be cases where learning cannot take place simply because the content cannot be downloaded. Although the issue of network coverage is real and serious in a developing country, ways should be sought to overcome technical problems of infrastructure.

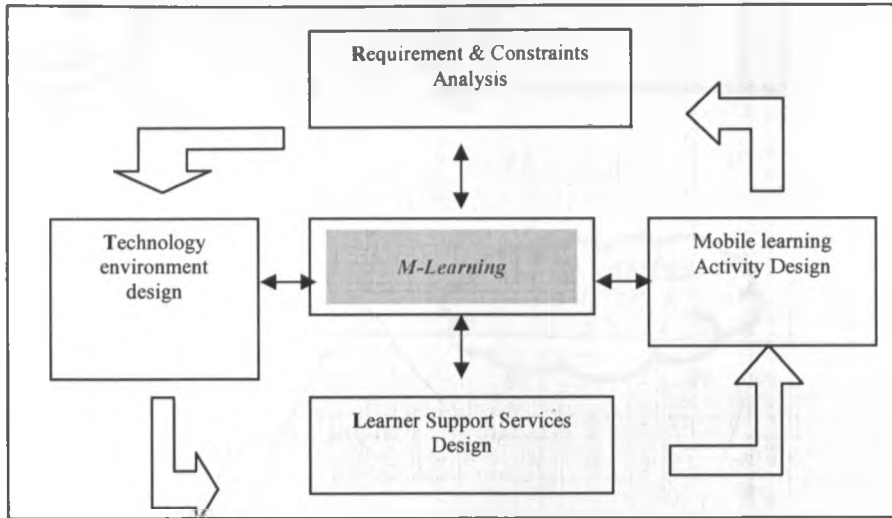


Figure 3.1 M-learning Development Framework

- Requirements and Constraints analysis:** Looks at the general demand for mobile learning and learner support services, we seek to find the answers to the common features of mobile learning, the position and status of ICT in the organization, analyses the users and the users' learning environment. It comprises potential users' attitudes, skills, experiences, use patterns, learning characteristics, motivations, learning tasks and possible barriers as well as possible mobile learning situations, environment and influencing factors. Liu et al. (2008) emphasizes that the understanding of user needs and the factors that influence their learning is crucial to the design of mobile learning activity.
- Technology Environment design:** 'Environment' constitutes elements such as database, platforms, networks and other technological aspects of mobile learning, content to be delivered will be text based. The activities were also designed to encourage learner control.
- Learner Support Services:** Learners also need support services to increase their confidence and competencies as well as to overcome any arising difficulties, this makes this framework comprehensive in the sense that it has taken into account all the necessary factors that concern the users, the learning itself and the environment in which the learning will take place.

- **Mobile Learning Activity:** This involves accessing content to acquire new skills, taking the exams and update to the database of the learners performance and tracking completion.

3.3 High Level Architecture of the Corporate M-learning System

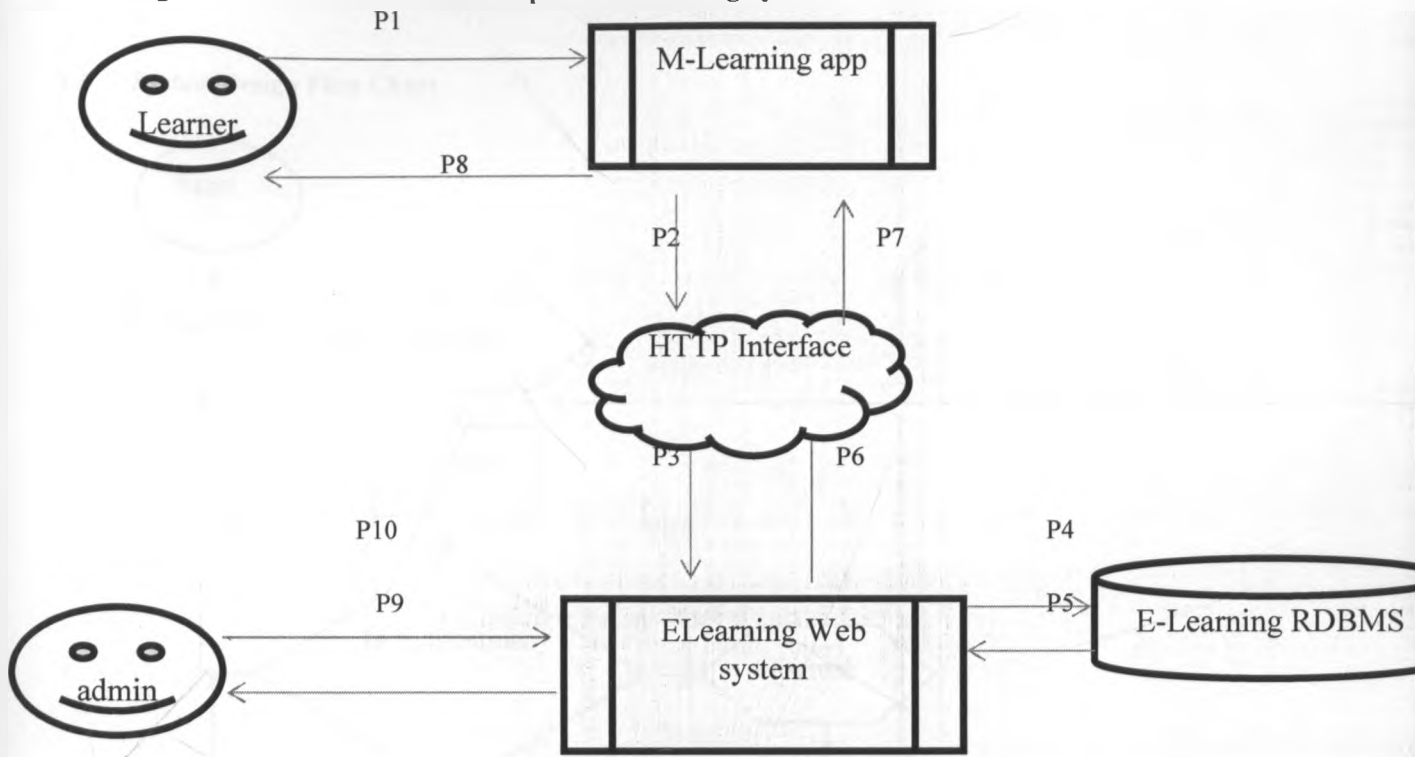


Figure 3.2 High level Architecture – Corporate M-learning with learner support services

Process Narrative:

P1: A learner enters details via a user interface on the android M-learning application

P2: The app captures the data and sends the data to the eLearning management system via a HTTP interface service [P3]

P3: The HTTP service interface pushes the data to the eLearning system

P4: ELearning system updates the backend database

P5: The eLearning system may query the DB for some data through channel P5.

P6: The queried information is routed to the android app via the HTTP service interface.

P7: The M-learning mobile system is updated

P8: User gets feedback.

P9: Trainer/Admin receives query HTTP interface service [P3]

P10: Trainer/Admin pulls messages and responds to queries or sends push message to learners

3.4 System Design Flow Chart

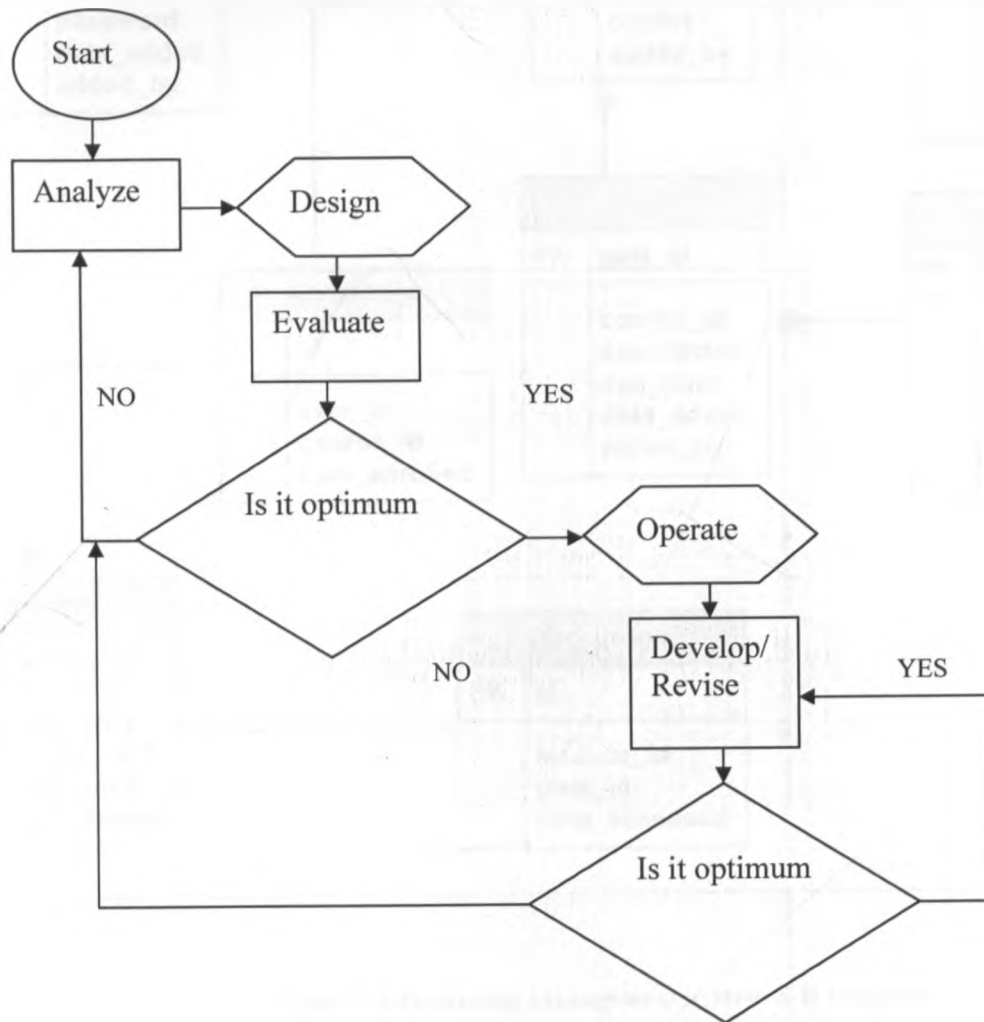


Figure 3.3 M-learning System Design Flow Chart Diagram

3.5 Underlying Database Structure - Current System E-Learning Management System

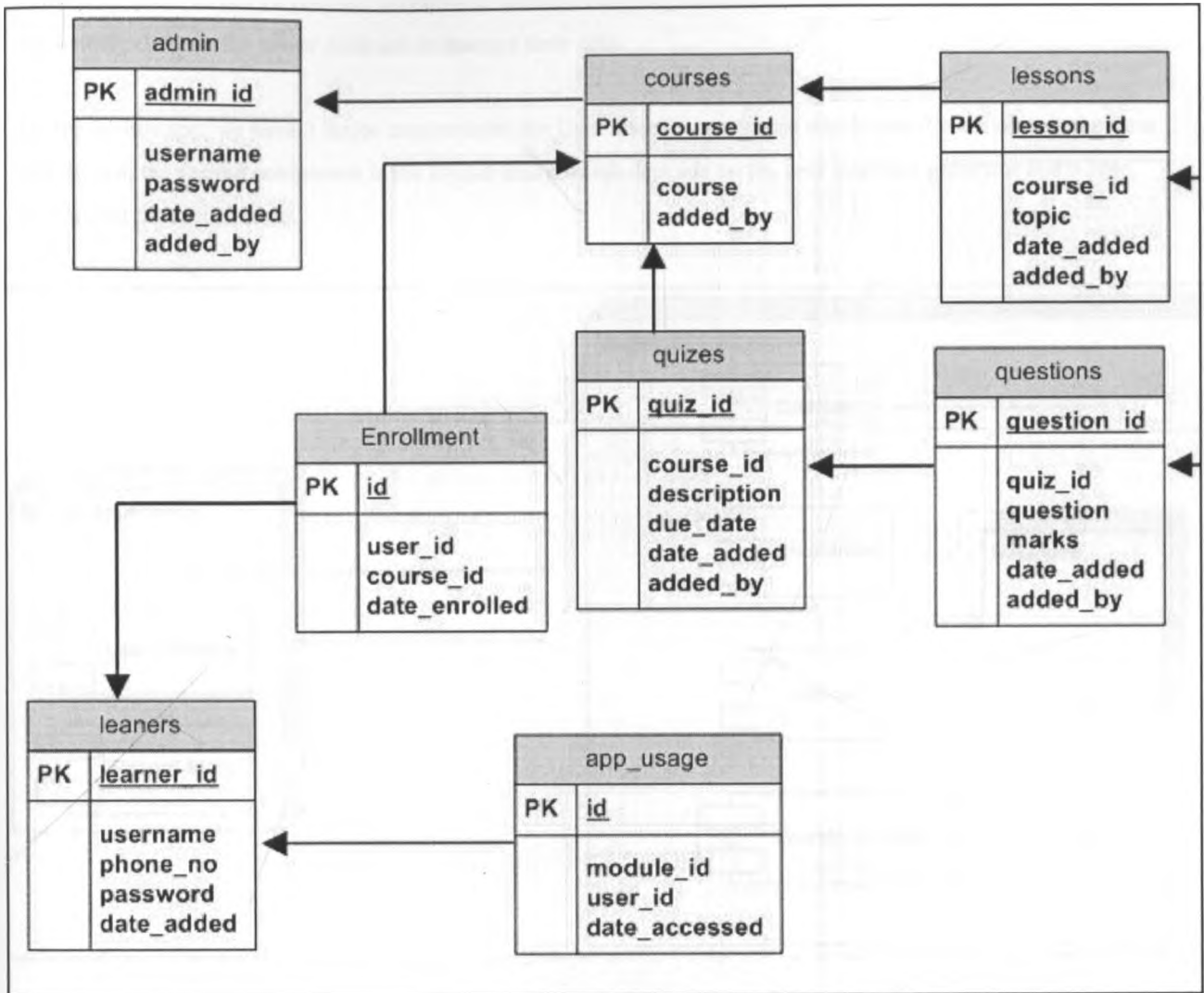


Figure 3.4 E-learning Management System E-R Diagram

Component Diagram

The server contains 6 main modules/components which respond to six different kinds of requests as shown on the application main screen i.e courses, enrollment, quizzes, blogging, download & synch and notifications. all these components rely on the server database to manage their data.

On the mobile app, we have 3 major components, the User interface generator which uses 2 main objects the form and the list, the second component is the offline study which depends on the user interface generator and a 3rd component the record store.

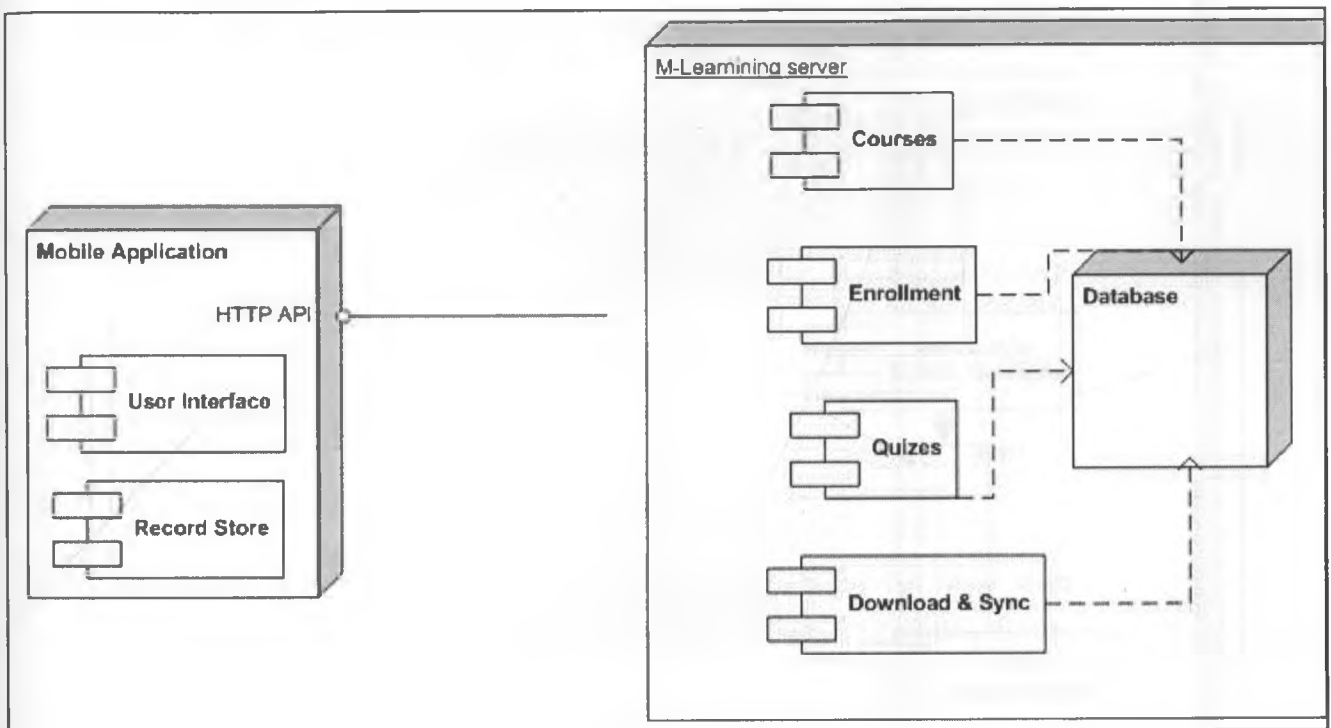


Figure 3.5 Detailed Component Diagram

3.6 Deployment Diagram

Apache server interfaces with Mysql server. Mysql server contains the tables we store our data while the apache server contains the PHP code running in the backend. This applies for the mobile application since most of the logic is coded in the backend, only a few features have been coded in the mobile phone especially the download module. .

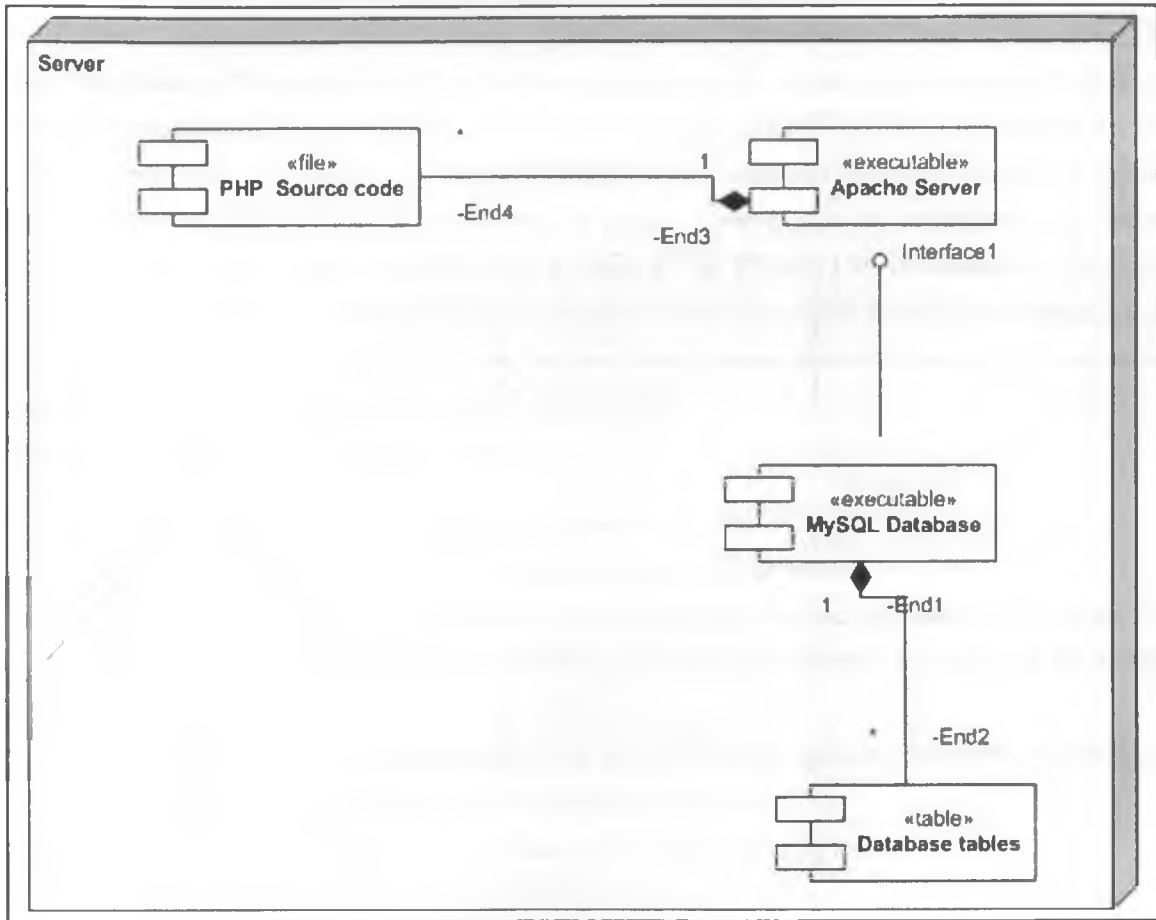


Figure 3.6 Detailed Deployment Diagram

3.8 Tools and Techniques

Google released Android in November 2007 with the goal of being an open source arena for software development on mobile device platforms. The Android platform is released under the Open Handset Alliance. The goal of this alliance is to create open standards for mobile devices. Android is an open source mobile operating system based on the Linux kernel. The operating system facilitates for developers to write managed code in Java using Google developed Java libraries. The Android platform does not only provide the mobile operating system itself including the development environment, it also provides a custom built virtual machine (Dalvik Virtual Machine) for the applications to run on as well as acting as the middleware between code and operating system. For application development, Android facilitates the use of 2D and 3D graphic libraries, a small customized SQL engine for persistent storage, advanced network capabilities such as Edge, 3G and WLAN. The API is constantly evolving and the Current release (2.0 Eclair) is already a huge step forward in terms of available features from release 1.0. Since Android is an open source mobile operating system, the community is welcomed to collaborate in the evolvement of the programming environment, the operating system and the API.

We choose to use Android for the following reasons:

- 1) The number of android devices being adopted by users is the highest
- 2) Android devices and applications are intuitive and easy to learn for novices
- 3) The application development is easier due to the fact that the programming model and language is Java which we are already familiar with. In addition, packaging and distribution of android applications is straight forward
- 4) Different mobile devices e.g mobile phones, iPads and so on can run android. Other platforms like Symbian OS only support a limited subset of Nokia mobile phone series only.

Therefore the next section, describes the implementation of the mobile end using android.

3.9 Implementation of M-learning with Android

We used eclipse IDE to develop the M-learning system based on Android. Eclipse is an Integrated Development Environment for popular programming languages like Java and C++. It offers sophisticated graphical features for editing and debugging code. Integration of android development into eclipse is also very easing. Familiarity with the IDE makes the most appropriate for this development. The implementation of Corporate M-learning support system with Android on top of eclipse followed the following steps:

1. We downloaded the eclipse android sdk which is freely available from Google.
2. Installed SDK into eclipse and configure it to the correct settings
3. Develop the M-learning mobile system in android phone emulator on eclipse
4. Debugged the application and tested it
5. Deployed the application to a real android device. The compiled application was uploaded to the mobile device via a USB cable. There was also availability of automatic installation via a web link.

The eLearning content management system was be integrated to the M-learning system with the eLearning CMS to facilitate communication and exchange of information between the two applications, we then developed a web service that sits between the two applications as shown in the architecture.

After development, we used beta testing with sample population as users in order to evaluate various aspects of the systems and evaluated if we had achieved our research objectives. Before then, a clear test plan was developed, outlined the test objectives, the test items/features, the passed and failed criteria for the tests, the expected and actual outcome etc. The outcome of the tests was to be used to review the system and trigger enhancements consistent with the research objectives. Thus the development process followed the agile software development methodology.

The flexibility of the proposed solution can however be reproducible in similar settings with a high degree of success for any other exercise that aims to solve attrition on e-learning and lack of e-learning progress checks with the deployment of learner support services on M-learning using the above defined methodology.

3.10 Limitations of the methodology and how it was overcome

Agile methodologies has limitations with large projects, this will be overcome by building M-learning application iteratively and engaging the user at the end of each iteration, this will be the best in this case this means that at the end of each iteration we shall have a working code.

Research Methodology

3.11 Research Design

This research is experimental in nature; exploratory research design was done in the following manner. This study involved two control group and treatment group, It comprised of 60 learners and 5 administrators. The participants were given the surveys before after M-learning experience; the outcome was later evaluated and analyzed for our findings.

3.11.1 Population and Sampling

Having a high importance of making a right choice for the elements of the sample that made it representative of the organization's population, random and systematic sampling methods was used in selecting the learners and the administrators who we worked with in the study.

The goals of this research is comparing the results of respondents from different subgroups of the sample population, the approach used is stratified sampling. Based on stratified sampling, two groups: control group-using e-learning and treatment group using m-learning were selected as the scope of this study .Total number of learners in these groups was 60; Besides, 5 administrators from training and talent development were selected to answer the interview questions. The tool used was sample size calculator on <http://www.surveysystem.com/sscalc.htm> referenced and used on 23rd April, 2012 to determine our sample size.

From a population of 541 staff and the sample size selected for learners was 60, as shown in the sample size calculator below; this was calculated with the confidence level at 95% and confidence interval of 11.94.

The learners and administrators were randomly selected for this study.

The image shows a screenshot of a web-based sample size calculator. It is divided into two sections: "Determine Sample Size" and "Find Confidence Interval".

Determine Sample Size

- Confidence Level: 95% 99%
- Confidence Interval:
- Population:
- Buttons:
- Sample size needed:

Find Confidence Interval

- Confidence Level: 95% 99%
- Sample Size:
- Population:
- Percentage:
- Buttons:

Figure 3.7 Learners Sample size from the calculator

The administrators samples size was also calculated using the same calculator

The image shows a screenshot of a web-based calculator interface. It is divided into two main sections. The top section is titled "Determine Sample Size" and contains the following fields: "Confidence Level" with radio buttons for "95%" (selected) and "99%"; "Confidence Interval" with a text input field containing "30 99"; "Population" with a text input field containing "9"; a "Calculate" button; a "Clear" button; and "Sample size needed" with a text input field containing "5". The bottom section is titled "Find Confidence Interval" and contains the following fields: "Confidence Level" with radio buttons for "95%" (selected) and "99%"; "Sample Size" with a text input field containing "5"; "Population" with a text input field containing "9"; "Percentage" with a text input field containing "50"; a "Calculate" button; a "Clear" button; and "Confidence Interval" with a text input field containing "30 99".

Figure 3.8 Administrators sample size from the calculator

3.11.2 Data Collection and Collation

Survey instrument

A set of questionnaires were designed informed by the framework designed in this study, based on the main features of the framework and were distributed among selected samples. The questionnaires consist of four main parts.

The post system usage questionnaires were designed using the 5 point likert scale, the reason why we chose this was because each progressive Likert item is treated as having a 'better' response than the preceding value. We also considered that the distance between each successive Likert item is equidistant, thus there were no varying weights between each likert item – this meant that the weight between Strongly Agree and Agree is the same as the weight between Disagree and Strongly Disagree.

- Part A: Device Aspect
- Part B: Learner Aspect and application usability
- Part C: Interaction Aspect
- Part D: Content Aspect
- Part E: Competency Aspect

The feedback of the study was gotten by emailing questionnaires to the learners.

Interviews with human resources were held by telephone. This was structured to seek a qualitative picture of the issues raised under aims of the study and to echo the responses from the questionnaires sent out to the learners. It

was an opportunity to capture details of the actual usage of M-learning and to go beyond-seeking the future prospects of learner support services. The questions asked were very precise to get feedback on the use of M-learning by the learners? Did they think that M-learning learner support services improved learner retention? How they used M-learning for giving support to the learners? Was M-learning and the support services effective for corporate e-learning?

CHAPTER 4 RESULTS

The organization has been using e-learning since 2006, the organization invested in LMS which is administered by the human resource department, it was noted that the system only delivered content and quiz but lacked learner support services, reminders were sent to all staff through e-mail to undertake e-learning, this did not focus on individual learners or courses.

Content delivered was only available through the organizations' intranet and this was not accessible outside the organization. Learning required at least 2hrs of the learner's time and this was not quite achievable when the learners had work to attend to, they prioritized work to learning.

More than 50% of employees spent up to half of their time outside the office at customer sites and at different branches of the organization, all the employees had multi-purpose hand-held devices which are web-enabled. Most of the employees used the portable devices regularly to access the internet and other applications that were installed onto these devices.

It was noted that the administrators did not have interactions with the learners who a majority was constantly on the move, further, the learners did not receive constant support services that could get them to complete the course they were already enrolled for, and the administrators had no way of retaining or constantly providing support services to learners as the current system had no such offering.

4.1 T-Test Analysis

This chapter presents the interpretation of the results as defined in the study objectives.

We defined two groups, one the treatment group and the other the control group. The treatment group used the developed M-learning system while the control group continued to use the existing E-learning system. This was done within a period of 8 weeks.

The analysis was done using independent sample T-TEST, comparing means on SPSS software, analysis was categorized as informed by the different categories in DLICC framework defined in this study.

It noted that whenever the P value is greater than 0.05, then the significance level is not so big, but whenever P value is less than 0.05, then there is significantly large variance between the two groups.

4.1.1 Device Aspect

Device/Content Aspect T-Test

Statement	Group	N	Mean	Mean Difference	P Value
Courses Enrolled for	T	30	4.27	2.067	0.119
	C	30	2.20		
Enrolled courses due dates	T	30	4.13	1.967	0.014
	C	30	2.17		
Contribution on online discussion board	T	30	4.17	2.633	0.283
	C	30	1.53		
Notification on new topics on discussion boards	T	30	4.27	2.4	0.016
	C	30	1.87		
Reminders on change of course due dates	T	30	4.23	1.767	0
	C	30	2.47		
Notification on quiz results and retakes if any	T	30	4.43	0.567	0.099
	C	30	3.87		

Table 5.1 Device Aspect Analysis

4.1.1.1 Device/Content Aspect Interpretation.

On Device Aspect there is a significant difference between the two groups in comparing the means, generally the treatment group has reports a higher mean on all the six areas, and a general significant mean difference of 1.9 is

recorded. We therefore find out that most of the information especially on notifications and reminders were sent to students via M-learning and not the current existing platform e-learning.

There was a significant difference in notification on quiz results and retakes, meaning that learners on M-learning got reminders and notifications on this platform than learners on E-learning both platforms gave the learners feedback on their results and notified them to retake the quizzes.

4.1.2 Learner Aspect

Learner Aspect T-test

Statement	Groups	N	Mean	Mean Difference	P Value
M-learning experience was fun	T	30	4.17	1.233	0.001
	C	30	2.93		
According to my experience I would take another mobile learning course if relevant to my learning needs	T	30	4.23	1.167	0
	C	30	3.07		
I would recommend mobile learning as a method of study to others	T	30	4.17	1.1	0
	C	30	3.07		
I used M-learning mostly while out of office	T	30	4.63	2.633	0
	C	30	2.00		
Downloading course content was easy	T	30	4.20	2.3	0.032
	C	30	1.90		
Navigation through the mobile course was easy	T	30	4.20	0.033	0.878
	C	30	4.17		
Evaluation and questioning in the mobile course was effective	T	30	4.17	0.033	0.496
	C	30	4.13		

Table 5.2 Learner Aspect Analysis

4.1.2.1 Learner/Usability Aspect Interpretation.

It is noted that most M-learning users enjoyed using the application compared to E-learners, most of the M-learning users would recommend other users to use the application. There was a notable significant difference on the usage

on M-learning outside the office compared to E-learning, where most of the users disagreed that they could not access the system outside the office confines. Downloading of content was also quite rich in M-learning compared to E-learning, most M-learning users got the opportunity to download content and use it outside the office.

Generally both groups agreed that navigation through the learning content and evaluation and questioning in the courses, was easy and effective.

4.1.3 Learner Support Services

Learner Support Services

Statement	Groups	N	Mean	Mean Difference	P Value
The reminders and notifications were a motivator to get enrolled courses completed and enrolment on new courses done with ease.	T	30	4.13	1.733	0.513
	C	30	2.40		
M-learning learner support services increases the quality of corporate e-learning	T	30	4.33	1.067	0
	C	30	3.27		
Communication with and feedback from the administrators was easy	T	30	4.17	1.767	0.608
	C	30	2.40		
Mobile learning is convenient for communication with other course students	T	30	4.13	2.3	0.688
	C	30	1.83		

Table 5.3 Learner Support Service Aspect Analysis

4.1.3.1 Learner Support Service Aspect Interpretation

We appreciate that there is significant variance in the learner support services offered on M-learning platform and E-learning platform. Most of the users on M-learning agreed that reminders and notification, communication with other students through online discussion boards and communication with administrators was easy.

Learners on E-learning generally disagreed that learner support services were available on E-learning, and hence the general high mean variance of more than 1.5

4.1.4 Competency/Completion

Competency/Completion

Statement	Groups	N	Mean	Mean Difference	P Value
Improved performance on quizzes taken	T	30	4.23	1.367	0
	C	30	2.87		
Competency and skills have been acquired after M-learning	T	30	4.03	0.267	0.075
	C	30	3.77		
There was more time to study	T	30	4.70	2.2	0
	C	30	2.50		
Been able to take more than two courses	T	30	4.33	1.9	0.008
	C	30	2.43		
Completed all courses enrolled for	T	30	4.40	1.967	0
	C	30	2.43		

Table 5.4 Competency/Completion Aspect Analysis

4.1.4.1 Competency/Completion Interpretation

There was a general agreement from M-learning users that M-learning helped them improve their performance, they acquired competency at the end of the courses take, there was generally a high level of agreement that there was more time to study compared to E-learning students, Majority of the M-learning students were able to take more than two courses and also most of the M-learning students were able to complete the courses they were enrolled for.

This is by the general comparison in means, as the mean variance in the two groups for the above mentioned categories was at an average of 1.85 which is significant difference.

On the other hand, E-learning students also generally Agreed that they were also able to acquire competency and skills after their course, and the difference between these two groups on this category is quite insignificant as its 0.267 which is quite low. We can therefore say that learners on both platforms acquire competency and skills after their course.

CHAPTER 5 DISCUSSIONS CONCLUSION AND RECOMMENDATION

5.1 Discussion and Conclusion

We can draw conclusion from this research, that learner support services through M-learning has been able to greatly enable the human resource department to retain more learners. M-learning support services have been a key contributor to having more learners complete their courses within stipulated time.

M-learning has been able to provide the following support services as shown from the interpretation of learners responses on learner support services, it is clear that support services on E-learning are missing and as earlier discussed most of the corporate learners are always out of office for other official engagements.

The effectiveness of M-learning support services, has effectively and greatly contributed to learners improved performances, getting more time to study and taking up of more than the three defined courses in the management score card. This therefore enables the organization to keep more skilled staff and gain a competitive edge over its competitors.

5.2 Limitations of the Research

- The course developed were designed in text format to enable speedy downloads; in further research the courses can be modified to have multimedia content.
- The mobile application was designed and deployed using android, the application was quite intuitive and easy for novice learners, the application could be deployed in different devices i.e ipads, cellphones and tablets, in further work the application can be developed to be transparent to device operating systems.
- We recognize that user bias cannot be completely eliminated, and therefore making the questionnaire responses anonymous gave the users the confidence to respond without bias.

5.3 Recommendations and future work

It is recommended that, Corporations should adopt M-learning learner support services and getting to solve the current learner attrition problem that is experienced by using E-learning content management systems only.

The application can be integrated to an SMS gateway to facilitate the use SMSs (text messages) to communicate important administrative issues to offline learners as well as to use mobile technology for learning purposes.

It is the responsibility of the administrators to come out with mobile compatible content, and should also facilitate the use of online board discussions to strengthened the social technology intersection for learners and administrators interaction this setups up social technology intersection and mobile learning requirements to be fulfilled.

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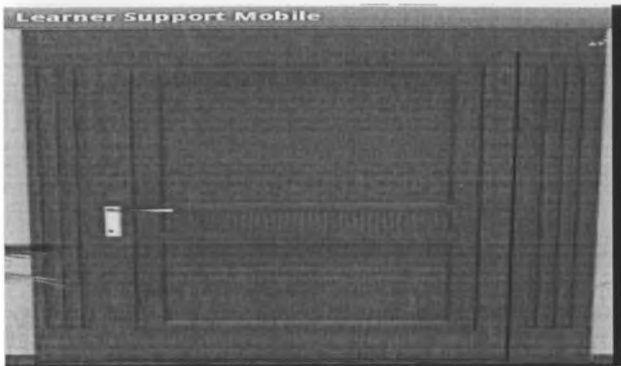
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APPENDICES

Appendix A- user view of the system

1.1 Starting up

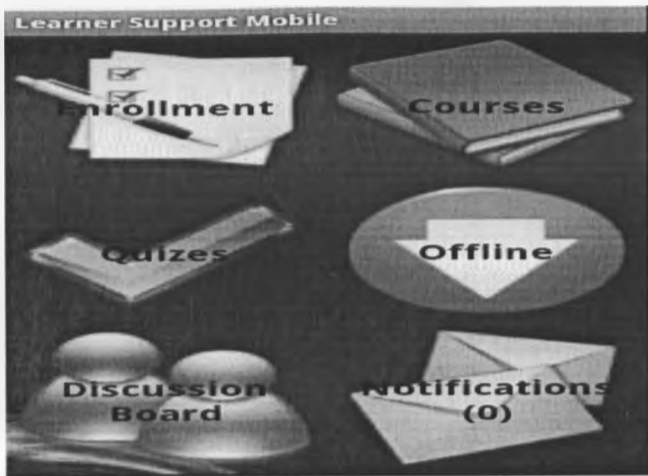


1.2 Registering for Mobile Application

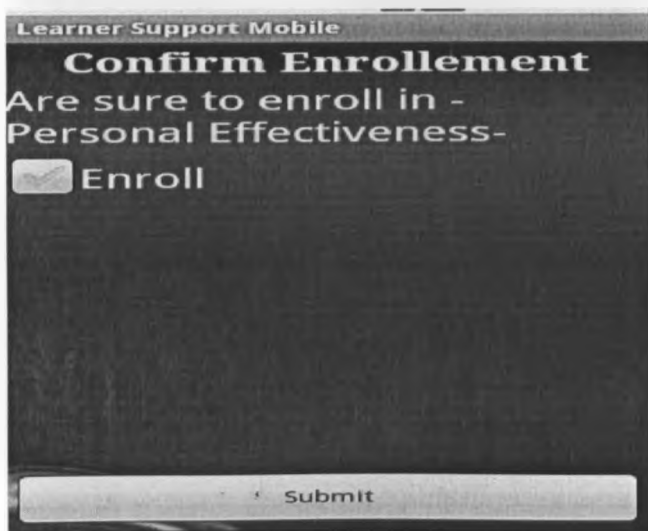
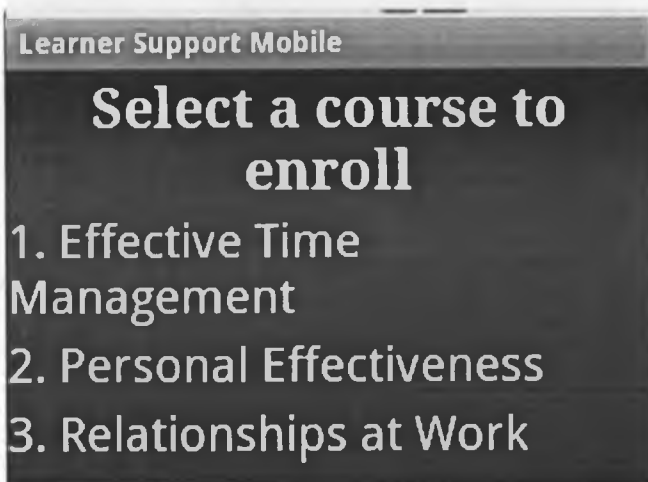
A screenshot of the registration form. The title bar at the top reads "Learner Support Mobile". Below the title bar, the word "Welcome" is displayed in a large font. The form consists of four input fields: "Username", "Phone no", "Password", and "Password". At the bottom of the form, there are two buttons: "Login" and "Exit".

1.3 Main page





1.4 Enrolling for a course



Learner Support Mobile

Enrollement

You have successfully enrolled in -Personal Effectiveness-, Go Home>Courses to access contents

1.5 Taking a course, lessons within a course

Learner Support Mobile

Select a course

1. Information Systems Security (Read)
2. Personal Effectiveness

Learner Support Mobile

Select a Lesson

Personal Effectiveness
Personal effectiveness and self-confidence
Goals at Work

Personal Effectiveness Page 1

What is personal effectiveness?

It can't just be achieving our goals because we could do so in a very wasteful, time consuming or sloppy way. How about making best use of our time and all other personal resources at our disposal? This means

Next

1.6 Taking Quiz

Select a course to do quizzes

1. Information Systems Security

Select a Quiz

Information Security

Information Security Question X

Social engineering is the intentional manipulation of an individual into believing that the information requester is authorized and entitled to receive information (10 marks)

A. True

You must score 70 to pass this quiz

Submit

Information Security Question X

Social engineering is the intentional manipulation of an individual into believing that the information requester is authorized and entitled to receive information (10 marks)



A. True



B. Exactly 1 answer(s) required

Submit

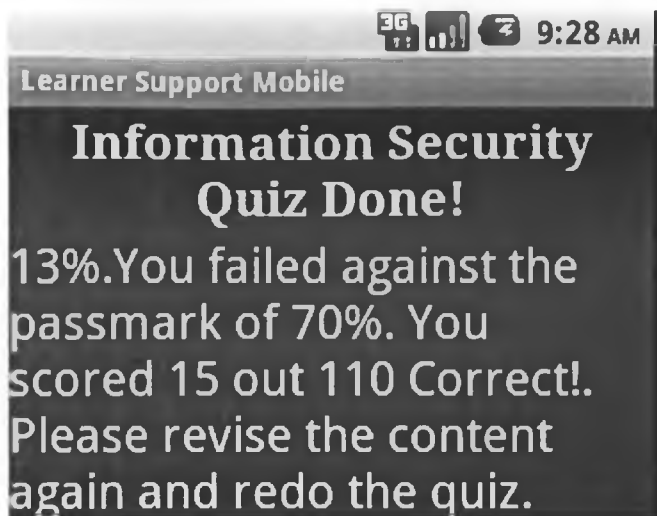
Information Security Quiz Done!

You have done all the questions!



View Results

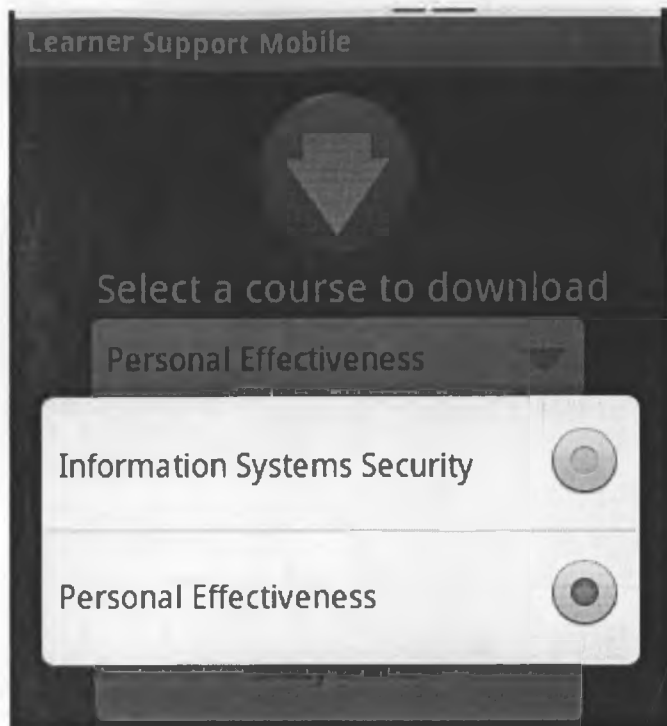
Submit



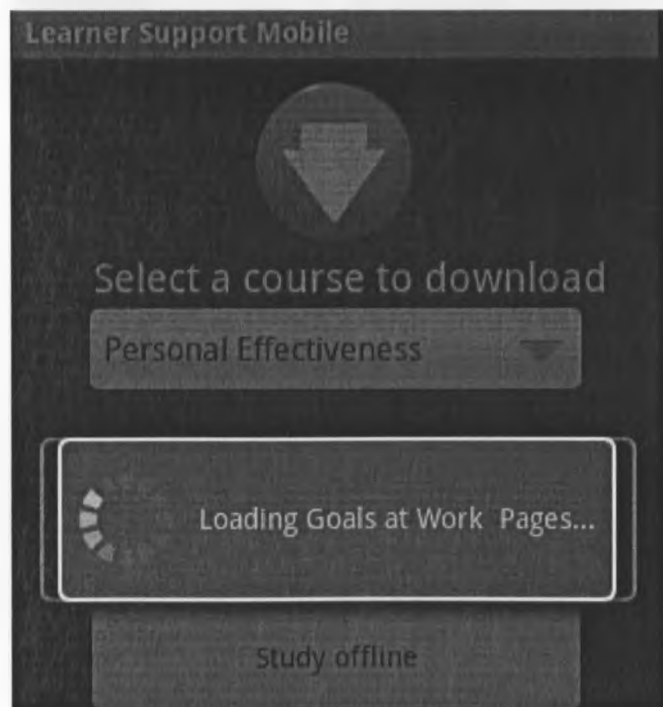
1.7 Offline operations



1.8 Selecting a course to download for offline studying



1.9 Downloading a course



1.10 Reading offline

Select a course

1. Information Systems Security
2. managers training
3. be the leader you were born to be
4. Test Course 1
5. Personal Effectiveness
6. Effective Time Management

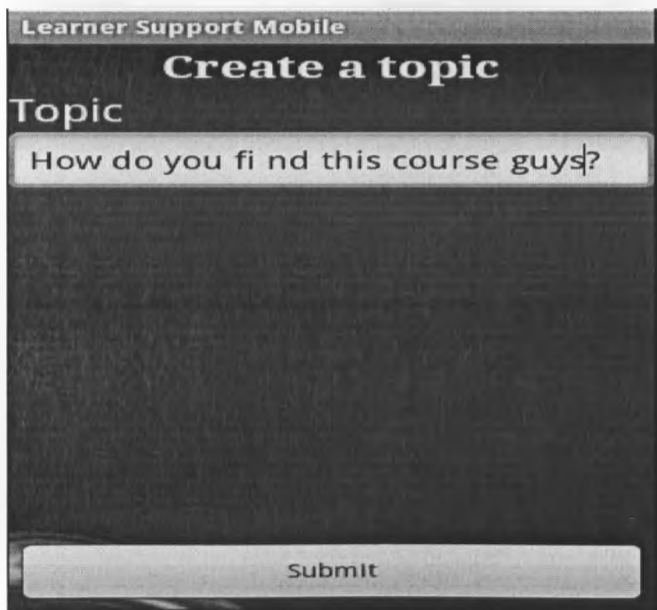
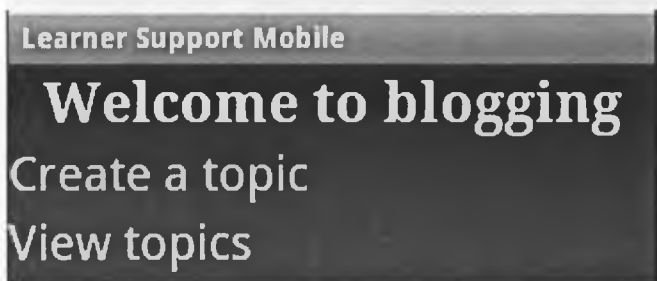
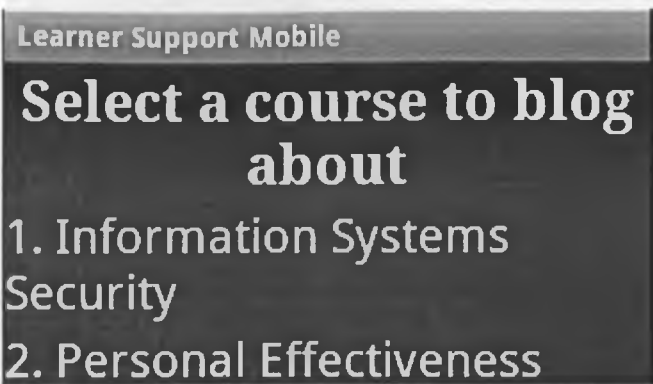
Select a lesson

Personal Effectiveness
Personal effectiveness and self-confidence
Goals at Work

Goals at Work Page 6

You viewed all the offline pages for this lesson, press back to view the list of lessons

1.11 Student interaction: online discussion board



Learner Support Mobile

Welcome to blogging

Create a topic

View topics

Your topic has been added.

Learner Support Mobile

Select a topic

How do you find... (0 replies)

Learner Support Mobile

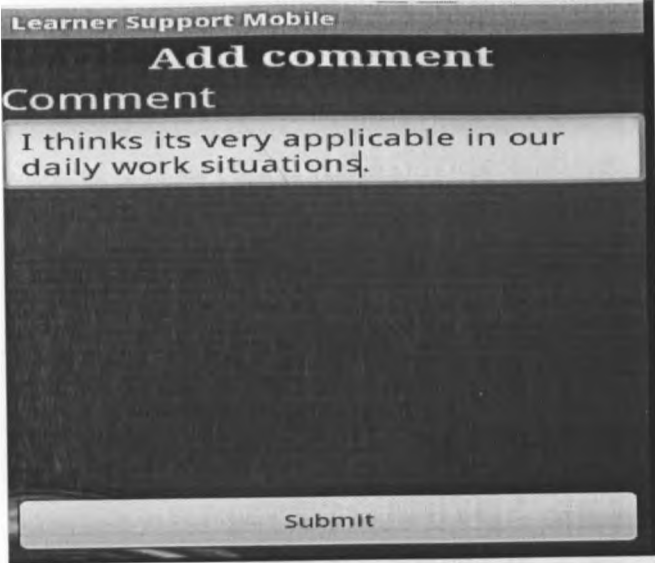
View topic

How do you find this course
guys? (0 comments)

Add comment

No comments have been
added yet

Submit



1.12

Reminders and Notifications

Learner Support Mobile

Notifications

System: A reply has ...

System: 13%. You fai...

System: You have suc...

System: You have suc...

Learner Support Mobile

View notification

System: 13%. You failed
against the passmark of 70%.

You scored 15 out 110

Correct!. Please revise the
content again and redo the
quiz.

Mark as read

Submit

Learner Support Mobile

Notifications

System: A reply has ...

System: You have suc...

System: You have suc...

Notification has been removed from the
list

Appendix B: administrator view of the system

The screenshot shows a website interface for 'M-LEARNING FOR CORPORATE LEARNERS'. At the top, there is a navigation bar with links for HOME, STAFF, ADMIN, and CONTACT US. The main content area is divided into two columns. The left column features a vertical heading 'Flexibility' and text stating 'M-learning is the most flexible mode of learning today.' Below this, it lists activities like enrollments, blogging, lessons, and quizzes, and encourages users to login. The right column has a heading 'M-LEARNING FOR CORPORATE LEARNERS' and explains that mobile learning is provided on personal devices. It offers support services and a link to download software. It also mentions creating a free account or logging in if one already exists. A final paragraph states that the service allows for enrollment, receiving messages from university admins, and getting deadline reminders.

Adding courses

The screenshot shows the 'Admin home' page. At the top, there is a navigation bar with links for HOME, STAFF, ADMIN (which is highlighted), and LOGOUT ADMIN. Below the navigation bar, the page title is 'Admin home'. There is a list of links for course management:

- [Add/View Courses](#)
- Available Courses
 - Effective Time Management
 - Information Systems Security
 - Personal Effectiveness
 - Relationships At Work

Adding lessons to a course

[Admin home](#)>>[Courses](#)>>[Effective Time Management](#)>>Plan your time.

[Add a page](#)

The principles being:

1. To concentrate on being effective, not on being busy.
2. To minimise wasted time.
3. The priorities being your key goals and objectives.
4. Plan in bite sized chunks.
5. Break complicated or difficult tasks into achievable elements or steps. The first step could be to investigate.
6. Identify the best time for each activity, for you and others?
7. Leave time free for the unexpected! You can always use it! This may be as much as 50% of your time.
8. Establish routines and patterns of work to improve efficiency.

[Edit page](#)

Page 1 of 1 Next Prev

1




Adding quiz

[HOME](#) [STAFF](#) [ADMIN](#) [LOGOUT ADMIN](#)













[Admin home](#)>>[Courses](#)

testsing

Course Name

Course name	Quiz	Edit	Delete
Effective Time Management	Quizes (1)		
Information Systems Security	Quizes (1)		
Personal Effectiveness	Quizes (0)		
Relationships at Work	Quizes (0)		

Adding questions to a quiz

Question	Marks
<input type="text"/>	<input type="text"/>
<input type="button" value="Add Question"/>	
Question	Marks
1 <u>Which security best practice will help protect the information on your personal digital assistant (smart phone)?</u>	10  
2 <u>Social engineering is the intentional manipulation of an individual into believing that the information requester is authorized and entitled to receive information</u>	10  
3 <u>How can you protect against viruses?</u>	10  
4 <u>When changing passwords it is OK to repeat the same password every third time it is changed</u>	10  
5 <u>Its all right to use my car's nickname as a password since no one knows my car's nickname</u>	10  
6 <u>A friend emails you unexpectedly at work with a "cool computer game" you</u>	10  

Defining the right answers

Question:

[Admin home](#)>>[Courses](#)>>[Information Systems Security](#)>>[Information Security](#)

Which security best practice will help protect the information on your personal digital assistant (smart phone)?

Answer	Correct?
A: <input type="text" value="Clearly identify your PDA with company stickers or logos"/>	<input type="checkbox"/>
B: <input type="text" value="Never remove your PDA from your bag for airport security"/>	<input type="checkbox"/>
C: <input type="text" value="Store your PDA password in a safe location"/>	<input checked="" type="checkbox"/>
D: <input type="text" value="Synchronize your PDA data regularly"/>	<input type="checkbox"/>

Viewing registered staff 4

HOME STAFF ADMIN LOGOUT ADMIN

Staff

Registered users

	Phone No	Username	Courses	Message
1	0720591851	amutinda	View	Send
2	733415415	Bbasiye	View	Send
3	0721573519	cchepkorir	View	Send
4	0732859635	cnjuguna	View	Send
5	0728888042	dchacha	View	Send
6	722365243	eedward	View	Send
7	0724967835	ekenda	View	Send
8	0721555600	emwose	View	Send
9	0700870934	enyamwaya	View	Send
10	0725664488	ewanjiku	View	Send
11	0725965874	fmutinda	View	Send
12	0775986512	gjuma	View	Send
13	0722548967	gkanau	View	Send

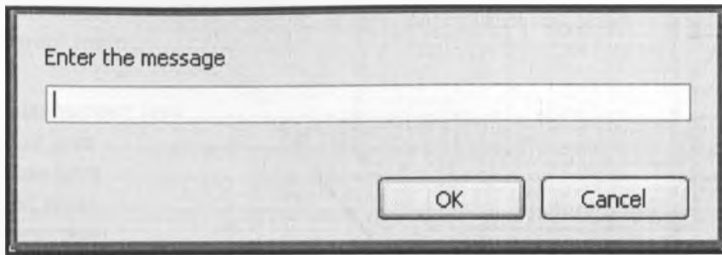
Viewing staff progress

HOME STAFF ADMIN LOGOUT ADMIN

Staff: pkabutu

- Courses Progress
 - Effective Time Management (DONE)
 - Information Systems Security (NOT STARTED)
 - Personal Effectiveness (QUIZ PENDING)
 - Relationships At Work (NOT ENROLLED [Enroll](#))

Sending Staff Reminders and notifications.



Enter the message

OK Cancel

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1 Mobile client

1.1 Com.learner.main

This package contains android activities: android activities are java classes which represent separate screens. It contains the following files each representing a separate screen. Each file is tied to a xml layout under a similar name under res/layouts

1.1.1 Splashscreen.java

Shows the splash screen image for a few second

1.1.2 User.java

Shows the login/register screen

1.1.3 Main.java

Shows the main screen with the icons for enrollment, courses, quizzes e.t.c if any of the icons is pressed, it sends the very initial request to the server, all subsequent requests are sent by bridge.java

1.1.4 List.java

Is used whenever the server sends instruction for showing a list. E.g the list of courses screen

1.1.5 Form.java

Is used whenever the server sends instruction for showing a form. A form can contain a label, textfield, checkbox e.t.c E.g the question screens

1.1.6 Bridge.java

When a list item is selected, or a form submitted, bridge.java is activated with the results, it sends the results to the server and when the instructions for the next screen come, it calls either the list.java or form.java activities. Its screen only shows a progress dialog.

1.1.7 Download.java

This is the activity used for offline studying, it allows downloading and updating of the courses, it also allows studying offline, to study offline, it acts as the bridge activity for offline to activate list.java and form.java activities while studying offline.

1.1.8 Appstatus.java

This is actually not an activity but a normal class used to get the network status, offline or online. Ideally it should be placed in a package named com.learner.utilities

1.1.9 My progress dialog

This is also not an activity but a class used to show the progress dialog, it is called by almost all other classes.

1.2 Com.learner.connect

This package contains classes for connecting to the server and retrieving response data.

1.3 Com.learner.db

Contains class for manager sqlite local database, it contains methods for creating, reading, updating and deleting from tables

1.3.1 Com.learner.db.models

This is a package that contains classes representing a single table record for the 3 tables used i.e courses, lessons, lessons Pages

1.4 Com.learner.widgets

Contains widgets used inside form or list activity.

1.4.1 Listitem.java

Represents a single item in the list activity. It is the only widget used by the list activity

1.4.2 Radiobutton

Used by form, not used currently

1.4.3 Textfield

Used by form e.g blogquestion or comment

1.4.4 Checkbox

Used by form, e.g question answers/choices

1.4.5 Label

Used by form, represents any non-editable text shown inside a form, e.g question text

1.4.6 Widgetinterface

Represents form items, all form items implement it thus we can create a single list of form items. It also forces all form items to implement the `getvalue()` method.

2 Server

The following files on the server are used to serve the mobile client, the rest are used for the web applications

2.1 /server index.php

All requests from the clients are sent to this file, it keeps usage statics but forwards all the requests to `/mobile/index.php` save for login or register request. The result from `/mobile/index.php` is received in json form, this files calls a custom json decoder under `/lib/json_decoder.php` which generates the data to be sent to the client.

2.2 /mobile/index.php

This file contains most of the business logic for the application. Its relies on the dozens of files defined by `/mobile/mobile_functions.php` and `/mobile/small_actions.php`

2.2.1 mobile/mobile_functions.php

see 2.2. it defines functions such as `generateResults`, `addBlogQuestions`, `lessonDone`, `prepareQuestion`. and dozens more. Note that this class interacts directly with the database

2.2.2 /mobile/small_actions.php

See 2.2 it contains light functions which don't require to interact with db but are required in more than 1 times by `/mobile/index.php` e.g `getBlogActionList()` which returns the list with 'add topic' and 'view topics' options

2.3 /lib

This folder Contains all the files required to interpret json data from `/mobile/index.php` and format it for consumption by the mobile client

2.3.1 JSON.php

A json library

2.3.2 Json_decoder.php

Uses `json.php` to tear apart the json data and walk through it calling the classes below to generate it, only valid json data would survive this process.

2.3.3 Button, checkbox, textfield, message, form, list e.t.c

All this files are used by json_decoder.php to generate data to be sent to the client.

Appendix D Questionnaires

Pre-test Sample Questionnaire



UNIVERSITY OF NAIROBI
SCHOOL OF COMPUTING AND INFORMATICS (SCI)

M-LEARNING SUPPORT SERVICES FOR CORPORATE LEARNING

This survey is being undertaken to assist in M-Learning support services research at UoN, SCI department. please take a moment to respond to this questionnaire.

General Information

Do you work with the computer in the office?

- Yes
- No

What time do you spend in the office within 8hrs of work?

- 20%
- 50%
- 75%
- 90%
- 100%

Corporate E-Learning

Have you participated in e-learning courses offered by the organization?

- Yes
- No

How many e-learning courses did you take last year?

- None
- One
- Two
- Three
- More than three

Did you complete all the e-learning courses enrolled for?

- Yes
- No

How would you rate learner-learner and /learner-administrators interaction on the current e-learning?

- Very good
- Generally good
- Insignificant
- Poor

No Interaction

Are there any learner support services you receive as a learner on e-learning?

- Yes
- No

Can you access e-learning courses outside the office?

- Yes
- No

How long does an average e-learning course take to complete during working hours?

- Within 30 mins
- Within 1 hr
- Within 2 hrs
- Within 3 hrs
- More than 3 hrs

Which one would you prioritize at work?

- Taking a course to completion
- Completing work on time

Mobile Devices & M-Learning perception

Do you own a mobile device

- Yes
- No

How often do you have your mobile device with you?

- Almost always
- Always
- Sometimes
- Infrequent
- Almost Never

Where do you most often use your mobile device?

- Home
- In transit
- At work
- Recreational clubs
- Other

Do you have internet access through a cellular network on your mobile device?

- Yes
- No

What mobile devices do you own?

- Mobile Phone
- Tablet
- PDA
- Any other

Is there any specific time that you do not carry your mobile device?

- Morning
- Early Afternoon
- Late Afternoon
- Night
- I always Have My Device

Do you have internet access through a Wi-Fi or any other internet connection on your mobile device?

- Yes
- No

Which activity do you most often engage in on your mobile device?

- SMS/MMS
- Device Calls
- Internet Access
- Email

Do you feel comfortable installing and operating third party software on a mobile phone?

- Completely uncomfortable
- Somewhat uncomfortable
- Not Sure
- Somewhat comfortable
- Completely Comfortable

Entertainment

Would you agree that having course materials such as slides, lecture notes, and practice quizzes available on your mobile phone would be beneficial to your learning process?

- Completely disagree
- Somewhat disagree
- Not Sure
- Somewhat agree
- Completely agree

Would you invest personal time to use software installed on your mobile device to take e-learning courses?

- No
- Probably not
- Not Sure
- Probably
- Yes

Do you feel that the use of some kind of mobile learning software would improve overall success in your courses?

- No
- Probably not
- Not Sure
- Probably
- Yes

Thank you for your participation!

Experimental Group/Control Group Questionnaire



UNIVERSITY OF NAIROBI
SCHOOL OF COMPUTING AND INFORMATICS (SCI)

M-LEARNING SUPPORT SERVICES FOR CORPORATE LEARNING

This survey is being undertaken to assist in M-Learning support services research at UoN, SCI department. Please take a moment to respond to this questionnaire.
Mobile devices can be effectively used in getting information regarding/Device Aspect

Do you get information on courses enrolled for on your M-learning application?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Do you get course due dates on the M-learning application?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Does M-learning application allow you to contribute on online discussion boards?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Does the M-learning application allow you to get notification on contributions made on online discussion boards?

- Agree
- Undecided
- Disagree
- Strongly Disagree

Do you get information on changes made on course due dates on your M-learning application?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Do you get notification on quiz results and retakes if any on your M-learning application?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

M-learning application User-friendliness/Learners Aspect

Did you enjoy using M-learning application?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

From your M-learning experience, would you take another mobile learning course if relevant to your learning needs?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Would you recommend mobile learning as a method of study to others?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Did you use M-learning mostly while out of office?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Downloading course content to the mobile application easy?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Navigating through mobile courses easy?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Evaluation and Questioning in M-learning was effective?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Learner Support Services / Interaction Aspect

Reminders and notifications encouraged one to complete courses, take quizzes and enroll for more courses?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Communication with, and feedback from administrators was easy?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

M-learning application is convenient way for communicating with other students on enrolled courses?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

M-learning application support services increases the quality of corporate e-learning?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Cost Effectiveness

The cost of downloading the mobile course was acceptable?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

The cost of communicating in the mobile learning course with the tutor and other students was acceptable?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Competency and general performance

M-learning has contributed to better performance on quizzes taken?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

There was more time to study and take more than two courses?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Been able to enroll and take more than two courses?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Completed all courses enrolled for?

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree

Thank you for your participation!

Sample Administrative Messages.

Some examples of notifications and reminders sent for administrative support are provided in Table below.

Reminder message	Purpose	Result
<i>Dear Student. Please enroll for Time management course by 21st May. Your study material is available online and for download.</i>	<ul style="list-style-type: none"> • Encouragement for course enrolment • Reminder on expected completion dates 	<ul style="list-style-type: none"> • Significant enrolment for the course
<i>Dear Peter, Your study material for information security course is still available to you, please retake the quiz within 5 days.</i>	<ul style="list-style-type: none"> • Extension of availability of course content for revision to students who failed to attain pass mark in the quiz. • Encouragement to complete the quiz 	<ul style="list-style-type: none"> • Significant retakes noted unlike previously where the retakes were not followed up.
<i>Dear Student. You have been enrolled for Information Security, please study the content and take the quiz on or before 8th June. Your study material is available online and for download.</i>	<ul style="list-style-type: none"> • Notification to students, that they have been enrolled for a course • Reminder on course due dates 	<ul style="list-style-type: none"> • All the students took the course and quiz in time, before the deadline.
<i>Dear Judy,. We have not received your scores for the Relationship at work course. Please take the quiz not later than Thursday 7 June.</i>	<ul style="list-style-type: none"> • Urgent notification for quiz to be taken. • Encouragement for taking the quiz • Notification of the deadline for quiz to be taken. 	<ul style="list-style-type: none"> • Increase in the number of course quiz taken compared to previous times
<i>Dear Student, we shall have live online discussion forum on Information Security on Friday 25th May at 1500Hrs. Your contribution and participation is highly welcome.</i>	<ul style="list-style-type: none"> • Encouragement for interaction session between learners on online discussion boards • Notification on the date and time for the forum 	<ul style="list-style-type: none"> • 58% attended online discussion forum vs the normal rate of 0% where there was no interaction