جـامـعـة الـشـرق الأوسـط للدراسـات العـليا
MIDDLE EAST UNIVERSITY FOR GRADUATE STUDIES

Design And Implementation Of Mobile Learning Content Model

A Thesis Presented to the Faculty of Information Systems and Technology

of the Middle East University for Graduate Studies

in Partial Fulfillment of the Requirements for the

Master Degree

2008/2009

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جامعة الشرق الأوسط للدراسات العليا

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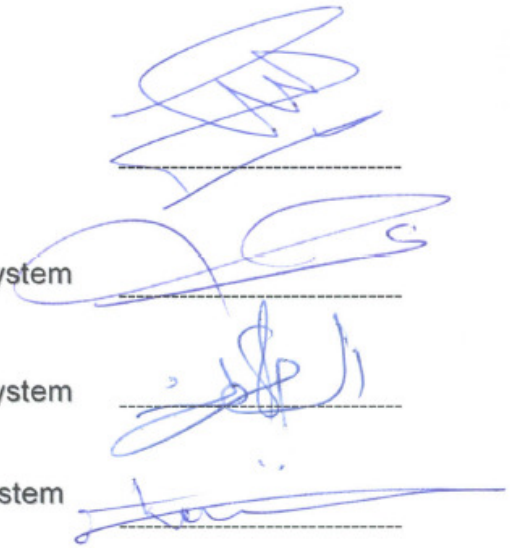

DEDICATION

This is dedicated to my family, for their love and encouragement.

ACKNOWLEDGMENTS

I would like to express my sincere appreciation to Professor Mohammad Al Fayoumi (PhD) for his guidance, support and motivation throughout my Master's Thesis.

I would further like to acknowledge all of the Information Technology faculty members at the Middle East University for Graduate Studies for helping and encouraging my efforts especially at the end of the thesis.

Above all, I would like to especially thanks my dear husband for his love, support and being always there for me.

To my lovely family Natalie, Jasmine, Yousef and Issa for supporting me during the time I was writing this thesis, i hope they feel that I make this for them.

I would like to give this thesis for my parent's souls, to feel proud of me always, because they are the one who planted in me the spirit of perseverance and ambitious.

To my dear sisters Abeer, Gadear, Manal and Halla, for their love and encouragement.

Without them all nothing of this would have been possible.

You all make the journey worthwhile …. Thank you all

.

“**D**esign **a**nd **I**mplementation **o**f **M**obile **L**earning **C**ontent **M**odel”

Abstract

Mobile technologies have drawn a great deal of attention not only in developed countries, but also in developing countries. Mobile technologies offer a possible solution for applying technology in education in developing countries, as it offers solutions to specific developing countries infrastructure limitations. Mobile phones are not just communication devices sparking new modalities of interaction between people; they are also powerful computing devices. Due to the significant penetration of mobile phones, many students are already owners of their own powerful learning devices in the form of mobile technology. m-Learning has enhanced learning and teaching environments. Mobile devices, such as smart phones and personal digital assistants (PDAs) are used as learning organizer tools and for delivering online courses to university students. Mobile technology enhanced learning pertains to the delivery of multimedia learning resource onto mobile end devices such as cell phones and PDAs. It also aims to support personalized adaptive learning in a community context. However, there are few applications that support studies through m-learning environments. This thesis presents the design and implementation of an m-learning application. In this thesis we focus on adapting content presentation to select elements from various sources in a mobile environment, such as elements from the learner's profile, mobile device requirements and connectivity’s. This ensures that the learner can manage and get the content through the mobile device and it environment. The framework of this project used to represent the approach for data representation to reduce the complexity of the learning environment and allows efficient content adaptation and it could be applied to any type of learning content; we are only taking into account material that supports learning, such as summery, quizzes, messages, objective and comment and so on. Moreover, the proposed model will support the student learning context which is a result of the mobility of m-learning scenarios such as user location, movement, duration of stay, noise level and availability of resources.

مترجماً الى اللغه العربية او الأنجليزيه:

"تصميم وتنفيذ نموذج للمحتوى التعليمي من خلال الموبايل"

ملخص

الهواتف المتقلة (موبايل) لها قدرا كبيرا من الاهتمام ليس فقط في البلدان المتقدمة، ولكن أيضا في البلدان النامية. تقدم تكنولوجيات الهواتف المتنقلة العديد من الحلول الممكنة لتطبيق التكنولوجيا في التعليم في البلدان النامية، لأنها توفر حلولا فريدة لقيود البنية الأساسية للبلدان النامية. الهواتف المحمولة ليست مجرد أجهزة اتصال جديدة للتواصل بين الناس ، بل أنها أجهزة لديها المقدرة على إجراء العمليات الحاسوبية. ونظرا لانتشار الهواتف المحمولة بين طلبة العلم فإنه يمكن استغلالها في تطوير نظم تساعدهم في عمليات التعليم. التعليم من خلال الأجهزة المتنقلة عمل على تعزيز بيئة التعلم والتعليم. الأجهزة النقالة، مثل الهواتف الذكية والمساعدات الرقمية الشخصية (أجهزة المساعد الرقمي الشخصي) يمكن أن تستخدم كأداة من أدوات التعلم ومنظم لتقديم دورات دراسية على شبكة الإنترنت لطلاب الجامعات. تكنولوجيا الهواتف الخلوية يمكن أن تعزز عملية التعلم، حيث يمكن استغلال الوسائط المتعددة الممكنة لعرض موارد التعليمي خلال الأجهزة المحمولة مثل الهواتف المحمولة وأجهزة المساعد الرقمي الشخصي. ويهدف أيضا لتكيف التعلم الشخصي وانتشارها في المجتمع. ومع ذلك ، فهناك عدد قليل من التطبيقات التي تدعم الدراسة من خلال الهاتف المحمول في بيئة التعلم. في هذه الرسالة نقوم بعرض تصميم وتنفيذ تطبيق التعليم من خلال الهواتف المتنقلة، حيث نركز على تكييف عرض المحتوى من خلال اختيار العناصر المختلفة في بيئة الهواتف المتنقلة ، مثل تحديد ملف شخصي للمتعلم، ونوع الجهاز النقال ومتطلبات الاتصال، حتى يتم التأكد من أن المتعلم يستطيع إدارة والحصول على المحتوى من خلال جهاز الخلوي. ومن خلال الإطار العام لهذا المشروع سوف يتم تحديد المنهج المناسب لتمثيل وعرض البيانات للتخفيف من تعقيد بيئة التعلم وزيادة كفاءته، ويمكن تطبيقه على أي نوع من أنواع التعلم، مع مراعاة المواد التي تدعم التعلم مثل الأختصارات, الرسائل القصيره, الأمتحانات والتعليقات الخ . علاوة على ذلك ، فإن النموذج المقترح سيدعم عملية التعليم مع الأخذ بعين الإعتبار بيئة الهواتف المتنقلة.

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LIST OF ABBREVIATIONS

(X)HTML	**Extensible Hypertext Markup Language**
3G	**Third Generation**
4G	**Fourth Generation**
API	**Application Programming Interfaces**
BL	**Battery Level**
CBT	**Computer-Based Training**
CC/PP	**Composite Capabilities/Preferences Profiles**
GPRS	**Global Packet Radio Service**
GSM	**Global System for Mobile Communication**
HTML	**Hyper Text Markup Language**
ICT	**Information Communication Technology**
IrDa	**Infrared Data Association**
KA	**Knowledge Area**
LO	**Learning Object**
LP	**Learner Preference**
LS	**Learner Style**
MMS	**Multimedia Messaging Service**
PC	**Personal Computer**
PDA	**Personal Digital Assistant**
PIM	**Personal Information Management**
SCORM	**Shareable Content Object Reference Model**
SMS	**Short Message Service**
UAPROF	**WAP User Agent Profile**
W3C	**Wide Web Consortium**
WAP	**Wireless Application Protocol**
Wi-Fi	**Wireless Fidelity Protocol**
WML	**Wireless Markup Language**
WURFL	**Wireless Universal Resource File**
WWW	**World Wide Web**
XML	**Extensible Markup Language**
XMLT	**Extensible Markup Language transformation**

Chapter 1

Introduction

Chapter 1

Introduction

1.1 Overview

Mobile technologies have drawn a great deal of attention not only in developed countries, but also in developing countries. Minges [25], Head of ITUs Market, Economics and Finance Unit, states that ”Mobile technology it is a technology that has permeated more widely than any other into new areas, and we must examine how we can utilize this technology going forward”.

In developing countries, mobile phones offer a possible solution for applying technology in education, as they are not only cheaper than desktop and laptop computers but offer unique solutions to developing countries infrastructure limitations [15]. Mobile phones are not just communications devices sparking new modalities of interaction between people; they are also powerful computing devices that are portable and personal [24]. Due to the significant penetration of mobile phones, many students are already owners of their own powerful learning devices in form of various types of mobile technology. Prensky [24] asks" why not to use the opportunity to their educational advantage?” He inferred that students with mobile devices can learn “anything, if educators design it right.”

m-Learning has been proved to enhance learning and teaching environments in various documented studies [10, 13, 37, and 18]. They found that mobile devices such as smart phones and personal digital assistants (PDAs), can be used as learning organizer tools, where students can access course materials and schedule their course calendar. Wang et al. [26] reported that mobile devices can successfully be used for delivering online courses to university students. However, there are few applications that support computer science studies through m-learning.

1.1 Statement of Problem

Mobile phones are powerful computing devices. Due to the significant penetration of mobile phones, m-learning has proved to enhance learning and teaching environments. So, we want to use this technology to enhance educational operation to in order with technology developments, and mobile technology will enhance learning pertains to the delivery of multimedia learning resource onto mobile end devices. It also aims at supporting personalized adaptive learning in a community context. However, there are few applications that support studies through m-learning environments, so we want to develop new system to support this trend.

The problem we will focus on is to confirm the effectiveness and the efficiency of the model that was proposed in [43] by implementing and designing a whole educational course according to their design approach. Furthermore, the effectiveness of our system will be evaluated using a sequence of simulations to give us quantitative results. A small number of higher education learners will be working with the system and to give us qualitative results, this result has been analyzed and accordingly the expectations were:

- Make full implementation of the model that was proposed in [43] for designing and adapting m-learning content, by translating the design into a program with a personal activity and we will carry out some program testing to discover and remove errors in the debugging process.
- Secured system, each learner has a username and a password, and will log in before using the system's functions.
- Studying the effectiveness of the system in the social life on the learning activity and its impact in higher education student in Jordan by using the survey.
- We will compare this model with other models to measure and establish the efficiency and effectiveness of the model adaptation performance regard to the learning contexts, objectives and the learner's preference [43].

1.2 Motivation

The rationale for this study comes from Hawkins' [15] clarification that "a cheap and easy-to-use technology must be used in schools to allow greater use among students and tutors, especially in developing countries." Therefore, use of mobile devices as personal computers for learning in developing countries would be a feasible option.

Using mobile telephone among the student's society it can be a good investment to let the student replace the traditional way of learning by using these technologies. m-Learning can develop the e-learning benefits by using this technology from personal computers (PC) and open new scope for the educational community to reach the idea of learning anytime and anywhere. Content design is an important subject that enhances the learning process in any learning form; therefore we would like to implement a model for adapting the learning content for m-learning applications.

1.3 Objectives

In this work we will focus on adapting content presentation to select elements from various sources in a mobile environment, for example, elements from the learner's profile, mobile device requirements and connectivity's[9]; to be sure that the learner can manage and get the content through the mobile device and it environment. We want to build a new m-learning system that conforms to the following features,

1. Design and implement a system that is easy to use and managed.
2. Design a system that fits with most of mobile devices that support multimedia.
3. Design systems that provide multimedia contents.
4. Achieve the desired goals of m-learning.
5. Increase spread of the concept of m-learning

1.4 Challenges

The majority of the existing challenge to build m-learning environment that depends on server side to fixed internet browsers on the mobile device, this technique give you thought about a poor use of the

system [35, 36]. Then the development to that technique modifies the content by using XMLT (Extensible Markup Language transformation) technique to display the content to suit different devices according to a repository of profiles on the server side. Instead, WAP, GPRS and Wi-Fi was used to provide a specialized learning skill for mobile learners and PDAs [12] to interact between a user and an application so we discuss the environment of a learning context and in particular the way which technology can be used to connection different locations and place and network connection, user's profile, lighting, noise levels, traffic conditions and how it can adapt, or help learners to adapt a learning context to meet their requirements moreover and it should be define unique learner.

1.5 m-Learning framework

Most of research in m-learning was made responsible for leading teaching & learning environment to use the new technology. This include

- Transforming the campus into a fully wireless environment.
- Equipping each student with personal electronic devices.
- Enabling and managing learning through an e-learning management system.

In this thesis, a user can communicate with the learning environment through a specialized connection depending on type of his device and physical environments context and his personal context.

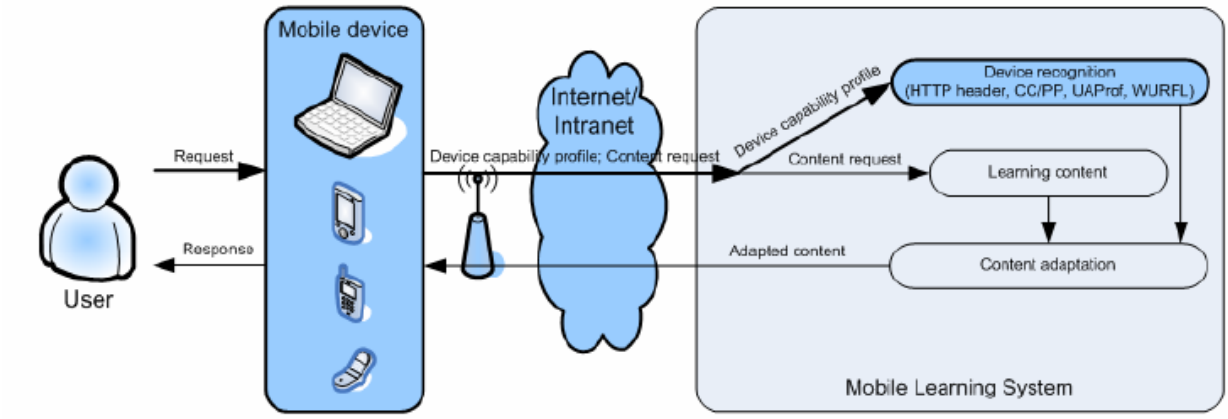


Figure 1.1 : m-Learning framework

The framework can be used to represent the approach for data representation to reduce the complexity of the learning environment [1] and allows efficient content adaptation and it could be applied to any type of learning content; we are only taking into account material that supports learning, such as summaries, quizzes, messages, objective comment and so on.

In this research, mobile learning framework is supported by these three pillars:

- A fully wireless enabled campus which allows for anywhere-anytime access to the e-environment.

- A student body that is equipped with personally-owned laptops or PDAs as appropriate.
- A campus-wide e-learning platform which supports and enables learners to access module information and services, interact, collaborate, and construct and present knowledge.

1.6 Proposed methodology

The proposed methodology for our work includes the following stages:

1.6.1 Analysis stage

During this stage it is necessary to analyses the system that we want to build. This will involve analysis of existing mobile devices, web browsers and methods for mobile devices recognition. The HTTP header values for different mobile devices also can be investigated using corresponding web sites [21, 23, 35].

Then define the types of mobile devices which will be supported Note-books, PDAs, smart phones, cell phones. During this selection the potential users, the mobile devices they posses and prefer to use, must be taken into account. It is necessary to select and test several of the most often used web browsers because they have different functional capabilities [36]. Table1.1 shows different types of mobile devices, their operation systems and some of the popular web browsers which can be used.

Mobile device	Operation system	Web browser
Notebooks	Windows	Internet Explorer, Mozilla Firefox, Opera, Netscape, Amaya
	Linux	Mozilla Firefox, Opera, Netscape, Konqueror, Amaya
PDAs	Windows Mobile	MS Mobile Internet Explorer, Minimo, Opera Mobile, PIE Plus, ftxPBrowser, MultiIE, NetFront, ThunderHawk, Deepfish
	Palm OS	WebPro, Xiino, Minuet Browser, Universe
	Linux	NetFront
	BlackBerry	BlackBerry
Smart phones	Windows Mobile	Internet Explorer, Opera Mini, ThunderHawk, Deepfish
	Symbian	WebViewer, Opera, ThunderHawk, NetFront
	Apple OS X	Safari
Cell phones	RTOS	Micro browser, Compact NetFront Plus

Table 1.1 : Types of mobile devices and their OS

Then define the characteristics of mobile devices which influence on the learning content adaptation have to be selected. The main characteristics on which the correct adaptation depends are:

• **Screen resolution.** This is a very important characteristic during the process of adaptation because at present there are big varieties of screen resolutions – from small ones of the cell phones to the large ones of Note-books [12].

• **Screen mode (portrait or landscape).** Many new PDA devices support switching over between portrait and landscape screen mode. That's why it is important to determine not only the screen resolution but the screen mode too.

• **Supported markup and script languages.** The determination of these characteristics is important especially for adaptation of (X)HTML web pages which use JavaScript, because not all web browsers for PDAs and smart phones support all JavaScript functions (for example MS Internet Explorer and MS Deepfish [11]). The mobile phones which respond to the standard WAP 1.x support WML and WML Script, while those of them which respond to the standard WAP 2.0 support XHTML.

• **Supported multimedia file formats.** In order to play appropriate multimedia elements on a mobile device with a particular web browser it is important to determine which of them are supported.

The method/methods for recognition of the defined mobile devices characteristics have to be selected too. Currently, servers and proxies can determine the identity of a particular device using the request header field in the HTTP protocol. In addition there are three alternative methods: the W3C Composite Capabilities/Preferences Profiles (CC/PP), the WAP User Agent Profile (UAPROF) standard and Wireless Universal Resource File (WURFL).

• **HTTP User-Agent Header.** The web browsers and servers use the HTTP protocol to transfer information on the WWW. It includes a mechanism for content presentation which browsers can accept. The server decides what kind of information to send depending on the device profile. Each HTTP request includes Accept Header [41], which indicates the types of data, which the browser can accept. In addition to the Accept Header the client sends User-Agent Header [41]. It identifies the client device and contains information about the browser, operating system and sometimes hardware information.

As the number and the kind of devices, which have internet connection, constantly grow, the need of content designed to different devices also develops. That why the information from User-Agent Header is not sufficient.

• **Composite Capabilities / Preferences Profiles (CC/PP)**. The specification Composite Capabilities/Preferences Profiles (CC/PP) from World Wide Web Consortium [16] documents a standard way, which allows devices to transmit their configuration details and capabilities (screen resolution, audio characteristics, frequency band) to web servers. CC/PP specification provides universal profile that describes the devices' characteristics. CC/PP is designed to be independent. The connected specifications as UAPROF, unlike CC/PP, define a variety of dictionaries describing the devices' characteristics.

• **WAP User Agent Profile (UAPROF**). Another way to identify the user device profile is using the User Agent Profile [43] specification. It is a specific CC/PP dictionary describing mobile devices and defining an effective way for CC/PP content transition via wireless nets. Mobile phones conformed to UAPROF specification provide CC/PP description of their characteristics on a server. Content servers, gateways and proxy servers can use this information and optimize the content for the device of a consumer. The information is in XML format. When a mobile device sends request to server, it also sends an URL address to its mobile profile. This is carried out by adding of X-Wap-Profile Header to the request. This header indicates the server where to find the device profile. The content server extracts the necessary

information for the client from device profile repository and can store it, so that it can be used later. WAP gateway or HTTP proxy must support working of UAPROF header.

• **Wireless Universal Resource File (WURFL).** The mobile device profile can be identified using the open source project Wireless Universal Resource File (WURFL) [24]. It is a configuration file containing information about the features of mobile devices offered on the market. The main goal of the developers of this file is to support maximum information for existing wireless devices that have an access to WAP pages. WURFL project has some advantages compared to UAPROF: 1) WURFL file can be stored on a server and it is not necessary to be accessed remotely; 2) Each device characteristics can be shaped.

1.6.2 Design Stage

This stage includes design the mobile system to fit with the results of the analysis stage, which includes user interface design, processes and relationships between different components of the system

This stage includes the program realization of the selected method/methods for mobile devices characteristics recognition. Since the proposed methodology is intended for systems which support on-line learning, the recognition must be realized from the server side and for the logic description has to be used a selected script language (JSP, ASP.net, XML). Initially verification about a particular device type (for example Notebook) is done. If its characteristics are not recognized it is accepted that this is other device type and it is verified. The process continues until the mobile device and its characteristics are recognized. The profile of the recognized device type should be able to be sent as a parameter to the module for learning content.

The program realization is accompanied with the experimental investigations with the selected mobile devices, web browsers and characteristics. During these tests web sites which return information about some device characteristics [17] can be used in order to verify the correct operation of the program. An analysis if the selected characteristics are recognized has to be done. Otherwise another recognition method has to be applied and programmed.

1.6.3 Implementation stage

In this stage the program realization of the selected methods for mobile devices characteristics recognition is integrated in m-learning System. And find how a user request for learning content via mobile device and how this request is processed by the system, also finding the interaction between the module for device capabilities recognition and the module for learning content adaptation.

1.6.4 Evaluation stage

This stage includes the evaluation of m-learning System efficiency with different devices. The purpose is to verify if the mobile device recognition is correct. If the particular device type is not correctly identified the realization of the recognition algorithm must be analyzed and revised.

1.7 Thesis Organization

This thesis is divided into seven chapters.

Chapter 2 : provides an overview of m-learning, the concept of m-learning and its technologies.

Chapter 3 : contains a review of the relevant literature in m-learning.

Chapter 4 : presents the project under the following headings:

- System Requirements
- Design and Implementation

Chapter 5 : presents the proposed model

Chapter 6 : comparison with other systems

Chapter 7 : conclusion and future work

Chapter 2

M-Learning

CHAPTER 2

Mobile Learning

This chapter presents a literature study on m-learning and its technologies. The concept of e-learning and m-learning is discussed. It highlights the shift from electronic learning to mobile learning, mentions two m-learning approaches, and describes the implementation of m-learning in schools and universities. Finally, in this chapter, we present the classification of mobile technologies and describe the functionality and platforms of mobile devices.

2.1 Mobile Learning

Urdan and Weggen [38] define electronic learning (e-learning) as ”the delivery of content via all electronic media, including the Internet, intranets, extranets, satellite broadcast, audio/video tape, interactive TV, and CD-ROM.”. Content could include text, graphics, animation, and covers both the conceptual material and interactive practice activities that allow learners to practice and to provide some personalized feedback [8]. Brown states that e-learning is a subset of distance learning, which is in turn a subset of flexible learning as shown in [Figure 2.1] [39].

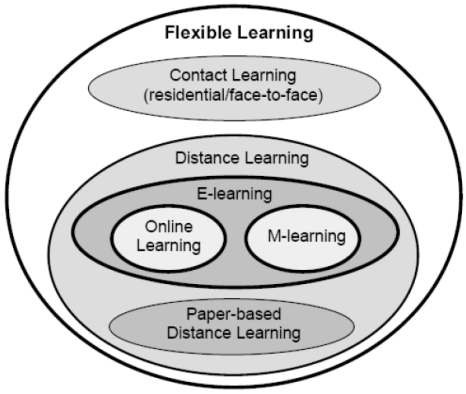


Figure 2.1: The subsets of flexible learning

The Figure 2.1 illustrates the subsets of flexible learning as distinct delivery modes; these delivery modes are in practice very much integrated or blended. For example, an e-learning environment can be divided into networked and stand-alone environments and that networked environments in turn can be divided into online (wired) and mobile (wireless) environments.

However, Firmin et al [33] finds that e-learning is an important aspect of further education because of enhancement of learning and its applicability to the workplace. e-Learning covers a wide range of applications and processes, including computer-based learning, web based learning, virtual classrooms, and digital collaboration [38].

This perspective dominates the literature. In this perspective, m-learning is viewed as learning that takes place via such wireless devices as mobile phones, personal digital assistants (PDAs), or laptop computers. For example, Wood [19] refers to the m-learning as ”the use of mobile and handheld IT devices, such as Personal Digital Assistants (PDAs), mobile telephones, laptops and tablet PC technologies, in teaching and learning”, where another definition of m-learning is ”the ability to enjoy an educational moment from a cell phone or personal digital assistant (PDA)” [28].

The success of the learning process in an educational system depends on many factors such as how the system presents the domain knowledge to the learner, how it changes its presentation in terms of complexity and granularity according to learner’s progress, and quite importantly, how it takes into account the user device and user preference profiles. Tutoring strategies are the major source of taking decisions regarding domain knowledge presentation. A set of effective and efficient tutoring strategies leads to the creation of an educational framework. Recognizing the device and preference profiles allows adaptation engine to make decision about users choices. A good adaptation engine will seamlessly adapt to user environment, anytime and anywhere.

e-Learning first emerged in the late 80s and in the 90s it moved from heavy desktops to laptops. Since then we have seen the processing power of handheld devices grow exponentially while becoming more affordable and even ubiquitous due to the demand for games, business communications, and in general the connected lifestyle of the wireless society. These things have opened a new door to learning on-the-go which we now call m-learning.

Quinn [8] defines m-learning as”e-learning through mobile computational devices: Palms, Windows CE machines, even your digital cell phone.”, and Brown [39] defines m-Learning as “a subset of e-learning”. The definition of m-learning has evolved with the advent of new technology. While m-learning could, in its broadest sense, be said to cover books, CD-ROMs, radios, and laptops, most researchers in the field of educational technology consider mobile learning, or m-learning, to be a subset of e-learning (Laouris & Eteokleous, 2005). What differentiates mobile learning from electronic learning is the nature of the technology. S. Geddes has provided a succinct definition: "m-Learning is the acquisition of any knowledge and skill through using mobile technology, anywhere, anytime that results in an alteration in behavior".

Other definitions of m-learning have been developed, but instead of focusing on the technology, they emphasize the characteristics of the learning process. Instead of looking at technology and

behavioral change, they examine how mobile technology has allowed a shift in learning strategies and approaches.

We can say that m-learning denotes instructional content or activities that are delivered on handheld (or mobile) devices, that accommodate limited multimedia delivery, primarily in the form of audio, images, animations (video), and text. Popular mobile devices include those capable of playing files that are often downloaded from the Internet on a computer and then uploaded onto the device where it is then taken with the individual, who may play the files while not directly connected to a computer. Audio and video files may be played on handheld computers, audio file players such as iPod, and handheld devices that play video files.

New hardware is always being developed which accommodate more simultaneous functions, larger files, and more robust access through phone and high-speed satellite connections. While all handheld technologies are expanding, the fastest development has been in the incorporation of connectivity and functionality, envisioned in the form of Smartphone's or wireless handhelds. M-learning also can accommodate e-books, where text files can be read on PDF files on handheld devices that include PDF or e-book reader software.

2.1.1 Changing from e-learning to m-Learning

Kinshuk [20] remarks that "there is much evidence that mobile technology is going to provide a natural extension for e-learning in the long run". Sharma and Kitchens [34] find that the shift from e-learning to m-learning can be accompanied by change in terminology. Laouris and Eteokleous [42] provide an example of terminology that used to characterize the two types of learning environments as presented in Table 2.1.

e-learning	**m-learning**
Computer	Mobile
Bandwidth	GPRS, G3, Bluetooth
Multimedia	Objects
Interactive	Spontaneous
Collaborative	Networked
Media-rich	Lightweight
More formal	Informal
Simulated situation	Realistic situation
Hyperlearning	Constructivism situationism, collaborative

to

Table 2.1: Terminology that used to characterize of e-learning and m-learning

Kukulska-Hulme and Traxler [3] recognize that m-learning has different strengths than e-learning as shown in Figure 2.2. They find that the strengths of m-Learning and e-learning can be

overlapped in terms of the learner experience. Mellow [29] states that m-learning is "a means to enhance the broader learning experience, it is not a primary method for delivering courses/distance learning."

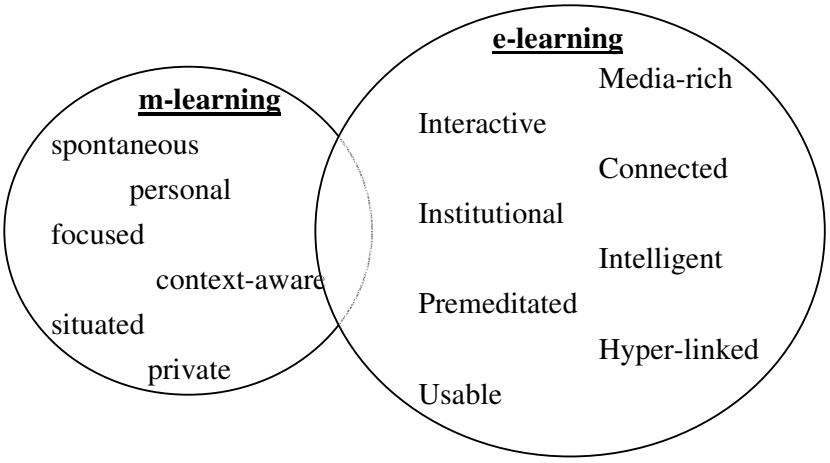


Figure 2.2: The characteristic of m-learning and e-learning

However, the main pedagogical difference between e-learning and m-Learning is that the former occurs in front of a computer, in the classroom, or in Internet labs, while the latter occurs in the field or at any location [34]. Anttewell [14] recognizes the benefits of m-Learning. These benefits are summarized briefly as follows:

- m-Learning helps learners to improve their literacy, numeracy skills and to recognize their existing abilities;
- m-Learning helps learners to identify the areas where they need assistance and support;
- m-Learning helps to combat resistance to the use of information communication technology (ICT) and can help bridge the gap between mobile phone literacy and ICT literacy;
- m-Learning helps to remove some of the formality from learning experience and engage reluctant learners;
- m-Learning helps learners to remain focused for long periods;
- m-Learning helps to raise self-esteem and self-confidence.

According to Laouris and Eteokleous, e-learning was dominated by the following terms: "multimedia, interactive, hyperlinked, media-rich,". m-Learning terms, however, exhibit a shift away from a media immersion experience, or a structured, benchmarked set of activities, to words that express what are perceived as the primary attributes of a very different experience:

"spontaneous, intimate, situated, connected, informal, lightweight, personal,". "Mobility is about increasing a learner's capacity to physically move their own learning environment as they move" (Barbosa & Geyer, 2005), there for the nature of the learner's interaction with instructional content is altered. Instead of immersing oneself into an environment that floods the senses with stimuli, such as that of a virtual reality experience provided by simulations and games in robust computer systems, or interacting with multiple users within a complex learning management system, the m-learner engages with the content in a constantly changing environment. Thus, if designed well, the m-learning course takes advantage of constantly changing instructional contexts or environment to allow the learner to connect the content so that he or she is compelled to integrate the world outside with the world of material on the device in order to successfully demonstrate the achievement of learning objectives. Specifically, the well-designed m-learning program brings together the learner's physical environment (constantly changing, since it is mobile), with the concepts to be understood and processed.

With mobile technologies, m-learner can be conceptualized as an individual using equipment to take readings, gather data, and to integrate data and knowledge to create a map. This process is literal and metaphoric. The "map" is the product, or the outcome of any learning activity. It is constructed in a spontaneous, problem-solving process.

The impact of a changing instructional strategy and a constantly evolving set of technological breakthroughs can have an impact on traditional courses such as literature. In the case of literature, distance learning in its most basic form included books and correspondence with an instructor.

m-Learning content attributes	m-Learner outcome attributes
=>portable, interactive	➔ situated problem-solving
=>limited media	➔ able to integrate multiple content sources
=>gather data	➔ create "map"
=>integrate prior knowledge	➔ develop tangible "solution" as outcome

Table 2.2. m-Learning content and outcome attributes

With the advent of Computer-Based Training and learning (CBT) or e-learning, the instructional strategies changed. Access to primary texts and abundant secondary texts became possible in a way that had never been envisioned before, thanks to repositories such as Project Gutenberg, which provides e-texts free of charge and libraries of secondary sources. Instructional strategies tended to emphasize the richness of contexts. For example, an e-learning course, or a CD-ROM course on

British Romanticism could also include videos, presentations, music, and images of art and architecture.

In addition to affecting instructional strategies, online technology influenced learning strategies and learner outcomes (Table 2.2). With inexpensive access to texts, abundant availability of texts, and immersion multimedia experiences, learners became adept at making interdisciplinary connections and tracing provenances. Students using CD-ROM or online repositories demonstrated that they were also skillful in applying theory to literary texts, thanks to the availability of high quality secondary sources.

Advances in information technology and computers changed instructional strategies and learner outcomes yet again. With the advent of mobile devices - handheld computers and devices capable of reading e-books - digitized texts became available via download or through memory cards.

The first responses to mobile devices by educators and researchers were mixed. Some were enthusiastic, as were Looney & Sheehan (2001), who emphasize that "students who are literally anywhere in the world will have access to the same content as does the student on campus, whether that access is through the faculty Web site, the college bookstore or the digital library". While educators praised the low cost and expanded access to literary works (Looney & Sheehan, 2001), they also pointed out how incapable the handheld devices were of providing the kind of immersion experience available through computer-based training and e-learning (Hawkins, 2000).

In fact, one can argue that the tendency to measure the quality of an educational experience by the degree to which one has an immersion experience is what hampered initial adoptions of e-books, despite the increase in both volume and extent of primary and secondary sources. Hawkins (2000) and others regularly listed "unattractive page formats" as the primary disadvantages of e-books. There was little thought or consideration given to how the content would be used, except in functional terms (lightweight, portable, long battery life), and where (in trains, planes, hotel rooms) (Hawkins, 2000). Providing students with low-cost access to a vast array of works was still the main focus (Crane, 2000).

The portability and improved access of mobile devices encouraged many researchers to point out that the real benefits of m-learning had to do with enhanced collaboration, improved abilities to incorporate situated learning by using the environmental inputs in order to solve a problem or create a "map" of a concept, process, or solution. S. Geddes points out that collaborative and dynamic approach to m-learning leads to the attainment of cognitive skills, which include reflection in action, reflection on action, and anticipation of future action.

The ability to work with multiple types of input from mobile devices to identify, comprehend, categorize, and synthesize information "on the fly" is an important and largely unexplored value of m-learning.

2.1.2 Why m-learning?

m-Learning is reaching a new kind of user through:

1. Convenience: accessible from anywhere to content including quizzes, journal entries, balance sheets, learning games
2. Collaboration: best learning takes place when we share and get immediate tips and feedback
3. Portability: stacks of books are replaced by RAM with learning experiences customized and connected (Reviews and summaries chunked for on-the-go access)
4. Compatibility: designed learning specially for mobile devices
5. Engaging/Fun: combine gaming and learning for a more entreating and effective experience.

2.1.3 What can we do with m-learning?

1. Access documents or document libraries
2. Access quizzes and self-assessment as question or games
3. Participate in lessons and tutorials
4. Receive lectures archived or broadcasted live
5. Access to video clip or audio libraries
6. Read asynchronous postings
7. Exhibit student work
8. Participate in virtual learning

2.1.4 What technology is currently available for m-learning?

1. SMS: Short Message Service allows users to send/receive messages of up to 160 characters between mobile phones (text messaging).
2. MMS: Multimedia Messaging Service serves the same purpose as SMS but allows the inclusion of graphics.
3. WAP: Wireless Application Protocol, An international protocol that allows users to access the internet via their WAP enabled mobile phones.
4. GPRS: General Protocol Radio Service, always on internet connection for mobile devices that provides greater speed of connection (171kb/s).
5. Bluetooth: A short range wireless connection. This enables PDAs (Personal Digital Assistants) to pass messages to and from other mobile devices.

6. 3G and 4G phones: By the end of the decade 4G (4th Generation mobile phones) will provide up to 100 megabits per second transmissions adequate for multimedia.
7. PDAs: Personal Digital Assistants have evolved to mini PCs able to carry out many of the basic functions of a larger PC using the Palm OS or MS Pocket PC operating system.
8. MP3s: Audio file format that efficiently compresses files and enables them to be shared.
9. CAMs: Video cameras now embedded into mobile phone and PDAs.

2.1.5 Benefits of m-learning

Portable computing/ communication devices such as laptop, PDAs, and smart phones connected to wireless networks enable mobility and facilitate mobile learning. Mobility allows teaching and learning to extend beyond the traditional classroom; in the case of distance learning, users of portable devices can break the tether of the home computer. Within the classroom, portable computing/communication devices give instructors and students increased flexibility and provide new opportunities for interaction.

Mobile technologies also support learning experiences that are collaborative, accessible, and integrated with the world beyond the classroom. The benefits, however, do not come without challenges.

2.1.5.1 Benefits

- Anytime, anywhere access to content.
- Can enhance interaction between and among students and instructions.
- Great for just-in-time training or review of content.
- Can enhance student-centered learning.
- Can appeal to tech-savvy students because of the media-rich environment.
- Support differentiation of student learning needs and personalized learning.
- Reduce cultural and communication barriers between faculty and students by using communication channels that students like.
- Facilitate collaboration through synchronous and asynchronous communication.
- Interaction: Student interaction with instructors and among each other.
- Portability: PDAs are lighter than books and enable the student to take notes or input data directly into the device regardless of location either typed, handwritten or using voice.
- Collaborative: enables several students work together on assignments even while at distant locations.
- Engaging learners: the new generation likes mobile devices such as PDAs, phones and games devices.

- Increase motivation: ownership of the handheld devices seems to increase commitment to using and learning from it.
- Bridging of the digital divide: since handhelds are more affordable than larger systems they are accessible to a larger percentage of the population.
- May assist learners with some disabilities.

2.1.5.2 Challenges

Technical challenges include:

- Connectivity and battery life
- Screen size and key size
- Ability for authors to visualize mobile phones for delivery
- Multiple standards, multiple screen sizes, multiple operating systems
- Repurposing existing e-learning materials for mobile platforms

Social and educational challenges include:

- Accessibility and cost barriers for end users: digital divide.
- How to assess learning outside the classroom
- How to support learning across many contexts
- Developing an appropriate theory of learning for the mobile age
- Design of technology to support a lifetime of learning
- Tracking of results and proper use of this information
- No restriction on learning timetable
- Personal and private information and content
- No demographical boundary

2.2 Mobile Technologies

2.2.1 Classification of Mobile Technology

Naismith [22] classify the range of mobile technologies using two orthogonal dimensions, personal vs. shared and portable vs. static, as represented in Figure 2.3.

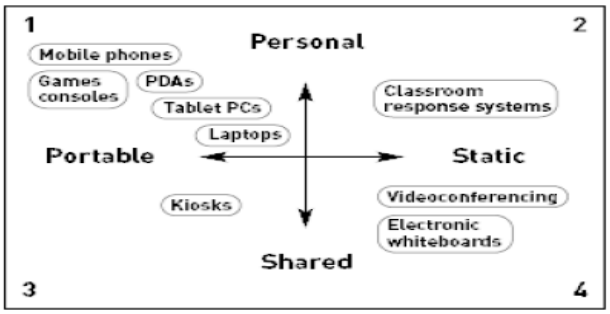


Figure 2.3: Classification of mobile technologies

Quadrant 1 shows devices that can be classified as both portable and personal. These kinds of devices are what most people commonly think of in relation to mobile technologies, such as mobile phones, PDAs, tablet PCs and laptops. It also includes hand-held video game consoles. Classroom response systems, shown in quadrant 2, consist of individual student devices that are used to respond anonymously to multiple choice questions administered by a tutor on a central server. In quadrant 3, there are examples of technologies that can provide learning experiences for users on the move, but the devices themselves are not physically movable. For example, street kiosks, interactive museum displays and other kinds of installations that offers pervasive access to information and learning experiences. For more shareable interactions, the devices themselves must become larger and hence less portable. Examples include interactive classroom white-boards and video-conferencing facilities, as shown in quadrant 4.

2.2.2 Mobile Phone

The most popular and widely owned handheld device is the mobile phone. Even the most basic phones provide simple personal information management (PIM) tools, such as address books and calendars. More advanced phones incorporate cameras and infrared or Bluetooth connectivity for exchanging information. Many phones contain modems. This means that they can be used to connect to other devices, such as laptops and PDAs, or to the Internet. In addition to voice communication, most phones provide short messaging service (SMS) and multimedia messaging service (MMS) [5]. Other types and functionality of mobile devices are presented in Figure 2.4.

Figure 2.4: Types and functionality of mobile devices

According to Riggs and Vandenbrink [31], mobile phones and smart phones can be classified into three categories, depending on the types of interactions between the user and the device. These types are: one-handed, two-handed, and stylus. A one-handed device has a small screen size and usually provides standard key pads as input mechanism. Users commonly interact with this type of devices with one hand. A two-handed device has a small QWERTY keyboard and it provides a larger screen size compared to the one-handed device. Generally, usage of the two handed devices is much like desktop computers. In stylus devices, users interact with this type of devices by a touch screen or pen-based interface. Typically, stylus devices have larger screens than One-handed and Two-handed devices. One-handed, Two-handed, and Stylus mobile devices are shown in Figure 2.5.

Figure 2.5: One-handed, Two-handed, and Stylus mobile devices

2.2.3 Mobile Operating Systems

Mobile technologies have not only different physical characteristics, but they also have different operating systems. Basically, there are four popular operating systems: Windows CE, Symbian OS, Palm OS, and Linux [32].

Windows CE

Windows CE is designed for low-resource mobile devices. It follows the same architecture of desktop Windows operating system. Windows CE uses many of the same Application Programming Interfaces (APIs) and includes a subset of the Windows user interface suitable for mobile devices. Windows CE has a large developer community and high availability of powerful development tools; however, its development tools are very expensive.

Symbian OS

Symbian OS is specifically designed for mobile devices. Symbian OS is a multitasking operating system with features that include a file system, graphical user interface framework, multimedia support, and libraries for all kinds of communication features that are needed to be on mobile devices. Symbian OS has a flexible architecture that allows for different user interfaces to exist on top of the core operating system functionality. Although Symbian OS has large developer community and free availability of development tools, each development tool is designed for a particular category of mobile devices.

Palm OS

Palm OS is a major player in the Personal Digital Assistant (PDA) market. Palm OS, like Symbian OS, is also designed specifically for lower-resource portable devices. Although Palm has a large number of applications and large developer community, it is popular only in the US.

Linux

Linux is an open-source operating system. Linux has a large open source community and its cost is free. However, it originally developed for desktop computers not for mobile devices.

Chapter 3

Related Work

Chapter 3

RELATED WORK

There are many research related to m-learning application building to measure the efficiency of this model. In this thesis we will take about the research done in [43], the authors study the factor that could help an authorize algorithm improvement in order to cover the weirdness in m-learning situation. m-learning is a new form of learning that appears as a result of the technological improvement in mobile and wireless technologies. In this thesis we deal with designing the learning content in m-learning application to fit the mobile learner's devices. We arrange the visual learning objects into three classifications depending on the screen resolutions of the most common types of mobile devices which are: PDAs, Smartphone's, cell phones and IPod devices. Proposal, studies standards, related to the work are explained:

[Grimstad, spring 2002]

This thesis is talk about how content can be distributed from a server to any nameless devices with different technological ability. They are concentrating on the Internet architecture in the way to support this operation include content control technology and how the server sense can adapt the content to these devices [17].

[Kinshuk 2003]

He is guaranteeing that handheld device is small size and high portability and direct access with no waiting for boot-up, supporting a wide range of learning activates and the cost of technology is cheaper. So adapt portable and mobile to make them more useful for different interactive and activities and the limitations of small screen and bandwidth [16].

[Trifonova, 2004]

This thesis consider m-learning from two points of view first one is a technical openness view. It points out that e-learning simply becomes m-learning by creating another way of access for mobile users with mobile devices - such as cell phones, PDAs or pocket PCs-. The content fit for learner needs to be used and then available in mobile environment. The second one is an educational side. It points out that m-learning supports a new dimension in the educational process will be required to ensure the effectiveness of mobile learning. Also, a new dimension of adaptability is device dimension and connectivity dimension. The connectivity dimension is might be connected to 'The Net' via many technologies WAP, GPRS, UMTS, Bluetooth, WiFi, etc. Mobile devices often have time of disconnection, either with intent (when the connection is too expensive) or not (when no infrastructure is provided) [2].

[Goh and Kinshuk 2004]

Summaries several mobile teaching and learning system implementations as presented in Table 3.1. Also, they draw the following conclusions [40]

- M-learning is in its infancy stage. Researchers are still exploring every aspect of mobile learning.
- Mobile content can be as simple as SMS to as sophisticated such as multimedia still picture.
- No video or flash applications on mobile devices were being evaluated.
- Mobile applications are simple in nature. Most researchers use existing device software such as browser, file transfer, note taker, voice recorder, or e-mail to conduct their respective experiments.
- Slightly more sophisticated applications involve technologies using database, Java, Active perl, and forms development.
- Most applications target directly towards mobile devices. Couple applications started with PC and move to mobile devices with re-design.
- A variety of mobile devices are being used. These include Nokia communicator, HP-Jornada, IPAQ, and Palm.
- Most mobile applications are run in mobile and fixed mobile environment.
- 802.11b wireless networks as well as public telecom infrastructures were used.
- Discussions on implementation issues were very limited in scope.
- Most papers target evaluation of end users experience.

Reference	Objective	Content	Device	Environment	Implementation Technologies
Waycott (2002)	Impact study	Text	PDA palm m105	Mobile	File transfer
Stone (2002)	Effectiveness of two ways sms	SMS Text	Mobile phone	Mobile	Existing device capability
Vavoula (2002)	Knowledge and learning organisation system (KLEOS)	Text	PC Laptop	Fix mobile	Java application
Seppälä (2002)	Discussion collaborative learning	Text Picture	Nokia Communicator	Mobile	WAP browser Digital picture
Smørdal (2002)	KNOWMOBILE PDA in medical education and clinical practice	Text Voice	PDA, HP Jornada 710/548	Mobile Fixed	Use existing technology Notetaker, offline e-mail, offline web browser, voice recorder, e-book
Milrad (2002)	C-Note Collaborative knowledge building	Text	PDA IPAQ C-PEN Java enable phone PC	Mobile	Sun personal Java, XML, XSL No SWING Cocoon Text base, Database
Ketamo (2002a)	x-task Adaptive working environment	Text	PC PDA Nokia 9210	Fixed Mobile	Mysql Active perl Apache web server HTML (simple)
Hsi (2002)	E-guidebook Enhance user experience in a museum	Text Picture	HP Jornada 690/720	Mobile	Web browser RFID 802.11
Attewell (2002)	M-learning Attract young adult to learn	Text	Mobile phone	Mobile	Lecando Server 5 J2EE HTML, WAP, VoiceXML
Ketamo (2002b)	Geometry game Matching game	Text Graphic	PC IPAQ	Fixed Mobile	Wireless LAN HTML
Chang (2002)	Bird watching Mobile Scaffolding bird watching learning system	Text Picture	IPAQ	Mobile	802.11b Database CE window form Mobile Ad-hoc network

Table 3.1: Survey of m-learning systems

[Barker et al 2005]

Propose a model that shows that the mobile devices can be applied as an academic support for learners via online assessment, delivering course content, and access to the Internet. These devices also enable learner-to-learner communication as well as learner-to-tutor communication as shown in Figure 3.1.

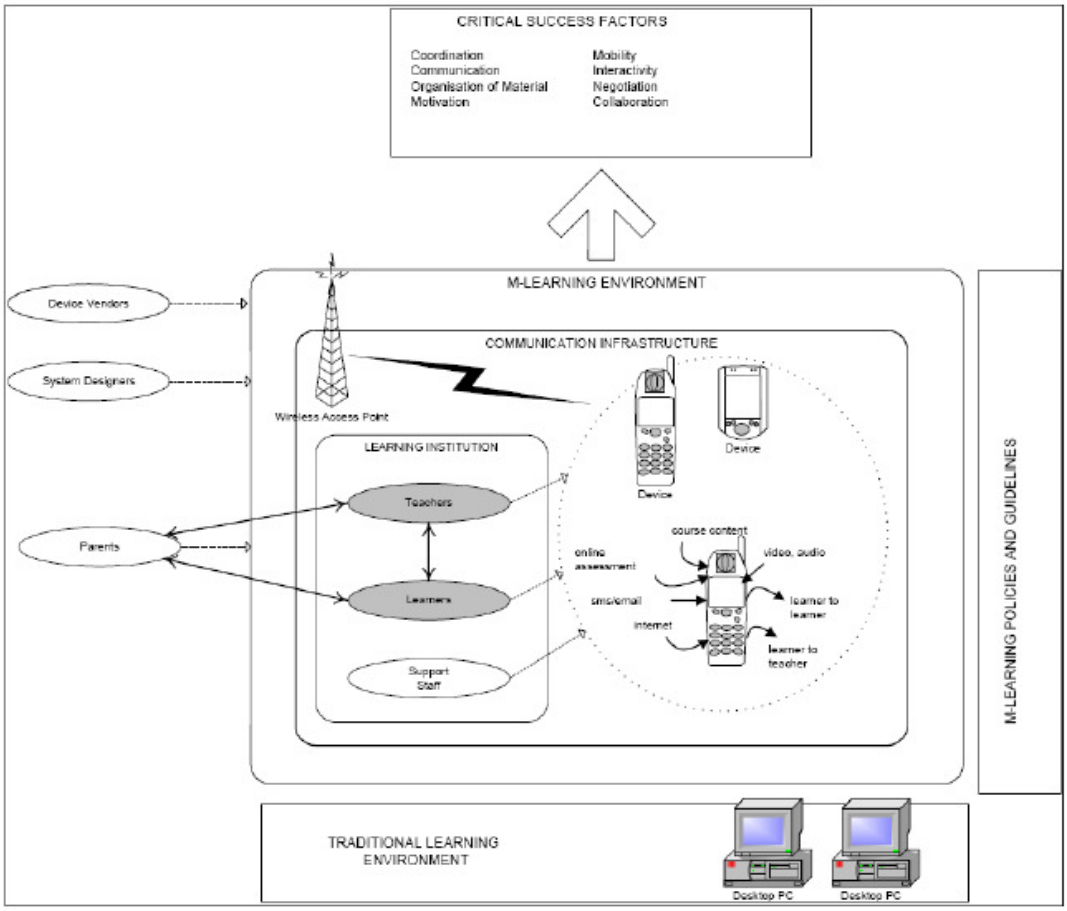


Figure 3.1: Model for m-learning adoption

The model for m-learning adoption contains an m-learning environment, which is underpinned by the traditional learning environment and also supported by effective m-learning policies and guidelines. As indicated, the traditional learning environment is one in which learning may still take place via desktop PCs. Within the m-learning environment, the communications infrastructure, here represented by a dotted line, contains wireless access points enabling communication among the mobile devices, such as mobile phones, PDAs, and wireless handheld devices.

[Fatma Elsayed 2006]

Has give framework for implementing an adaptive m-learning environment from a java mobile client, students and tutors they will be able to browse and interact through the mobile environment created by the tutor earlier it will test with different algorithms for learning and conclusion in a m-learning domain and

they give the rights for a tutor to built-in the chapters with a m-learning environment and data from the learner's who use the system. Furthermore, the system will go into an assessment phase to test the overall performance of the system as seen in the Figure 3.2

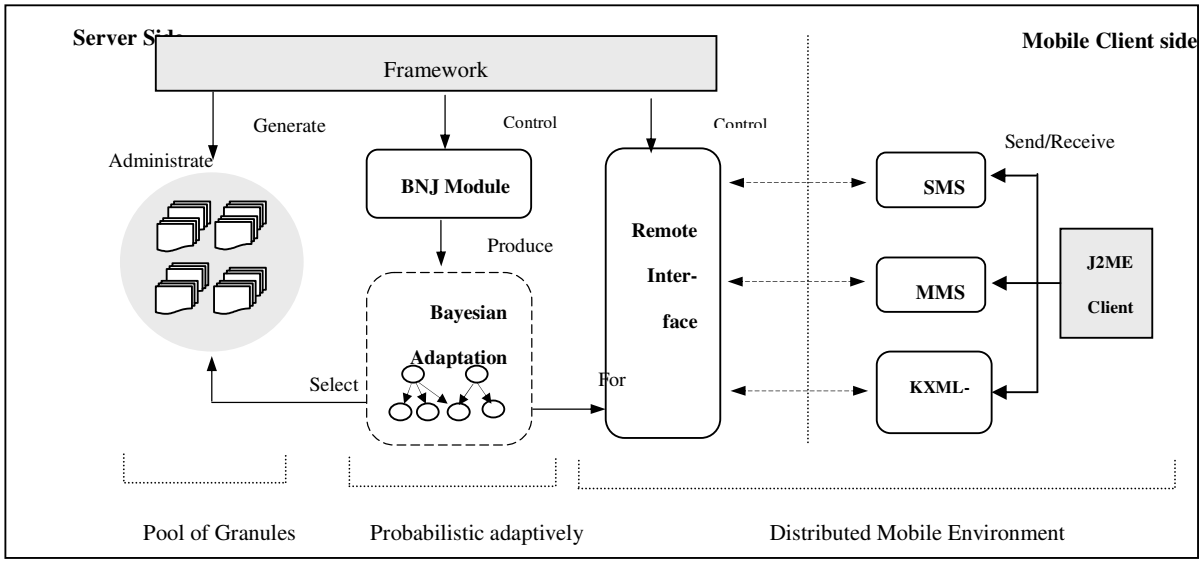


Figure 3.2. A general overview of the system architecture showing the server side learning environment and the mobile client.

[Henda 2006]

Has adaptability in m-learning deal with a set of question. First, how to make us use a technology without losing the feature of learning. Second how to specify adaptation dimensions, adaptation kinds and different relations between them, what to adapt, how we adapt and what to consider to adapting. In order to reply to these questions, we begin by evaluate the text to determine adaptively dimensions and kinds set up by the mobility. And then we set up a proposed framework of adaptive m-learning that treat the issue of how considering adaptively dimension not only from a technological point of view but also from an educational point of view. This framework is considered in their researches that are developing m-learning environments based on an adaptive content and adaptive learning activities. Finally, they use this framework to adapt Web services and SCORM (Shareable Content Object Reference Model) as seen in Figure 3.3.

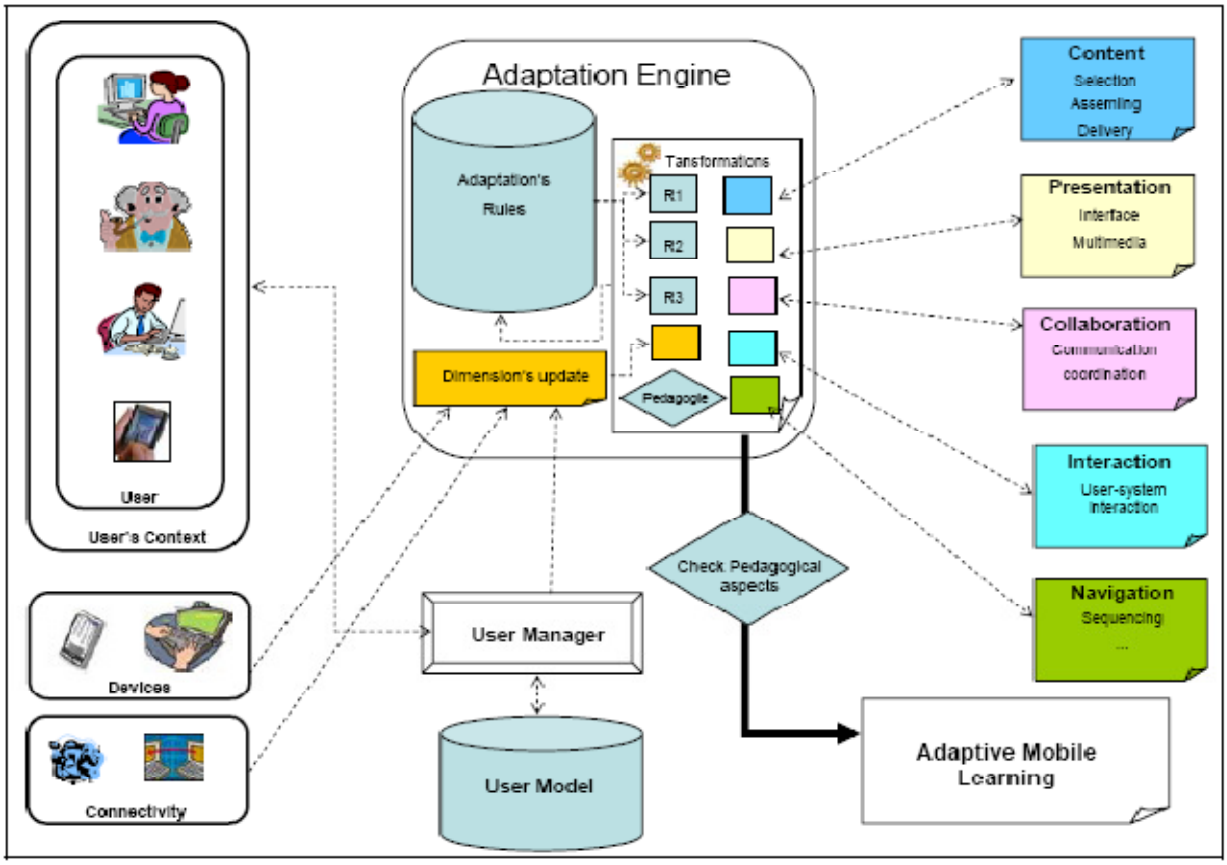


Figure 3.3: General framework to m-learning adaptation

[Zaina Hamdan 2008]

The author propose a new model for designing the learning content in a new model which goes well with the learner's mobility, preferences, support the device limitation and fit the learning objectives. Furthermore he study the factor that could help a authorize algorithm improvement in order to cover the weirdness in m-learning situation [43]. Our project dependents on the future work of this thesis, and we will take this paper in our mind on applying and comparison.

Chapter 4

System Design

CHAPTER 4

System Design

This chapter presents the design of this project. In this chapter, we define the project requirements, use cases diagrams, class diagrams, activity diagrams, and sequences diagrams are also described.

4.1 Software requirements

Software requirement Knowledge Area (KA) is demonstrated in order to solve some problem in the real world. We refer to requirements on 'software' because we worried of the problems to be adopting by software. For this reason, a software requirement is a property which must be displayed by software developed or adapted to solve a particular problem. The problem may be to automate part of a task of someone who will use the software, to support the business processes of the organization that has specially made the software, to correct weakness of existing software, to control a device. Typically, software requirements are uniquely identified so that they can be subjected to software layout control and managed over the entire software life cycle, the website tools requirements for Design FrontPage and ASP.NET 2005 with C#, XHTML. WAP (Wireless Application Protocol) technology is used for Internet connection and it has typical data transfer rates 9kbps. The PDA tools required are Dot Net Environment, XML, Web Service, PDA Device, Connections throw Wi-Fi technology and it provides 54 Mbps data transfer rate or Connections throw GPRS technology is used for Internet connection and it has typical data transfer rates from 30 to 100kbps.

4.2 Design The System

According to Holtzblatt [18], designing applications for mobile platforms presents a unique and more difficult challenge than traditional software design. Since users of such devices expect to be able to run such applications with no training and no help system. In this section we will describe the use case, classes, activity, and sequence diagrams of our project.

4.2.1 Logic Model

The Logic Model process is a tool that has been used by program managers and evaluators to describe the effectiveness of their programs. The model describes logical linkages among program resources, activities, outputs, audiences, and short-, intermediate-, and long-term outcomes related to a specific problem or situation. Logic models are narrative or graphical depictions of processes in real life that communicate the underlying assumptions upon which an activity is expected to lead to a specific result. Logic Models illustrate a sequence of cause-and-effect relationships is-a systems approach to communicate the path toward a desired result. Figure 4.1 shows the logic diagram of our project.

The following logic model shows the inputs required for m-learning system to work correctly and efficiently for each activity in the system and the logical linkages between them, and what is the output that will get from the system. The outcomes from the system appear on the three right columns, to help us in developing the system and what are expectations from the system and how to refine the system to get the outcomes.

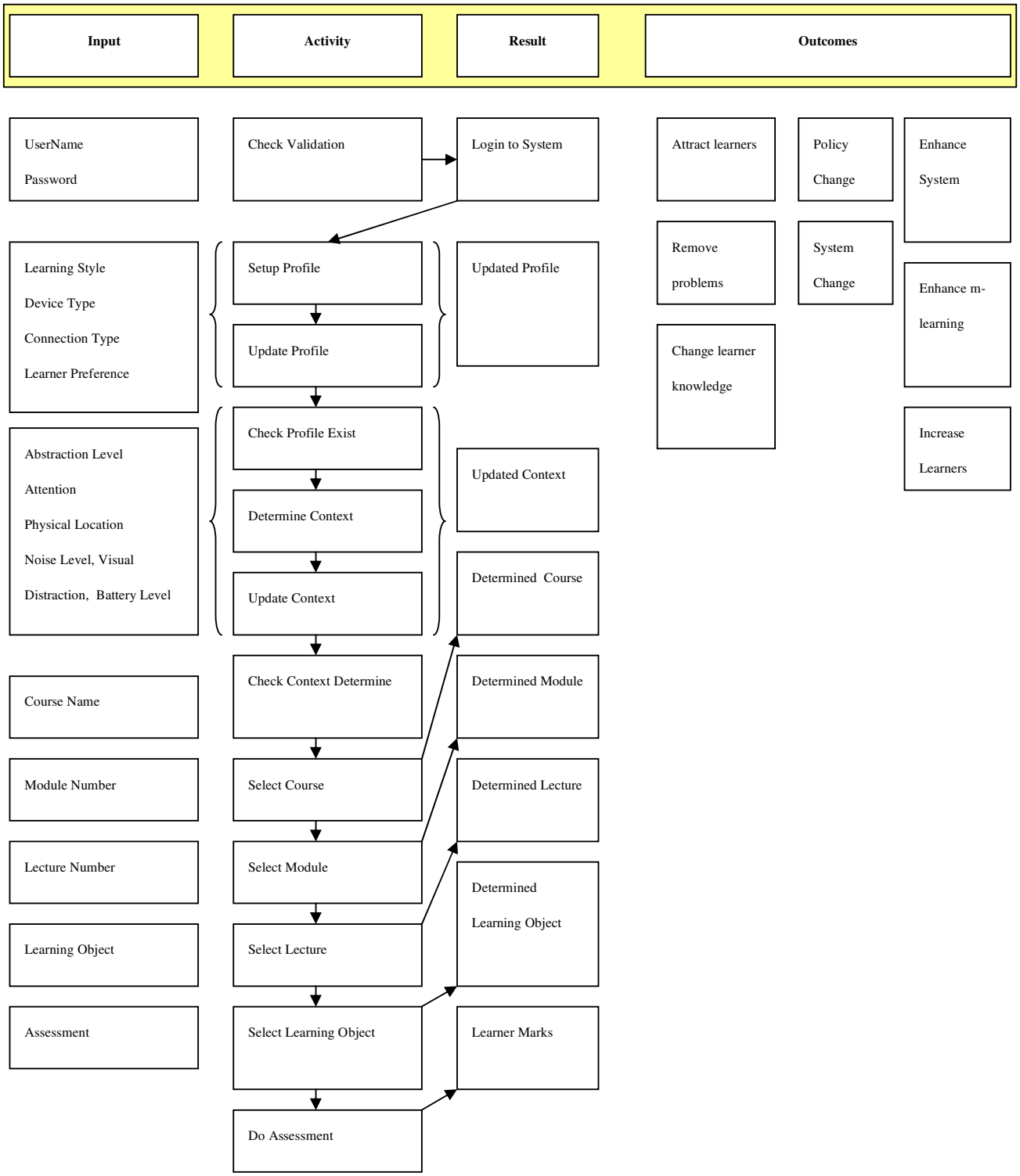


Figure 4.1: m-Learning system logic model

4.2.2 Functional Modeling

4.2.2.1 Use case diagram

A use case diagram is a technique for capturing the potential requirements of a new system or software change [43]. Each use case provides one or more scenarios that convey how the system should interact with the end user or another system to achieve a specific business goal. Figure 4-2 shows the use case diagram extracted from the requirements (notes: * means many to many relationships).

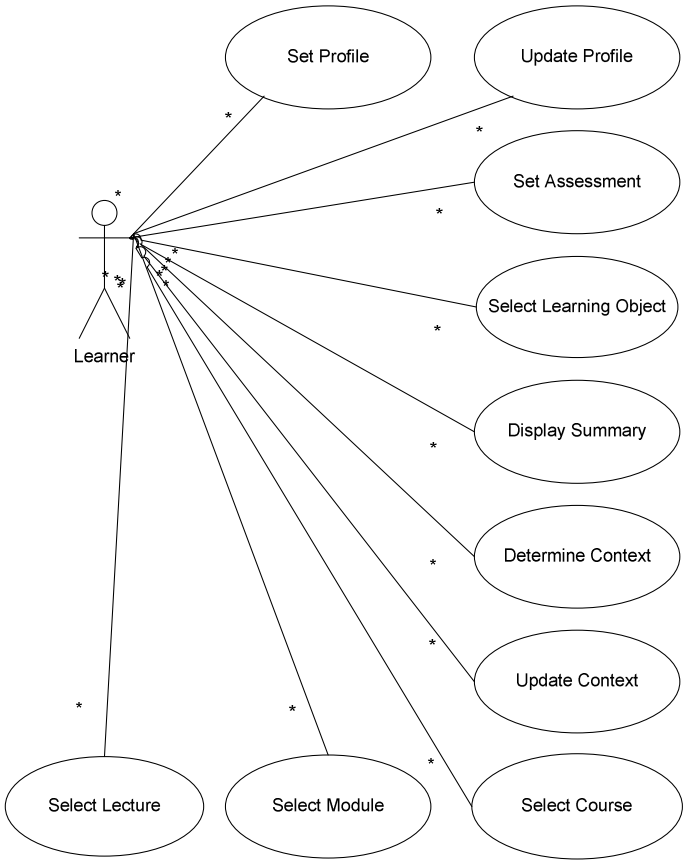


Figure 4.2: m-Learning use case

The user can set his own profile and he can make update for it if he/she change his device or his mode in learning or his learning environments also he can choice his course, model, lectures, learning object, summary, assessment, determine and update for the context.

4.2.3 Environmental Modeling

4.2.3.1 Class Diagram

A class diagram is a visual representation of an application showing its classes and the relationships between the classes, the attributes and operations for each class. The class diagram provides the basic building blocks for all other structure diagrams, such as the component or object diagrams. The Figure 4.3 shows the class diagram of the project.

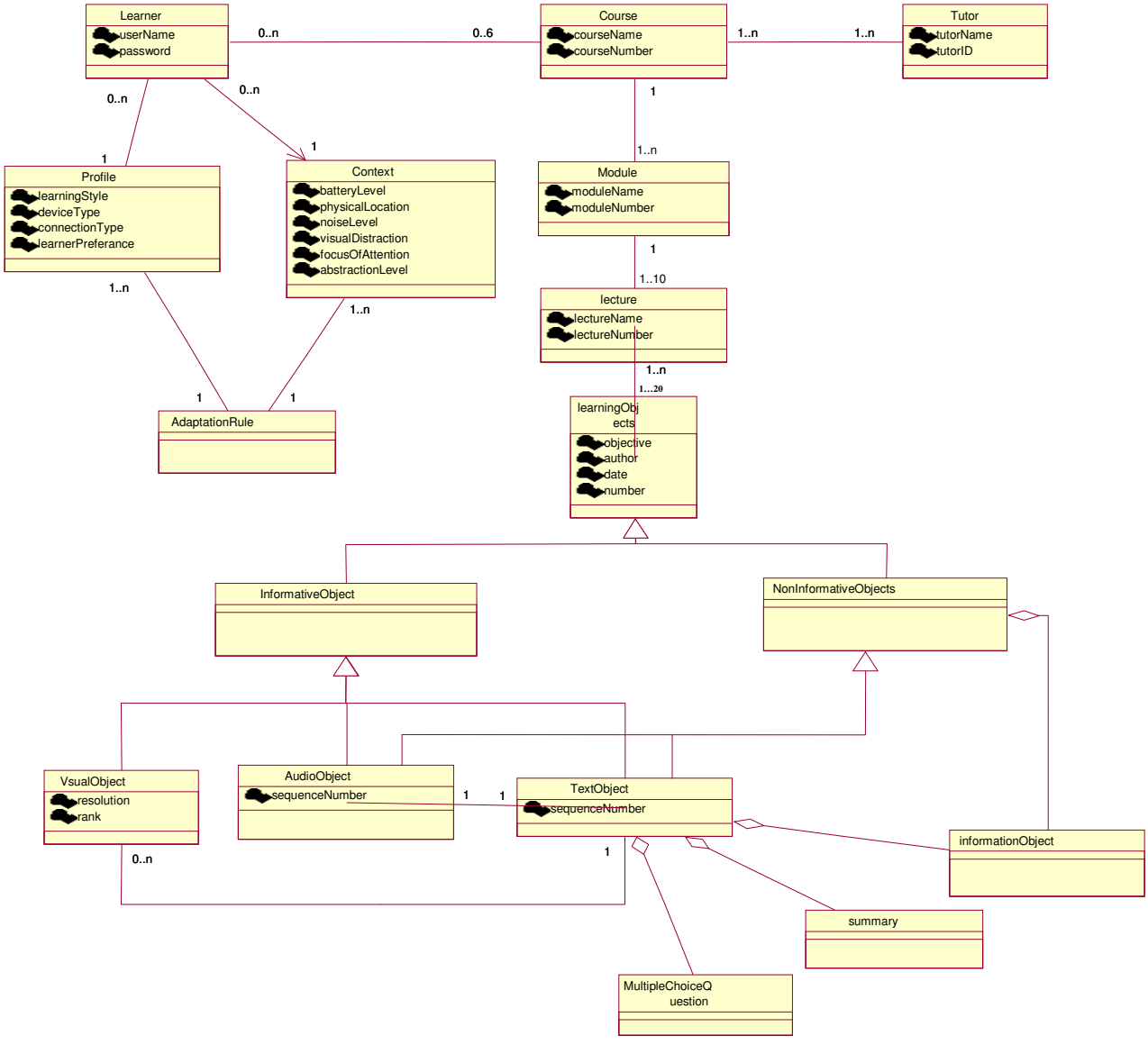


Figure 4.3: m-Learning class diagram

I use the object oriented and make a set of the class inherits and this class diagram show this relationships between the classes.

4.2.4 Behavior Modeling

4.2.4.1 Sequence Diagram

A sequence diagram is a visual representation of the interaction between collaborating groups of objects in a system [43]. It shows the sequence of actions that occur in the system. Figure below demonstrates the series of actions performed by the project.

4.3.4.1.1 Start Panel Sequence Diagram

Function	Set Profile
Description	If the learner select Setup Profile activity the system shall create a profile to that learner
Input	Learning Style, Device Type, Connection Type, Learner Preference.
Action	▪ The system shall view a form that must be filled by the learner ▪ The system shall display a confirmation message to inform the learner that the learner profile has been added successfully
Pre-Condition	The learner should log in.

Table 4.1 : Set profile function

The following sequence diagram expresses the start panel to check if the leaner setup his/her profile or not if not, the system will request from the leaner to create his/her profile to continue using the system**.**

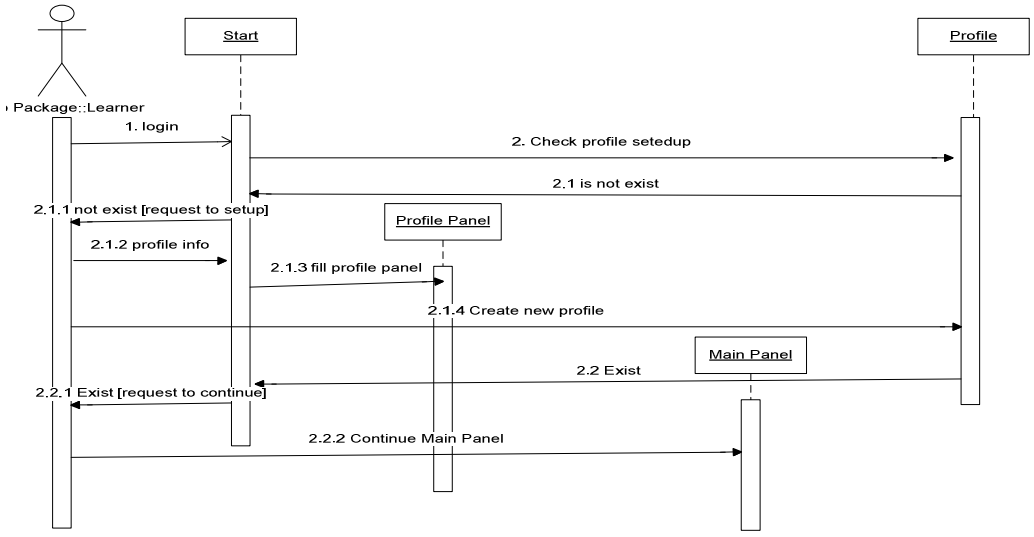


Figure 4.4 : Start panel sequence diagram

4.2.4.1.2 Main Panel Sequence Diagram

Main Panel is the menu of m-learning system that the learner will use to navigate the system.

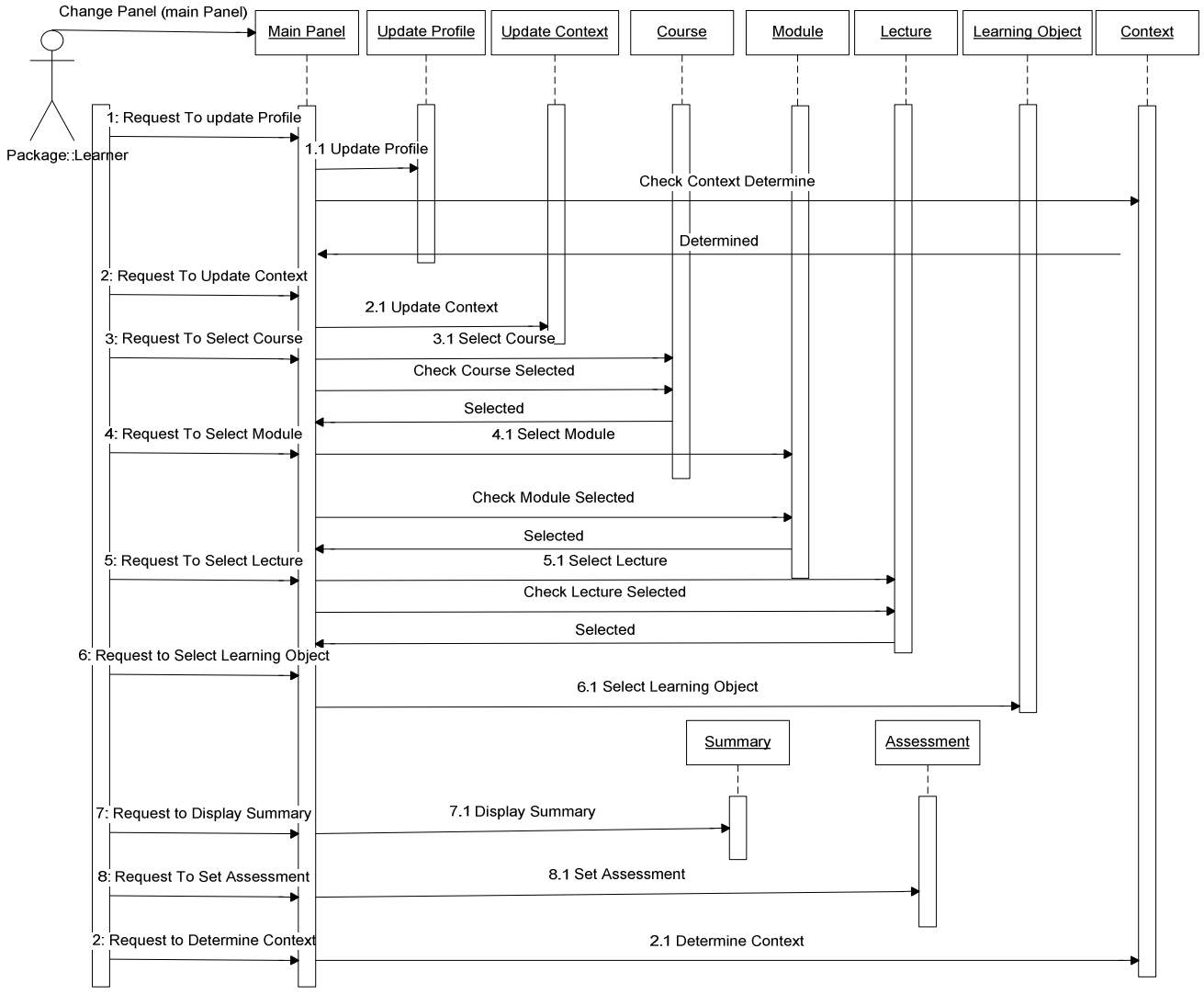


Figure 4.5: Main Panel Sequence Diagram

4.2.4.1.3 Update Profile Panel Sequence Diagram

The following sequence diagram shows how the learner can update the profile and what the action that will be taken from the system. (Note that, this function can not be available if the learner did not create his profile)

Function	Update Profile
Description	If the learner select Update Profile activity the system shall allow the learner to update his own profile
Input	Updated information (Learning Style, Device Type, Connection Type, and Learner Preference.)
Action	▪ The system shall display the update context page; the learner should enter the new context information. ▪ A confirmation message will be displayed to inform the learner that his profile has been updated successfully.
Pre-Condition	1. The learner should log in 3.The learner should already have setup his own profile

Table 4.2 : Update profile function

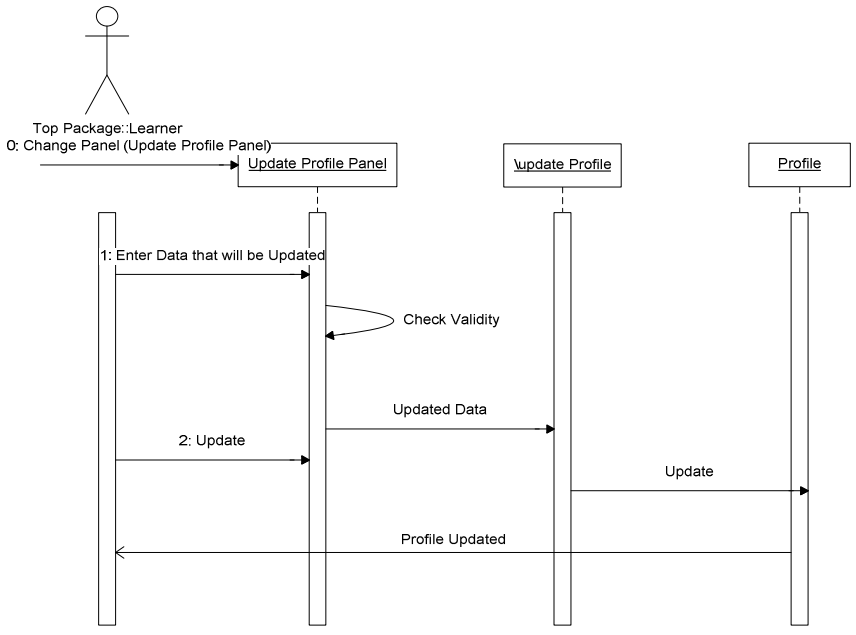


Figure 4.6 : Update profile panel sequence diagram

4.2.4.1.4 Determine Context Panel Sequence Diagram

The following sequence diagram shows how the learner can determine his personal and environmental and device context, and what is the action will take from the system.

Function	Determine Context
Description	If the learner selects to determine context the system shall allow the learner to specify his personal, environmental and device contexts.
Input	Abstraction Level, Focus of Attention, Physical Location, Noise Level, Visual Distraction and Battery Level.
Action	▪ The system shall a page that include check box to determine each factors' value. ▪ A confirmation message will be displayed to inform the learner that his context has been added successfully.
Pre-Condition	1. The learner should log in 2.The learner should already have setup his own profile

Table 4.3 : Determine context function

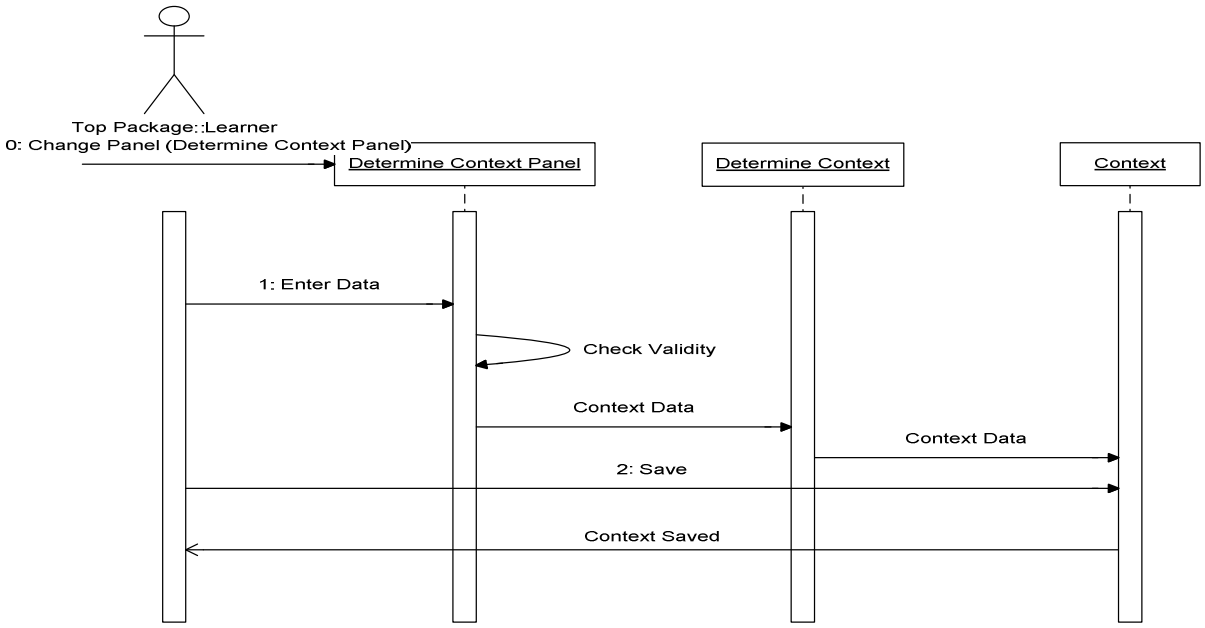


Figure 4.7: Determine context panel sequence diagram

4.2.4.1.5 Update Context Panel Sequence Diagram

The following sequence diagram shows how the learner can update (if he create it before) his personal and environmental and device context, and what is the action will take from the system.

Function	Update Context
Description	If the learner selects to update the predefined context the system shall allow the learner to update his personal, environmental and device contexts.
Input	Updated context information (Abstraction Level, Focus of Attention, Physical Location, Noise Level, Visual Distraction and Battery Level).
Action	▪ The system shall display a page that includes check boxes to determine each factor's value. ▪ A confirmation message will be displayed to inform the learner that his context has been updated successfully.
Pre-Condition	1. The learner should log in 2.The learner should already have setup his own profile 3. The learner should already have determined his context

Table 4.4 : Update context function

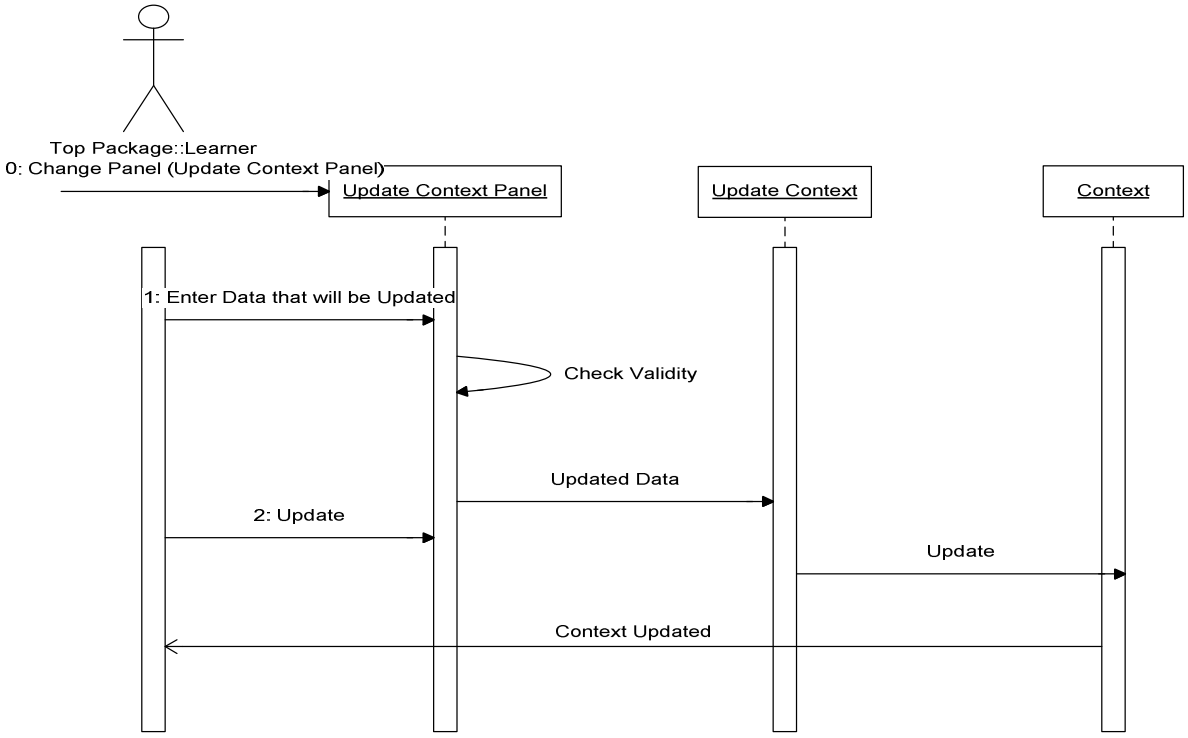


Figure 4.8: Update context panel sequence diagram

4.2.4.1.6 Course Panel Sequence Diagram

The following sequence diagram shows how the learner can determine the courses

Function	Select Course
Description	If the learner selects course the system shall allow the learner to view the modules that are available on the course.
Input	Select the course name
Action	▪ The system will display the course to the learner as a menu of modules hyperlinks.
Pre-Condition	1. The learner should log in 2.The learner should already have setup his own profile 3. The learner should already have determine his context

which will select, and what is the action will take from the system

Table 4.5 : Select course function

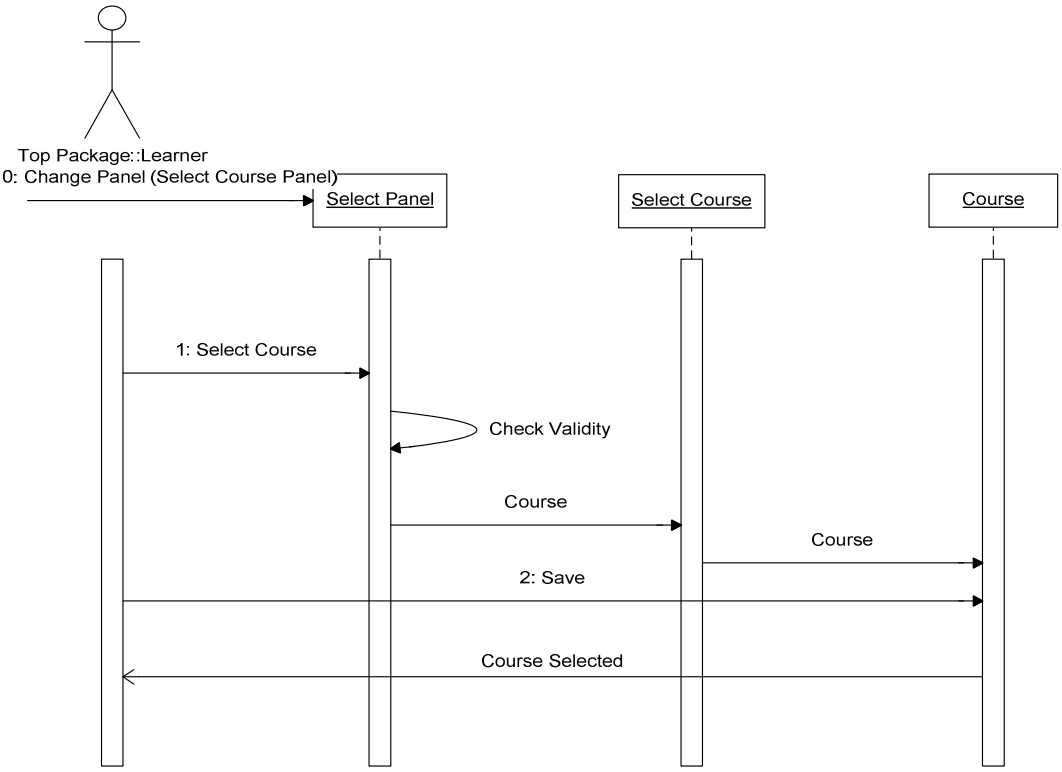


Figure 4.9: Course panel sequence diagram

4.2.4.1.7 Module Panel Sequence Diagram

The following sequence diagram shows how the learner can determine the module which will be selected and what is the action the learner will take from the system.

Function	Select Module
Description	If the learner selects a module the system shall allow the learner to view the lectures that are available on the module.
Input	Select the module number
Action	▪ The system will display the module to the learner as a menu of lectures' hyperlinks.
Pre-Condition	1. The learner should log in. 2. The learner should already have setup his own profile. 3. The learner should already have determined his context. 4. The learner should already select a specific course.

Table 4.6 : Select module function

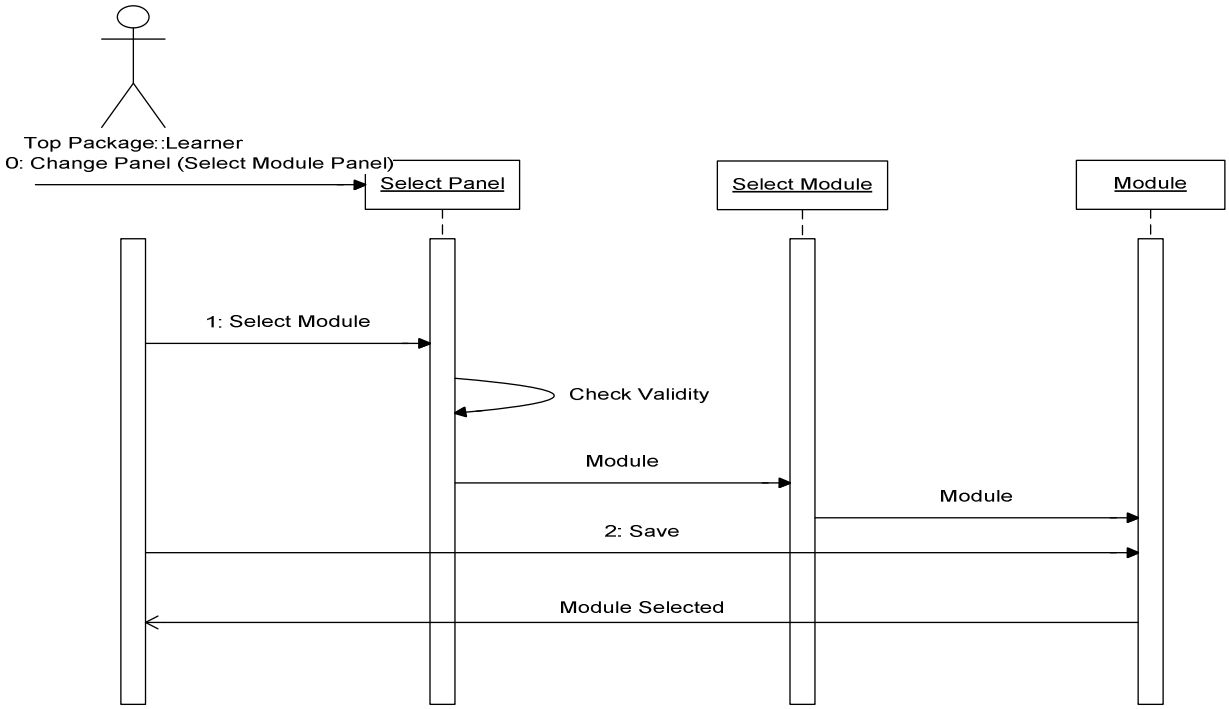


Figure 4.10: Module Panel Sequence Diagram

4.2.4.1.8 Lecture Panel Sequence Diagram

The following sequence diagram shows how the learner can determine the lectures which will be selected, and what is the action the learner will take from the system

Function	Select Lecture
Description	If the learner selects a lecture the system shall allow the learner to view the learning objects that are on the lecture
Input	Select the lecture number
Action	▪ The system will display the lecture to the learner as a menu of learning objects' hyperlinks.
Pre-Condition	1. The learner should log in. 2. The learner should already have setup his own profile. 3. The learner should already have determined his context. 4. The learner should already select a specific course. 5. The learner should already select a specific module.

Table 4.7 : Select lecture function

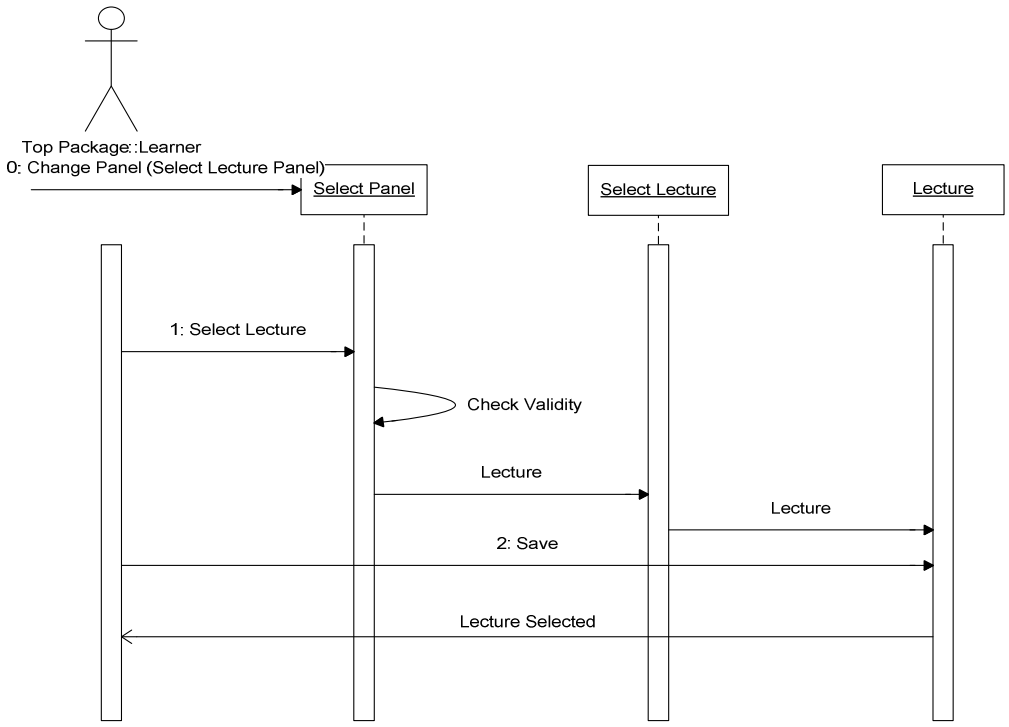


Figure 4.11: Lecture Panel Sequence Diagram

4.2.4.1.9 Learning Object Panel Sequence Diagram

The following sequence diagram shows how the learner can determine the learning object content and what is the action that the learner will take from the system.

Function	Select a Learning Object
Description	If the learner selects a learning object the system shall allow the learner to view the object content.
Input	Select the learning object
Action	The system will display the learning object content with the right presentation format (text, audio, visual or compound objects)
Pre-Condition	1. The learner should log in. 2. The learner should already have setup his own profile. 3. The learner should already have determined his context. 4. The learner should already select a specific course. 5. The learner should already select a specific module. 6. The learner should already select a specific lecture.

Table 4.8 : Select learning object function

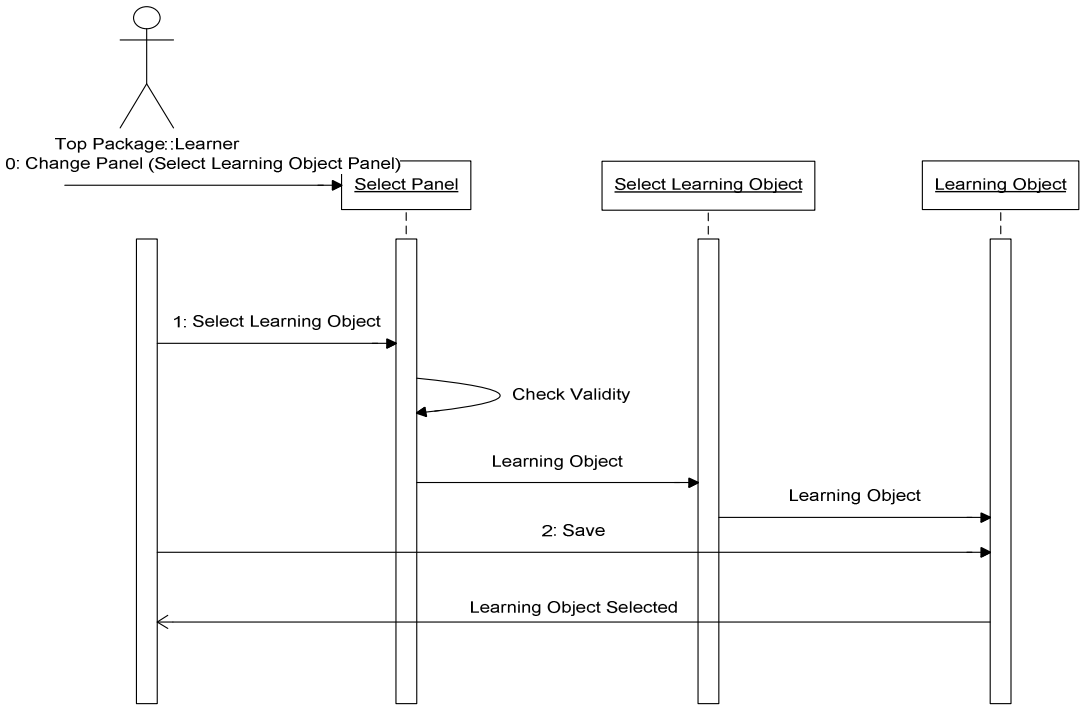


Figure 4.12: Learning object panel sequence diagram

4.2.4.1.10 Display Summary Panel Sequence Diagram

The following sequence diagram shows how the learner can view the content of each learning object, and what is the action will take from the system

Function	Display the Summary
Description	If the learner selects display the summary the system shall allow the learner to view the content on high level of abstraction.
Input	Select the summary hyperlink
Action	▪ The system will display the summary part of each informative learning object.
Pre-Condition	1. The learner should log in. 2. The learner should already have setup his own profile. 3. The learner should already have determined his context. 4. The learner should already select a specific course. 5. The learner should already select a specific module. 6. The learner should already select a specific lecture.

Table 4.9 : Display the summary function

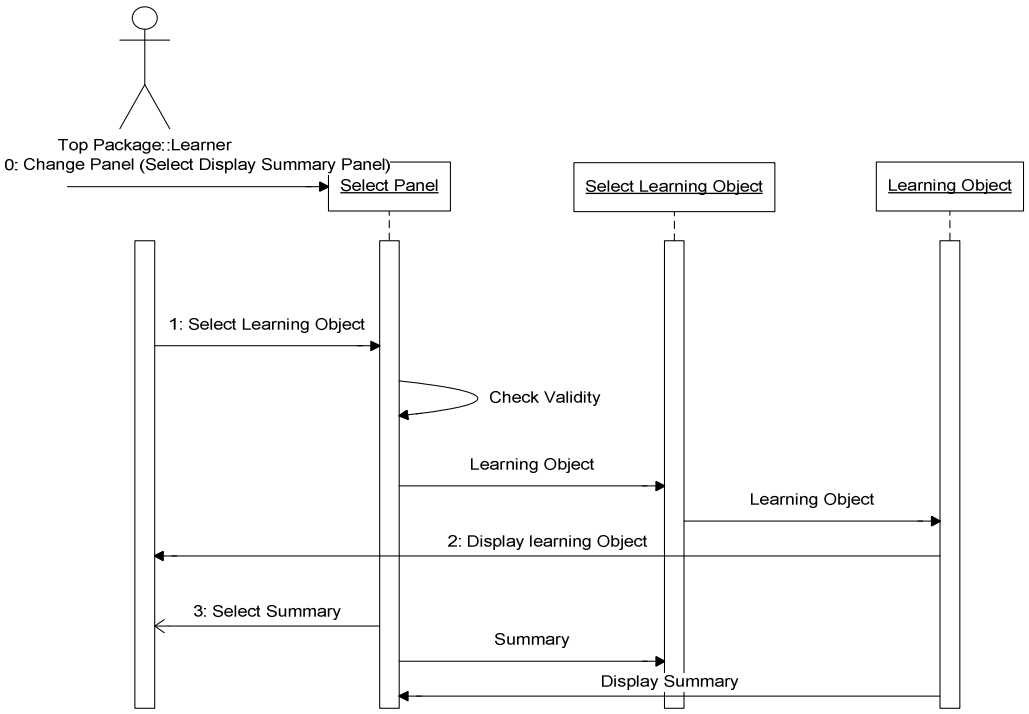


Figure 4.13: Display summary panel sequence diagram

4.2.4.1.11 Display Assessment Panel Sequence Diagram

The following sequence diagram shows how the learner can test his knowledge of each informative learning object, and what is the action will take from the system

Function	**Set the Assessment**
Description	If the learner selects set the assessment the system shall allow the learner to test his knowledge by several multiple choice questions.
Input	Select the set the assessment hyperlink
Action	▪ The system will display the multiple choice question of each informative learning object. ▪ The system must evaluate the learner answers.
Pre-Condition	1. The learner should log in. 2. The learner should already have setup his own profile. 3. The learner should already have determined his context. 4. The learner should already select a specific course. 5. The learner should already select a specific module. 6. The learner should already select a specific lecture.

Table 4.10 : Set the assessment function

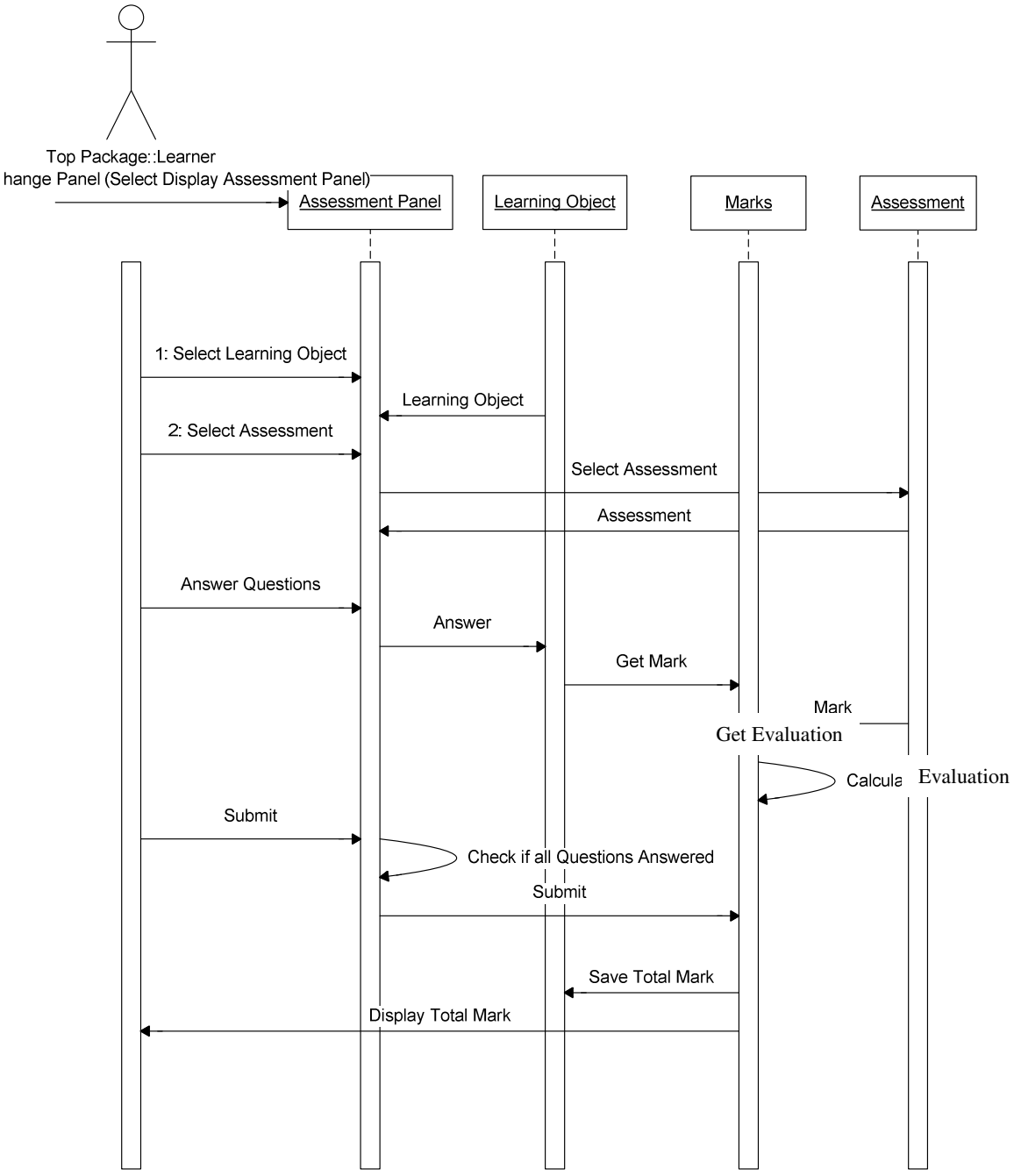


Figure 4.14: Display assessment panel sequence diagram

4.3. System non functional requirements

System non-functional requirements act to constrain the solution. Non-functional requirements are sometimes known as constraints or quality requirements. They can be further classified according to whether they are performance requirements, maintainability requirements, safety requirements, and reliability requirements.

4.3.1 The system is secure. And each learner has a username and a password, and he shall log in before using the system's functions.

4.3.2 The event response time for m-learning System is 2 second.

4.4. System functional requirements

The user interfaces are friendly, and the system is easy to use; the learner shall be able to use all the system functions after a total of one hour training. After this training the average number of errors made by the learner shall not exceed two errors per day.

4.5 Table design description

In this section we will define the design of the database that will be used in our system and each of tables that includes, and the relationships between them.

4.5.1 Connection Types Table

This table contains all types of connection that the system can used, like (WI-FI , GPRS).

FIELD NAME	DATA TYPE	NOTE
ConnectionID	Number	PRIMARY KEY
ConnctionType	Text	

Table 4.11 : Connection Types table

4.5.2 Device Types Table:

This table contains all types of devices that the users can used, like (PC , PDA).

FIELD NAME	DATA TYPE	NOTE
DeviceID	Number	PRIMARY KEY
DeviceType	Text	

Table 4.12 : Device Type table

4.5.3 Learning Styles Table:

This table contains all learning styles that the system provides it to users, like (Sensing Style, Global Style).

FIELD NAME	DATA TYPE	NOTE
LearnID	Number	PRIMARY KEY
Learn	Text	

Table 4.13 : learning Style table

4.5.4 Learn Preferences Table:

This table contains all learn preference, like (Text, Audio).

FIELD NAME	DATA TYPE	NOTE
PreferenceIP	Number	PRIMARY KEY
leanPreference	Text	

Table 4.14 : Learn Preferences table

4.5.5 Types Table:

This table contains lectures types that the system provides it , like (definition, explain).

FIELD NAME	DATA TYPE	NOTE
TypeID	Number	PRIMARY KEY
TypeDesc	Text	

Table 4.15 : Types table

4.5.6 Lecture Table:

This table contains all the lectures that the system provides it.

- LectureID : This field contains a number that represents lecture number (Lecture1 , Lecture2).
- LO : Each lecture consists of many learning object, this field contains a number that represents number of the object in the lecture (Object1, Object2).
- Level : This field is used to Differentiate Core learning object from summary learning object.
- Type : This field is used to determine the type of the learning object (definition, explain, fact).
- Body : This field contains learning object text.

- Audio : This field contains the name of audio file that refers to this learning object.
- Vedio : This field contains the name of video file that refers to this learning object.

FIELD NAME	DATA TYPE	NOTE
LectureID	Number	PRIMARY KEY
LO	Number	PRIMARY KEY
Level	Number	PRIMARY KEY
Type	Number	
Body	Memo	
Audio	Text	
Vedio	Text	

Table 4.16 : Lecture table

4.5.7 Questions Table:

Table Description: This table contains all the lectures examination questions.

- lectureID : lecture number.
- QuestionID : object number.
- QuestionText : the question itself.

FIELD NAME	DATA TYPE	NOTE
lectureID	Number	PRIMARY KEY
QuestionID	Number	PRIMARY KEY
QuestionText	Text	

Table 4.17 : Questions table

4.5.8 Answers Table:

This table contains all the lectures examinations Answers.

- lectureID : lecture number.
- QuestionID : object number.
- ChoiceID : choice number.
- ChoiceText: the answer itself.
- IsTrue : This field contains True if the choice is the correct one otherwise contains False.

FIELD NAME	DATA TYPE	NOTE
lectureID	Number	PRIMARY KEY
QuestionID	Number	PRIMARY KEY
ChoiceID	Number	PRIMARY KEY
ChoiceText	Text	
IsTrue	Yes/No	

Table 4.18 : Answers table

4.5.9 Users Table:

This table contains all the users who registered on the system.

FIELD NAME	DATA TYPE	NOTE
UserID	Text	PRIMARY KEY
Password	Text	
learnStyle	Number	
DeviceType	Number	
ConType	Number	
LearnPerformance	Number	

Table 4.19 : Users table

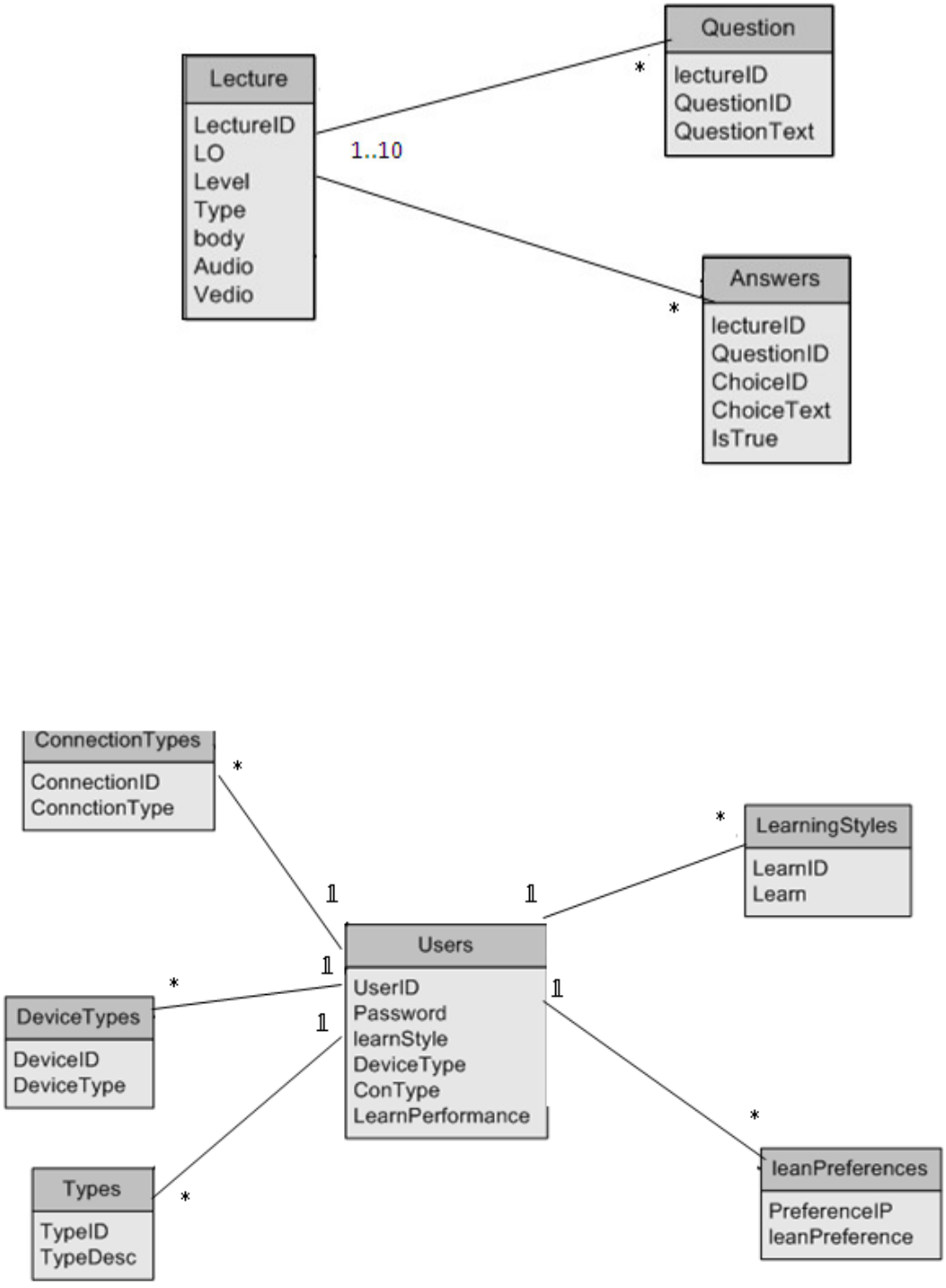


Figure 4.15: ER diagram for the system

Chapter 5

The Propose System Implementation

CHAPTER 5

The Propose System

Implementation

5.1 The Implementation

During the implementation phase, the system design is converted into set programs that represent the whole integrated system. Using Asp.net with C# the implementation process is started, and divided into two stages, one of them is interface design, and the other is the code and connects the system with database.

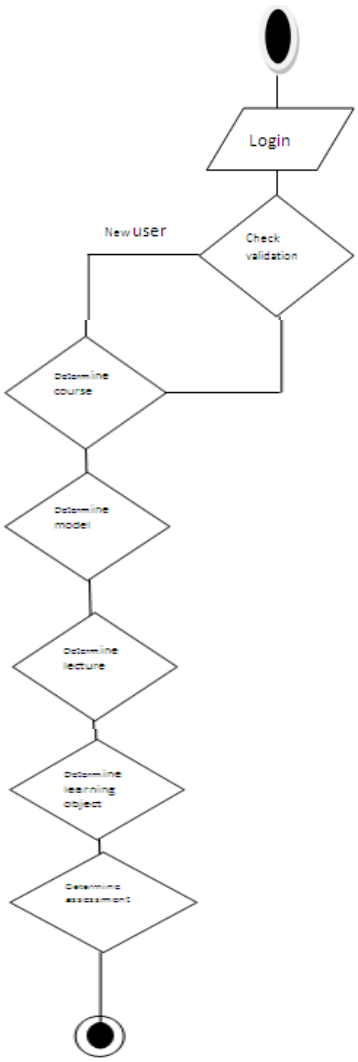
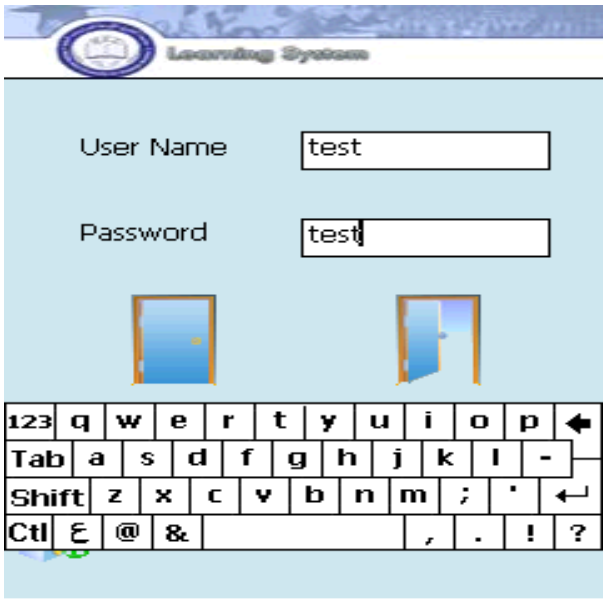


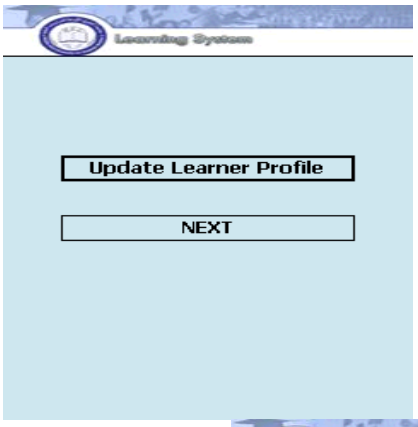
Figure 5.1 Shows the proposed system implementation

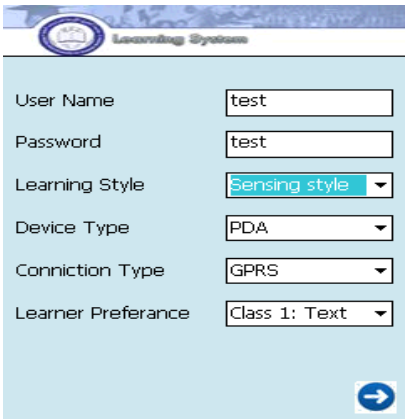
The interface designed for many devices like PC, PDA, Cell phone, IPODs is as following:

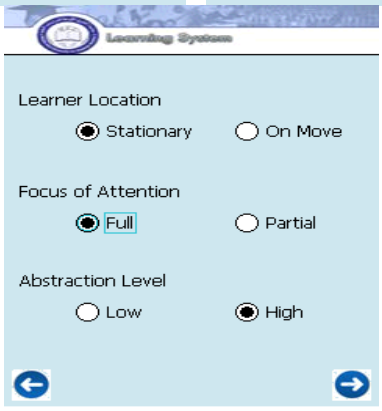
The main screen of the mobile system Figure 5.2 shows the log in page, the learner sets his user name and password.

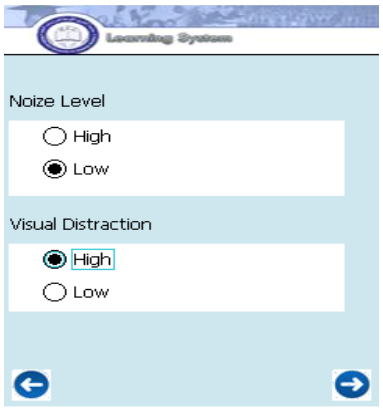


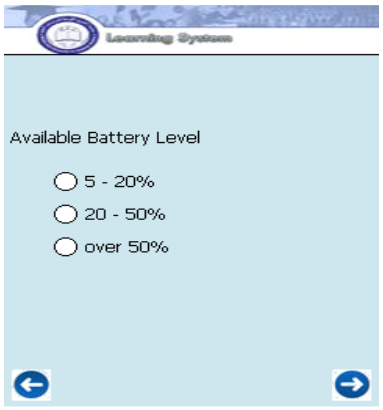
Where the learner will enter to the screen to create his profile, determine context information that will be used from the system, the Figure 5.3 shows the user authorize to update his profile or keep it as is.


Learning System
Update Learner Profile
NEXT

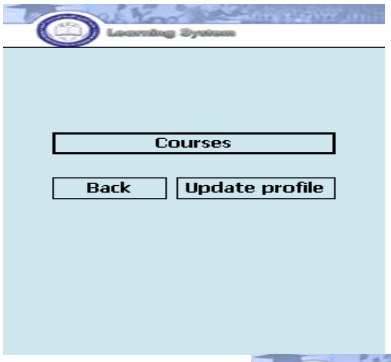

Learning System
User Name
test
Password
test
Learning Style
Sensing style
Device Type
PDA
Conniction Type
GPRS
Learner Preferance
Class 1: Text


Learning System
Learner Location
Stationary
On Move
Focus of Attention
Full
Partial
Abstraction Level
Low
High

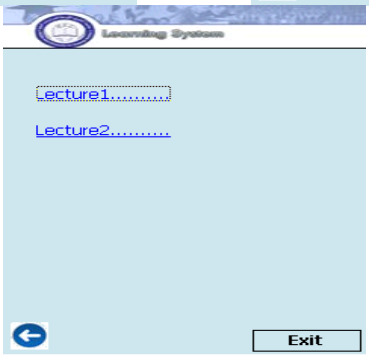

Learning System
Noize Level
High
Low
Visual Distraction
High
Low


Learning System
Available Battery Level
5 - 20%
20 - 50%
over 50%

In Figure 5.4 the user can browse the courses he already has taken; search any learning object he wants to start with, the user can browse the courses he already has taken; search any learning object he wants to start with.


Courses
Back
Update profile


DataBaseCourse
IS Project Managment Course
IS Development Course
Knoeledge Base Systems Course
Update profile


Lecture1.....
Lecture2.....
Exit


OPENWAVE
Courses
Back


OPENWAVE
DataBase Course
IS Project
Management
Course
IS Developement
Course
Knowledge Base


OPENWAVE
Lecture 1
Lecture 2
Lecture 3

The second stage was coding the system, where we divide this stage into rules. Each one of these rules execute in each devices as follow

5.1 The Rules That Must Be Implemented By Mobile:-

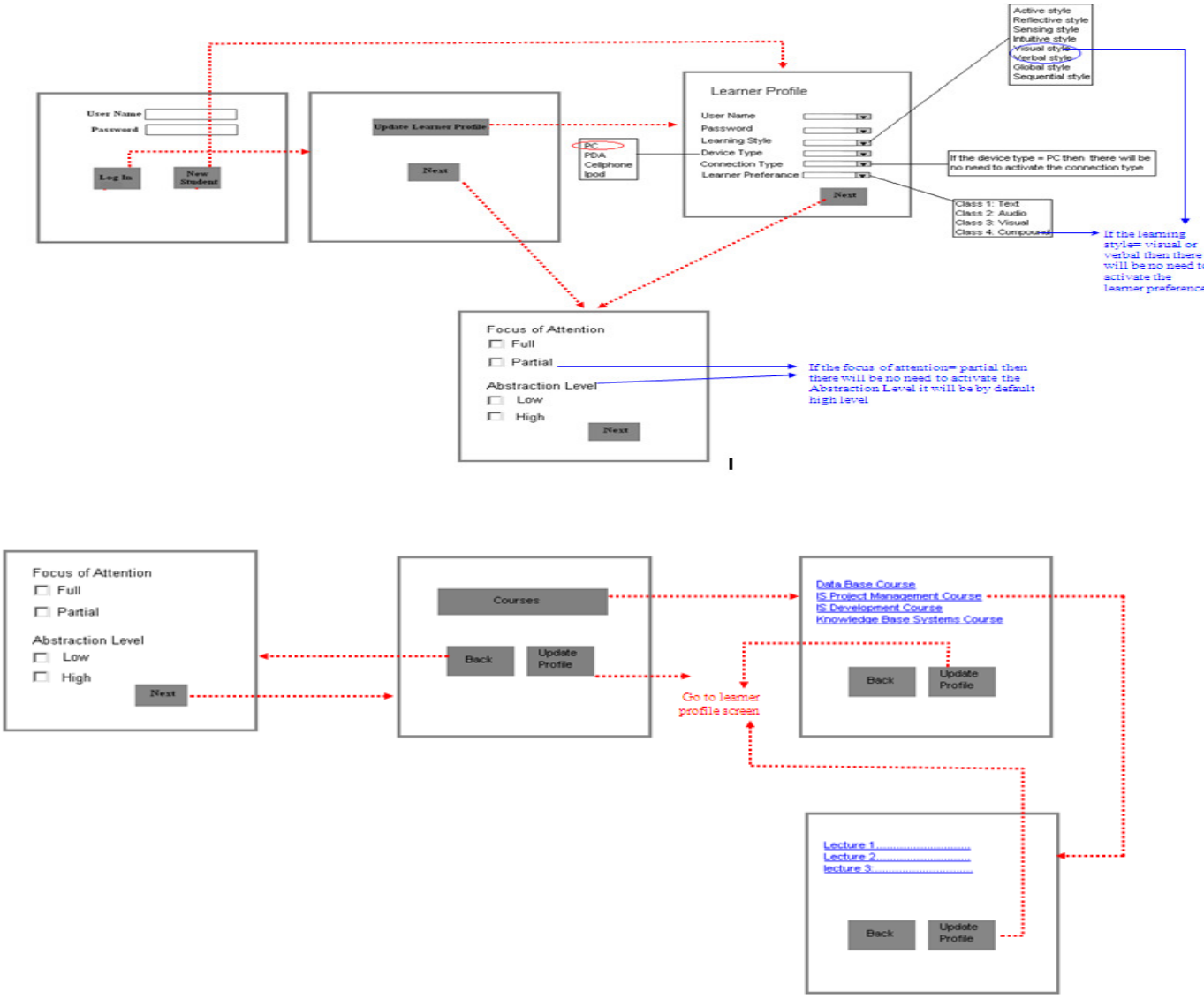


Figure 5.5 Implementation Via Mobile

- *IF the learner Focus of Attention ="Partial"*

Then Abstraction Level = "High" // which means only display the summary of each learning object

End IF

- *[IF Learning Style ="Sensing"*

Then present facts learning objects first followed by example learning objects

Else

[IF Learning Style ="Intuitive"

Then present concept learning objects first followed by theory learning objects

End IF]

Else keep the standard order of the learning objects.

End IF]

- *IF Learning Style ="Global"*

Then for each lecture present the summaries of learning objects first followed by the information objects

Else IF Learning Style ="Sequential"

Then for each lecture present the information objects of learning objects first, followed by the summaries.

End IF

- *[IF Learning Style ="Intuitive"*

Then present learning objects in low level of detail// only summary

Else

[IF Learning Style ="Global" or "Sequential"

Then Present learning objects in both levels of details// summary + information objects

End IF]

Else

[IF the Abstraction level="High"

Then present learning objects in low level of detail l// only summary

End IF]

Else present learning objects in high level of detail// only Information objects

End IF]

- *IF learner preference = "class 1"*

Then present text learning objects

- *IF learner preference = "class 2"*

Then present audio learning objects

- *IF learner preference = "class 3"*

Then present visual learning objects

- *IF learner preference = "class 4"*

Then present text, audio, and visual learning objects

5.2 The Rules That Must Be Implemented PDA:-

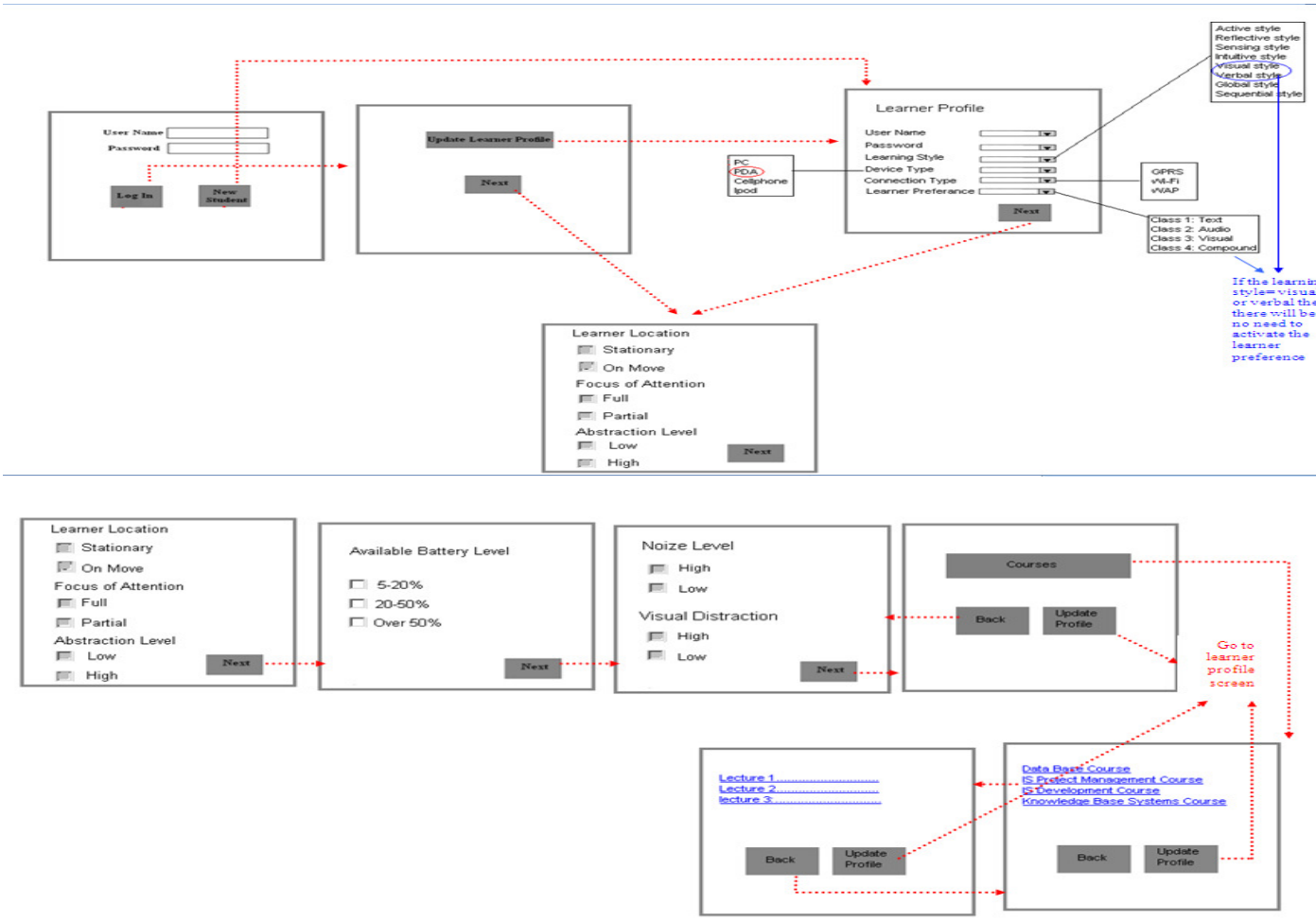


Figure 5.6 The Implementation Via PDA

- *IF the learner Location ="On Move"*

Then the learner Focus of Attention="Partial"

End IF

- *IF the learner Focus of Attention ="Partial"*

Then Abstraction Level = "High" // which means only display the summary of each learning object

End IF

- *[IF Learning Style ="Sensing"*

Then present facts learning objects first followed by example learning objects

Else

[IF Learning Style ="Intuitive"

Then present concept learning objects first followed by theory learning objects

End IF]

Else keep the standard order of the learning objects.

End IF]

- *IF Learning Style ="Global"*

Then for each lecture present the summaries of learning objects first followed by the information objects

Else IF Learning Style ="Sequential"

Then for each lecture present the information objects of learning objects first followed by the summaries.

End IF

- *[IF Learning Style ="Intuitive"*

Then present learning objects in low level of detail// only summary

Else

[IF Learning Style ="Global" or "Sequential"

Then Present learning objects in both levels of details// summary + information objects

End IF] / Else

[IF the Abstraction level="High"

Then present learning objects in low level of detail l// only summary

End IF]

Else present learning objects in high level of detail// only Information objects

End IF]

5.2.1 Rules For Adaptation Of The Leaning Object Presentation

CASE # 1

IF BL ="5-20%" *THEN apply Rule 1* *Else apply Case 2*

- **Rule1**

IF Location = "Stationary" and Visual Distraction= "Low"

Then present text LOs

Else

[Display notification message = "Text content is not compatible with your context" and apply Rule 1.1]

End IF

Figure 4.16 is an activity diagram that describes the first rule in the presentation type adaptation rules.

- **Rule 1.1**

[IF Noise Level ="Low"

Then play audio LOs

Else display verification message = "can you use your device headphones?"

[IF yes play audio LOs

Else display notification message="We recommend you to access the learning content later]"

End IF]

End IF]

CASE # 2

IF BL ="20-50%" and LS ≠ ("Visual" or "Verbal") and LP="Class1" *THEN apply Rule 1* *Else apply Case 3*

CASE # 3

IF BL ="20-50%" and LS ≠ ("Visual" or "Verbal") and LP="Class2"
THEN apply Rule 2
Else apply Case 4

- **Rule2**

[IF Noise Level = "Low"
Then present audio LOs
Else display notification message = "Audio content is not compatible *with your context, would you like to have other type of content?"*
[IF learner selects text content
Then apply Rule 2.1
Else
[IF learner selects visual content
Then go through Rule 3, Rule 4, Rule5, Rule 6, Rule 7, and Rule 8
End IF]
End IF]
End IF]

- **Rule 2.1**

IF Location = "Stationary" and Visual Distraction= "Low"
Then present text LOs
Else display notification message = "We recommend you to access the learning content later"
End IF

CASE # 4

IF BL ="20-50%" and LS ≠ ("Visual" or "Verbal") and LP="Class3"
THEN go through, Rule4, Rule 5, Rule 6, and Rule 7
Else apply Case 5

- **Rule 4**

[IF Device Type = ("PDA" or "Smartphone") and Connection Type = "GPRS"
Then
[IF Location = "Stationary" and Visual Distraction = "Low"
Then present essential graphic and animation LOs less than 240x320 pixels
Else
[Display notification message = "Visual content is not compatible with your context"
and apply Rule 1.1]
End IF]
End IF]

- **Rule 5**

[IF Device Type = ("PDA" or "Smartphone") and Connection Type = "Wi-Fi"
Then
[IF Location ="Stationary" and Visual Distraction ="Low"
Then present graphic and animation LOs less than 240x320 pixels
Else
[Display notification message = "Visual content is not compatible with your context"
and apply Rule 1.1]
End IF]
End IF]

- **Rule 6**

[IF Device Type = "Cellular Phone" and Connection Type = "GPRS" Then
[IF Location ="Stationary" and Visual Distraction ="Low"
Then present essential graphic and animation LOs less than 120x160 pixels
Else
[Display notification message = "Visual content is not compatible with your context"
and apply Rule 1.1]
End IF]
End IF]

- **Rule 7**

[IF Device Type = "Cellular Phone" and Connection Type = "Wi-Fi"

Then

[IF Location ="Stationary" and Visual Distraction ="Low"

Then present graphic and animation LOs less than 120x160 pixels

Else

[Display notification message = "Visual content is not compatible with your context" and apply Rule 1.1]

End IF]

End IF]

CASE # 5

IF BL ="20-50%" and LS ≠ ("Visual" or "Verbal") and LP="Class4" *THEN go through Rule10, Rule 11, Rule 12, Rule 13, and Rule 14* *Else apply Case 6*

- **Rule 10**

[IF Device Type = ("PDA" or "Smartphone") and Connection Type = "GPRS"

Then

[IF Location ="Stationary" and Noise Level ="Low" and Visual Distraction ="Low"

Then present text LOs, audio LOs and essential graphic and animation LOs less than 240x320 pixels.

Else

[IF Location ="Stationary" and Visual Distraction ="Low"

Then present text LOs and essential graphic and animation LOs less than 240x320 pixels

Else apply Rule 1.1

End IF]

End IF]

End IF]

- **Rule 11**

[IF Device Type = ("PDA" or "Smartphone") and Connection Type = "Wi-Fi"

Then

[IF Location = "Stationary" and Noise Level = "Low" and Visual Distraction = "Low"

Then present text LOs, audio LOs and graphic and animation LOs less than 240x320 pixels.

Else

[IF Location ="Stationary" and Visual Distraction ="Low"

Then present text LOs and graphic and animation LOs less than 240x320 pixels

Else apply Rule 1.1

End IF]

End IF]

End IF]

- **Rule 12**

[IF Device Type = "Cellular Phone" and Connection Type = "GPRS"

Then

[IF Location ="Stationary" and Noise Level ="Low" and Visual Distraction ="Low"

Then present text LOs, audio LOs and essential graphic and animation LOs less than 120x160 pixels.

Else

[IF Location ="Stationary" and Visual Distraction ="Low"

Then present text LOs and graphic and animation LOs less than 120x160 pixels

Else apply Rule 1.1

End IF]

End IF] End IF]

Rule 13

[IF Device Type = "Cellular Phone" and Connection Type = "Wi-Fi"

Then

[IF Location ="Stationary" and Noise Level ="Low" and Visual Distraction ="Low"

Then present text LOs, audio LOs and graphic and animation LOs less than 120x160 pixels

Else

[IF Location ="Stationary" and Visual Distraction ="Low"

Then present text LOs and graphic and animation LOs less than 120x160pixels

Else apply Rule 1.1

End IF]

End IF]

End IF]

CASE # 6

IF BL ="Over 50%" and LS ≠ ("Visual" or "Verbal") and LP="Class1"

Then apply Rule 1

Else apply Case 7

CASE # 7

IF BL ="Over 50%" and LS ≠ ("Visual" or "Verbal") and LP="Class2"

Then apply Rule 2

Else apply Case 8

CASE # 8

IF BL ="Over 50%" and LS ≠ ("Visual" or "Verbal") and LP="Class3"

Then go through Rule 17, Rule 18

Else apply Case 9

- **Rule17**

[IF Device Type = ("PDA"or "Smartphone") and Connection Type = ("GPRS" or "Wi-Fi")

Then

[IF Location ="Stationary" and Visual Distraction ="Low"

Then present graphic and animation LOs less than 240x320 pixels

Else

[Display notification message = "Visual content is not compatible with your context" and apply Rule 1.1]

End IF]

End IF]

- **Rule18**

[IF Device Type = "Cellular Phone" and Connection Type = ("GPRS" or "Wi-Fi") Then

[IF Location ="Stationary" and Visual Distraction ="Low"

Then present graphic and animation LOs less than 120x160 pixels

Else

[Display notification message = "Visual content is not compatible with your context" and apply Rule 1.]

End IF]

End IF]

CASE # 9

IF BL ="Over 50%" and LS ≠ ("Visual" or "Verbal") and LP="Class4"
Then go through Rule 22, Rule 23
Else go to Case 10

- **Rule 22**

[IF Device Type = ("PDA"or "Smartphone") and Connection Type = "GPRS" or "Wi-Fi")

Then

[IF Location ="Stationary" and Noise Level ="Low" and Visual Distraction ="Low"

Then present text LOs, audio LOs and graphic and animation LOs less than 240x320 pixels.

Else

[IF Location ="Stationary" and Visual Distraction ="Low"

Then present text LOs and graphic and animation LOs less than 240x320 pixels

Else apply Rule 1.1

End IF]

End IF]

End IF]

- **Rule 23**

[IF Device Type = "Cellular Phone" and Connection Type = ("GPRS" or "Wi-Fi")

Then

[IF Location ="Stationary" and Noise Level ="Low" and Visual Distraction ="Low"
Then present text LOs, audio LOs and graphic and animation LOs less than 120x160 pixels
Else
[IF Location ="Stationary" and Visual Distraction ="Low"
Then present text LOs, graphic and animation LOs less than 120x160 pixels
Else apply Rule 1.1
End IF]
End IF]
End IF]

CASE # 10

IF BL = ("20-50%" or Over 50 %) and LS = "Verbal"
Then apply Rule 25
Else apply Case 11

- **Rule 25**

IF L="Stationary" and Noise Level ="Low" and Visual Distraction ="Low"
Then present text and audio LOs
Else
[IF Location ="Stationary" and Visual Distraction ="Low"
Then present text LOs
Else apply Rule 1.1
End IF]
End IF]
End IF]

CASE # 11

IF BL ="20-50%" and LS ="Visual"
THEN go through Rule27, Rule28, Rule 29, and Rule 30
Else apply Case 12

- **Rule 27**

IF Device Type = ("PDA"or "Smartphone") and Connection Type = "GPRS"

Then apply Rule 4

End IF

- **Rule 28**

IF Device Type = ("PDA"or "Smartphone") and Connection Type = "Wi-Fi" Then

Then apply Rule 5

End IF

- **Rule 29**

IF Device Type = "Cellular Phone" and Connection Type = "GPRS" Then

Then apply Rule 6

End IF

- **Rule 30**

IF Device Type = "Cellular Phone" and Connection Type = "Wi-Fi" Then

Then apply Rule 7

End IF

CASE # 12

IF BL ="Over 50 %" and LS ="Visual"

Then go through Rule34, Rule 35

- **Rule 34**

IF Device Type = ("PDA"or "Smartphone") and Connection Type = ("GPRS" or "Wi-Fi") Then

Then apply Rule 17

End IF

- **Rule 35**

IF Device Type = "Cellular Phone" and Connection Type = ("GPRS" or "Wi-Fi") Then

Then apply Rule 18

End IF

5.3 The Rules That Must Be Implemented Via IPOD:-

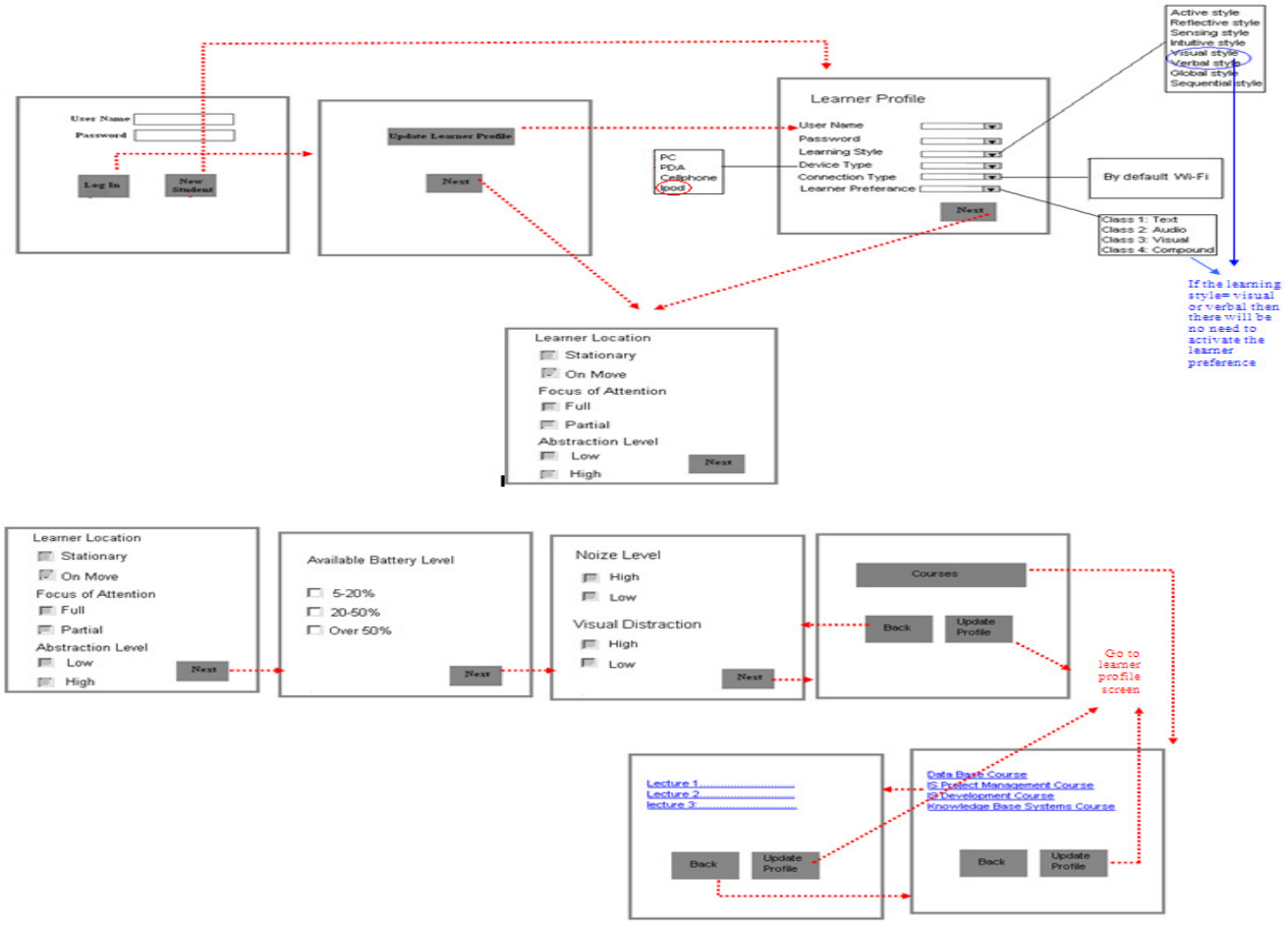


Figure 5.7 The Implementation Via IPOD

- *IF the learner Location ="On Move"*

Then the learner Focus of Attention="Partial"

End IF

- *IF the learner Focus of Attention ="Partial"*

Then Abstraction Level = "High" // which means only display the summary of each learning object

End IF

- *[IF Learning Style ="Sensing"*

Then present facts learning objects first followed by example learning objects

Else

[IF Learning Style ="Intuitive"

Then present concept learning objects first followed by theory learning objects

End IF]

Else keep the standard order of the learning objects.

End IF]

- *IF Learning Style ="Global"*

Then for each lecture present the summaries of learning objects first followed by the information objects

Else IF Learning Style ="Sequential"

Then for each lecture present the information objects of learning objects first followed by the summaries.

End IF

- *[IF Learning Style ="Intuitive"*

Then present learning objects in low level of detail// only summary

Else

[IF Learning Style ="Global" or "Sequential"

Then Present learning objects in both levels of details// summary + information objects

End IF]

Else

[IF the Abstraction level="High"

Then present learning objects in low level of detail l// only summary

End IF]

Else present learning objects in high level of detail// only Information objects

End IF]

5.3.1 Rules For Adaptation Of The Leaning Object Presentation

CASE # 1

IF BL ="5-20%"
THEN apply Rule 1
Else apply Case 2

- **Rule1**

IF Location = "Stationary" and Visual Distraction= "Low"

Then present text LOs

Else

[Display notification message = "Text content is not compatible with your context" and apply Rule 1.1]

End IF

Figure 4.16 is an activity diagram that describes the first rule in the presentation type adaptation rules.

- **Rule 1.1**

[IF Noise Level ="Low"

Then play audio LOs

Else display verification message = "can you use your device headphones?"

[IF yes play audio LOs

Else display notification message="We recommend you to access the learning content later]"

End IF]

End IF]

CASE # 2

IF BL ="20-50%" and LS ≠ ("Visual" or "Verbal") and LP="Class1"

THEN apply Rule 1

Else apply Case 3

CASE # 3

IF BL ="20-50%" and LS ≠ ("Visual" or "Verbal") and LP="Class2"

THEN apply Rule 2

Else apply Case 4

- **Rule2**

[IF Noise Level = "Low"

Then present audio LOs

Else display notification message = "Audio content is not compatible *with your context, would you like to have other type of content?"*

[IF learner selects text content

Then apply Rule 2.1

Else

[IF learner selects visual content

Then go through Rule 3, Rule 4, Rule5, Rule 6, Rule 7, and Rule 8

End IF]

End IF]

End IF]

- **Rule 2.1**

IF Location = "Stationary" and Visual Distraction= "Low"

Then present text LOs

Else display notification message = "We recommend you to access the learning content later"

End IF

CASE # 4

IF BL ="20-50%" and LS ≠ ("Visual" or "Verbal") and LP="Class3"
THEN apply Rule 8
Else apply Case 5

- **Rule 8**

[IF Device Type = "IPod"
Then
[IF Location ="Stationary" and Visual Distraction ="Low"
Then present graphic and animation LOs less than 320x480 pixels
Else
[Display notification message = "Visual content is not compatible with your context"
and apply Rule 1.1]
End IF]
End IF]

CASE # 5

IF BL ="20-50%" and LS ≠ ("Visual" or "Verbal") and LP="Class4"
THEN go through Rule 14
Else apply Case 6

- **Rule 14**

[IF Device Type = "IPod"
Then
[IF Location ="Stationary" and Noise Level ="Low" and Visual Distraction ="Low"
Then present text LOs, audio LOs and graphic and animation LOs less than 320x480 pixels
[IF Location ="Stationary" and Visual Distraction ="Low"
Then present text LOs and graphic and animation LOs less than 320x480 pixels
Else apply Rule 1.1
End IF]
End IF]
End IF]

CASE # 6

IF BL ="Over 50%" and LS ≠ ("Visual" or "Verbal") and LP="Class1"

Then apply Rule 1

Else apply Case 7

CASE # 7

IF BL ="Over 50%" and LS ≠ ("Visual" or "Verbal") and LP="Class2"

Then apply Rule 2

Else apply Case 8

CASE # 8

IF BL ="Over 50%" and LS ≠ ("Visual" or "Verbal") and LP="Class3"

Then go through Rule 19

Else apply Case 9

- **Rule 19**

IF Device Type ="IPod"

Then apply Rule 8

End IF

CASE # 9

IF BL ="Over 50%" and LS ≠ ("Visual" or "Verbal") and LP="Class4"

Then go apply Rule 24

Else go to Case 10

- **Rule 24**

IF Device Type ="IPod"

Then apply Rule 14

End IF

CASE # 10

IF BL = ("20-50%" or Over 50 %) and LS = "Verbal"

Then apply Rule 25

Else apply Case 11

- **Rule 25**

IF L="Stationary" and Noise Level ="Low" and Visual Distraction ="Low"

Then present text and audio LOs

Else

[IF Location ="Stationary" and Visual Distraction ="Low"

Then present text LOs

Else apply Rule 1.1

End IF]

End IF]

End IF]

CASE # 11

IF BL ="20-50%" and LS ="Visual"

THEN apply Rule 31

Else apply Case 12

- **Rule 31**

IF Device Type = "IPod"

Then apply Rule 8

End IF

CASE # 12

IF BL ="Over 50 %" and LS ="Visual"

Then apply Rule 36

- **Rule 36**

IF Device Type ="IPod"

Then apply Rule 8

End IF

Chapter 6
Test and Comparison

Chapter 6

Test and Comparison

6.1 System Testing

Software validation or, more generally, verification and validation are intended to show that a system conforms to its specification and that the system meets the expectations of the users. We have tested the system and checked the validation of the generic interface through the three stages of the testing process, where the systems should not be tested as a single, monolithic unit. Unit testing involves checking all program units and the triggers that were built one by one and verifying that each unit meets its specification. Figure 6.1 shows a three-stage testing process where system components are tested, the integrated system is tested and, finally, the system is tested with real data.

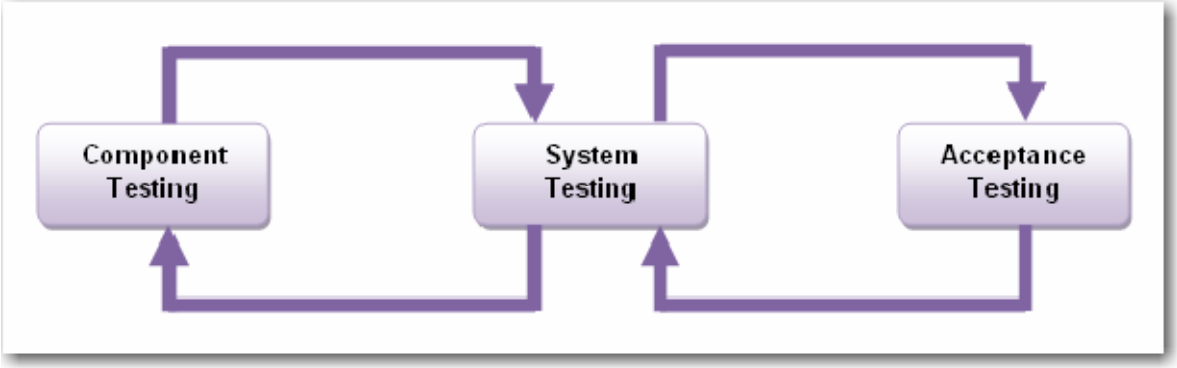


Figure 6.1 : Testing process

The stages in the testing process are:

1) Component (or unit) testing: individual components are tested to ensure that they operate correctly. Each component is tested independently, without other system components. Components may be simple entities as functions, object classes or triggers, or may be coherent groupings of these entities.

2) System Testing: the components are integrated to make up the system. This process is concerned with finding errors that result from unanticipated interactions between components and component interface problems. It is also concerned with validating that the system meets its requirements and testing the emergent system properties.

3) Acceptance testing: this is the final stage in the testing process before the system is accepted for operational use. The system is tested with real data rather than with simulated test data.

After that, the individual program units are integrated and tested as a complete system to ensure that the software requirements have been met. The system is tested firstly with simulated test data, and then with real data.

After the system is installed and put in practical use, maintenance involves correcting the errors which were not discovered in earlier stages of the development life cycle, improving the implementation of the system units and enhancing the system's services as new requirements are discovered.

Improving our system enhancing the services it provides the users with, could always be in place to satisfy the users' needs. Evolving the interface with its components and design would serve its functionality, and such a process could also be considered as future work for this thesis and for other interested researchers.

6.2 Data collection methods

Questionnaire design, pre-test stage and the pilot study
The questionnaire development process was guided by the following practice recommended by social research:

6.2.1 Initial design and development of the survey instrument
6.2.2 Pre-testing and enhancement through panel of experts opinion

6.2.1 Initial design and development of the survey instrument

Attention was paid to the choice of wording since the language of questionnaires is an exceedingly important attributes of their effectiveness and should reflect the respondent's own language usage. The word of the questionnaire can also help to avoid pitfalls, such as leading and double-barreled questions. Items in the questionnaire were designed to bring them as close as possible to being simple, clear, short, and technically accurate, bias free and at an appropriate reading level.

6.2.2 Enhancement through panel of experts opinion

After the initial development of the constructs, which reflect the main key concepts of the research model, a draft questionnaire was pre-test informally to a group of friends and experts in Ministry of Education in Jordan as Dr Aref Hussain Abu Awwad. They provided many constructive suggestion regarding the structure, wording and presentation of the draft questionnaire.

6.3 Data Analysis and results

6.3.1 Preliminary data analysis and descriptive statistics
6.3.1.1 research sample characteristics

In this section, we will have a closer look at the sample data and which it means to the research and how we can confirm our hypotheses. The research sample of contains 50 respondent's which were distribute according to gender, age and experience in using the internet. The sample of distribution according to gender of respondents illustrated in table

6.1

Gender	Frequency	Percent
Male	36	72.1%
Female	14	27.9%
Total	50	100.0%

Table 6.1 Sample distribute according to gender of respondent's

From the above table which shows the sample distribute according to gender of response the most frequent number of gender of respondent's are representative to male with 36 people with represent of 72.1% and female with 14 people who represent of 27.9%, Since most females tend to study in traditional way. The sample of distribution according to age of respondents illustrated in table 2

Age	Frequency	Percent
Less than 30	20	40.4%
31 – 40	18	36.1%
41 – 50	9	18.3%
More than 50	3	5.7%
Total	50	100.0%

Table 6.2 Sample of distribution according to age of respondents

The above table which shows that the most frequent number of age ranges is less than 30 with percent of 40.4%, but the frequent number of age ranges from 31 – 40 with percent of 36.1% which is a logical thing since most of the worker in this field ranged in this age categories, the next frequent is 41 – 50 with percent of 18.3%, finally more than 50 with percent of 5.7%. So that show that younger people goes easy with m-learning. The sample of distribution according to gender of respondents illustrated in table 6.3

Position experience	Frequency	Percent
Less than 1 year	3	4.2%
2-5	7	13.4%
6-10	30	57.7%
More than 10 years	10	24.6%
Total	50	100.0%

Table 6.3 Sample of distribution according to experience in using internet is respondents

From the above table which shows the sample distribute according to experience in using internet of response the most frequent system experience was range from 6-10 years with percent of 57.7%. The second frequent was more than 10 years with percent of 24.6%, next frequents was 2-5 years with present of 13.4%, finally less than 1 year with present of 4.2%. The majority of population in this category is 6-10 since the more student involved in using internet the more he get interesting in using m-learning.

6.4 Evaluator of the survey

The primary data-collection tool was a questionnaire prepared especially for this thesis. We collect data to evaluate the m-learning implementation. The survey was carried out with higher education students of the University in Jordan. These questionnaires were distributed to find the weaknesses of m-learning and the type of mobile learning applications that they would like instead of traditional way. They could use the above survey to evaluate of m-learning. A cluster analysis was conducted (based on the Pearson Correlation) to identify patterns amongst the scores. The analysis that follows identifies some of the important features of the m-learning experience, and establishes ways to test them and evaluations that aim of m-learning courses. These tests can also help future researchers establish if m-learning is effective. Furthermore, it represents a step towards the creation of a targeted and specific evaluation system for m-Learning courses.

6.4.1 Analysis of student's response

This section presents a survey conducted with students on the use of PDA and mobile devices. The mean result obtained from each question had a scale of 1 – 5 i.e. 1 = strongly disagree, 5 = strongly agree.

Use a PDA or mobile to access learning resources. General trends of the students towards m-learning help school materials. The weakness of m-learning is does not allow students to refer to too many resources such as books, traditional learning materials or lecturer slides. 45.9 % of strongly agreed, 26.8 agreed, 9.1 slightly agreed and, 18.2 slightly disagreed, 11.3 disagreed, 5.6 strongly disagreed. The majority of students would like to use a PDA to access learning resources in the classrooms. Students could access the on line courses system and download lecturer's slides, synchronize the lecturers power point slides on their PDA or mobile.

Ask questions from a PDA and mobile to the interaction of student with course via their sites from this question and interact with student activities and tests so test is a good method to test student's skills for a particular area. Lecturers would also know the students' knowledge in the area. From this question, 33.8 % agreed, 15.2% slightly agreed, 3.9% disagreed and 4.3% strongly disagreed. These tests are in the form of multiple-choice questions, which have been created by the lecturer.

About question I feel that these sites help me to organize my time to learn better, would be displayed in real time on the lecturer's notebook use a PDA or mobile this question is asked if students would like to improve their learning in anytime anywhere. From this survey we found that 80% of students wanted this feature on their PDA and mobile they agreed that the use of these sites makes the learning process more easily and 0.05% is slightly disagreed.

6.5 Evaluative measurement and clarification

Overall satisfaction A student's overall feeling of satisfaction after a course is as important in the m-learning environment as in the classroom. If students do not feel satisfied, they will not continue taking mobile courses. Researchers should not ignore the psychological importance of 'enjoyment' or 'satisfaction'. These feelings enable learning.

Course organization Just as in a physical class, m-learning students can lose focus if they feel that a course lacks direction. As such, surveys must ask whether students feel lost or confused by the course's direction. Both researchers and administrators stand to benefit from a close examination of students' feelings about course organization. Researchers can use this part of the survey ensure that students are happy and learning effectively.

Course activities The design of m-Learning activities requires special attention to both the physical limitations of mobile devices (such as cellphones and personal digital assistants) and the psychological limitations and transactional distances of virtual communication. Designers and teachers must give attention to how their activities affect students.

Student interaction Younger students (often called 'digital natives') feel comfortable in the virtual realities created by instant messaging, cellular telephone, and online games, while older learners (called 'digital immigrants') feel more comfortable in face-to-face environments.

Relationship to content m-learning presents a number of new opportunities for instructional designers to change the relationship between students and course content. Students can access learning materials at any time and from any location. This may well lead to changes in how students study. The above survey included a question that addressed the problem that students find themselves spending hours alone over required texts.

6.6 Comparison

Today the more and more rapid development contributes to the increasing abilities of the mobile devices (cell phones, smart phones, PDAs, laptops) and wireless communications, which are the main parts of the mobile learning. On the other hand for the implementation of m-learning it is necessary to use a corresponding system for the management of such type of education.

In [17, 23] several big m-learning research projects are examined, m-learning Project, from e-learning to m-Learning, etc. There are descriptions of the projects' purposes, the target groups, the mobile devices which can be used but there is no sufficient information about the concrete technologies used for their development. The comparison of different m-learning systems is a difficult task because this form of education is in its infancy and today there exist a little number of successful implementations, for which enough published information can be found.

Today a variety of mobile solutions exists, which are used in different spheres of daily life – in business, in health care, in education, etc. Some of these solutions are standalone applications which are executed on the user's mobile device and are not connected with a mobile management system. Such applications are not an object of this paper. Systems which manage the m-learning and present the learning content on handheld mobile devices - cell phones, smart phones and/or PDAs are presented here.

During the process of defining the criteria for comparison of m-learning systems the characteristics which vastly distinguish the m-learning from e-learning have to be taken into consideration. The learning content in m-learning is visualized on mobile devices. Some of these devices have limited functionality (cell phones). On the second place m-Learning can be on-line or/and off-line [9]. If the learning is off-line the applications have to be loaded in the mobile device’s memory which often has limited capacity. It is also important to determine what kind of information the particular system supports – educational (learning content, exam tests, games, etc.) and/or administrative (news, SMS, etc.). During the comparison of the systems it must be taken into account if the system is independent of existing e-learning platforms or it is based on such platforms. As there are no developed standards for m-learning, yet, a suitable comparison criterion would be the e-learning standards (SCORM, AICC, etc.) supported by the m-learning systems. Important information especially for the future development of such systems is the programming language used for the development of existing systems. It must be mentioned that the m-learning systems have to adapt the learning content for mobile devices with different visualization abilities, in contrast to the e-learning systems.

The comparison analysis of the m-learning systems is made using the following criteria:

- . Type of supported mobile devices;
- . Type of supported m-learning – on-line and/or off-line;

- Type of information which the system supports – educational (learning content, exam tests, etc.) and/or administrative (news, SMS, etc.);
- Programming language used during the system development;
- Content adaptation technology.

The results of the comparison of the systems are shown in the following table:

m-Learning System	Type of mobile device	Type of connection		Type of information	Program language	Content adaptation technology
		Online	Offline			
GoBinder 2006 (Blackboard Backpack) [44]	Ultra Mobile	No	offline	Learning content & Course Information	C++, C#	XML
Mobile Customer Education System [45]	PDAs, Cell phones	web	No	Administrative information	N/a	XML
iQpakk Mobile [46]	PDA	No	offline	Learning content, Administrative information	C++	XML
ObjectJ Mobile Learning [47]	PDAs	web	proxy	Learning content	Java	N/a
Our System	PDA, Smart phones, Laptops, PC, IPod	web	no	Learning content, Course Information, Exam Test Audio	ASP.net using C#	XML

Table 6.4 Comparison Systems

From Table 6.4, our system support different types of mobile devices (PDA, Smart phones,) and Windows based Laptops. Also our system support on-line learning, maintain learning content, course information and exam tests.

The programming language for development of m-learning systems is ASP.net with C#, which designed to support web design, so this system will be faster and easy to use; and the adaptation technology that used is XML based.

Chapter 7
Conclusion and future work

Chapter 7

Conclusion and future work

7.1 Conclusion

In developing countries, mobile phones offer a possible solution for applying technology in education, as they are not only cheaper than desktop and laptop computers but offer unique solutions to developing countries infrastructure limitations.

- Mobile phones are not just communications devices sparking new modalities of interaction between people; they are also powerful computing devices that are portable and personal.
- Due to the significant penetration of mobile phones, many students are already owners of their own powerful learning devices in the form of various types of mobile technology and the student can learn anything with mobile device if educators design it right.
- Develop new m-learning systems that support the main elements of m-learning such as availability, accessibility, flexibility, personality, and portability which make our system a mobile environment.
- Adapting a set of tools, solutions, and mobile technologies into this system, this would enrich the m-learning and increase students' motivation.

This thesis presented the design and implementation of m-learning that will be used in the project to support students learning. However, recognize that developing applications for mobile devices is a very difficult task, because these devices have not only technical limitations, but also different platforms.

7.2 Future work

We would like to suggest some interesting issues and ideas that could not be reached because of time, resources and other constraints and they will aid as an improvement on our m-learning System. As future work, we suggest

- Adding search function to the system, to allow the learners to search for lectures, subject or anything else
- Adding other multimedia elements such as voice, video as learning elements to be more friendly with a user mobility

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[47] http://objectj.com/solutions/mlearning/mlearning.pdf

Appendix A

IDENTIFYING STUDY

Dear Student:

The scientist's study finding the trends of higher education student of m-learning application, and what is the impact in their education, to complement the requirements to gain a master's degree in information technology. The distribution of sample collection according to the following cases:

Variable	SEX		College		College level (College year)		Experience in the use of Internet		
	MALE	FEMALE	Scientific	humane	third	fourth	Less than Year	ONE TO LESS THAN THREE YEAR	Three More
NO.									
Percent%									

Dimension	Almost always	Frequently	About Half	Rarely If ever	**Does not apply**	Don't Know
1) The interaction of students with school materials via their site	☐	☐	☐	☐	☐	☐
2) Interaction with student activities and tasks and tests	☐	☐	☐	☐	☐	☐
3) I feel that these sites help me to organize my time in Learn better.	☐	☐	☐	☐	☐	☐
4) I think that these sites support and promote the traditional education way	☐	☐	☐	☐	☐	☐
5) I believe that the use of these sites makes the learning process more easily	☐	☐	☐	☐	☐	☐
6)) I feel that learning is more beneficial uses of these ways	☐	☐	☐	☐	☐	☐
7) I want to register more courses which offer Internet sites.	☐	☐	☐	☐	☐	☐
8) I feel that I use these sites to increase my confidence in myself learning.	☐	☐	☐	☐	☐	☐
9) I think that the use of these sites does not require possession of special computer skills.	☐	☐	☐	☐	☐	☐
10). I think that assisted learning sites are fit for all subjects.	☐	☐	☐	☐	☐	☐
11) I believe that the use of such sites helps me to understand the content subjects better.	☐	☐	☐	☐	☐	☐

Appendix B

This is some of our ASP.net code with C# we been used in our implementation.

```
using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;

public partial class Courses : System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {


    }
```

```
<%@ Page Language="C#" AutoEventWireup="true"
CodeFile="Courses.aspx.cs" Inherits="Courses" %>
<%@ Register TagPrefix="mobile"
Namespace="System.Web.UI.MobileControls" Assembly="System.Web.Mobile"
%>

<html xmlns="http://www.w3.org/1999/xhtml" >
<body>
    <mobile:Form id="Form1" runat="server">
        <mobile:Label ID="Label1" Runat="server"> DataBase
Course</mobile:Label>
        <mobile:Command ID="Command2" Runat="server" Format="Link"
OnClick="Command2_Click">IS Project Management Course</mobile:Command>
        <mobile:Label ID="Label2" Runat="server">IS Developement
Course</mobile:Label>
        <mobile:Label ID="Label3" Runat="server">Knowledge Base System
Course</mobile:Label>
        <br />
        <mobile:Command ID="Command1" Runat="server"
OnClick="Command1_Click">Back</mobile:Command>
```

```
    </mobile:Form>
</body>
</html>

    protected void Command1_Click(object sender, EventArgs e)
    {
        RedirectToMobilePage("Determine.aspx");
    }
    protected void Command2_Click(object sender, EventArgs e)
    {
        RedirectToMobilePage("Determine2.aspx");
    }
}
```

To Update profile

```
using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;
using System.Data.OleDb;
using System.Configuration;

public partial class UpdateProf :
System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {
        if (string.IsNullOrEmpty((string)Session["UserID"]))
        {
            RedirectToMobilePage("default.aspx", true);
        }

    }
    protected void Command1_Click(object sender, EventArgs e)
    {
        OleDbConnection con = new
OleDbConnection(ConfigurationManager.ConnectionStrings["ConnectionStrin
g"].ConnectionString);
        OleDbCommand cmd = new OleDbCommand();
        cmd.Connection = con;
        cmd.CommandText = "update  [Users] set learnStyle=" +
SelectionList1.SelectedIndex + " where UserID='" +
Session["UserID"].ToString() +"'";
        con.Open();
        cmd.ExecuteNonQuery();
```

```
        con.Close();

        RedirectToMobilePage("step1.aspx");
    }
    protected void Form1_Activate(object sender, EventArgs e)
    {

    }
}
```

To set the lectures

```
%@ Page Language="C#" AutoEventWireup="true"
CodeFile="UpdateProf.aspx.cs" Inherits="UpdateProf" %>
<%@ Register TagPrefix="mobile"
Namespace="System.Web.UI.MobileControls" Assembly="System.Web.Mobile"
%>

<html xmlns="http://www.w3.org/1999/xhtml" >
<body>
    <mobile:Form id="Form1" runat="server" OnActivate="Form1_Activate">
        <mobile:Label ID="Label1" Runat="server" Font-
Bold="True">Learning Style</mobile:Label>
        <mobile:SelectionList ID="SelectionList1" Runat="server"
Rows="2" SelectType="Radio">
            <Item Selected="True" Text="Sensing Style" Value="1" />
            <Item Text="Intuitive Style" Value="2" />
            <Item Text="Visual Style" Value="2" />
            <Item Text="Verbal Style" Value="3" />
            <Item Text="Global Style" Value="4" />
            <Item Text="Sequential Style" Value="5" />
        </mobile:SelectionList>
        <mobile:Label ID="Label2" Runat="server" Font-Bold="True"
Visible="False">Learner perferences</mobile:Label>
        <br />
        <mobile:SelectionList ID="SelectionList2" Runat="server"
Rows="2" SelectType="Radio" Visible="False">
            <Item Selected="True" Text="Text" Value="1" />
            <Item Text="Visual " Value="2" />
            <Item Text="Audio" Value="Audio" />
        </mobile:SelectionList>
        <mobile:Command ID="Command1" Runat="server"
OnClick="Command1_Click">Next</mobile:Command>

    </mobile:Form>
</body>
</html>
```

To set the questions

```
using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
```

```
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;
using System.Configuration;
using System.Data.OleDb;

public partial class Questions :
System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {


        if (!IsPostBack)
        {
            lblAnswer.Text = "";
            ViewState["counter"] = 1;
            Image1.Visible = false;
            FillGV();
        }
    }


    private void FillGV()
    {
        try
        {
        OleDbConnection con = new
OleDbConnection(ConfigurationManager.ConnectionStrings["ConnectionStrin
g"].ConnectionString);
        OleDbCommand cmd = new OleDbCommand();
        OleDbDataAdapter da = new OleDbDataAdapter(cmd);

        DataSet ds = new DataSet();
        cmd.Connection = con;
        string Sql = "SELECT Questions.QuestionID,
Questions.QuestionText  FROM Questions WHERE Questions.lectureID=  " +
Request.QueryString["lec"].ToString() + " and  QuestionID = " +
ViewState["counter"].ToString();
        string Sql2 = "SELECT Answers.QuestionID, Answers.ChoiceID,
Answers.ChoiceText, Answers.IsTrue  FROM Answers WHERE
Answers.lectureID=" + Request.QueryString["lec"].ToString() + " and
QuestionID = " + ViewState["counter"].ToString() + " order by
lectureID,QuestionID,ChoiceID";


        con.Open();
        cmd.CommandText = Sql;
        da.SelectCommand = cmd;
        da.Fill(ds, "Main");


        cmd.CommandText = Sql2;
        da.SelectCommand = cmd;
        da.Fill(ds, "Sub");
```

```
        SelectionList1.DataTextField = "ChoiceText";
        SelectionList1.DataValueField = "ChoiceID";
        Label1.Text =
ds.Tables["Main"].Rows[0]["QuestionText"].ToString();
        SelectionList1.DataSource = ds.Tables["sub"];
        SelectionList1.DataBind();

        }
    catch
    {
    }

    }
    protected void Command3_Click(object sender, EventArgs e)
    {
        RedirectToMobilePage("Courses.aspx");
    }
    protected void cmdNext_Click(object sender, EventArgs e)
    {
        Image1.Visible = false;
        lblAnswer.Text = "";
        ViewState["counter"] = (int)ViewState["counter"] + 1;
        FillGV();
    }
    protected void cmdPrevios_Click(object sender, EventArgs e)
    {
        Image1.Visible = false;
        lblAnswer.Text = "";
        ViewState["counter"] = (int)ViewState["counter"] - 1;
        FillGV();
    }

    private void CheckCorrect(string QuestionID, string ChoiceID)
    {
        try
        {
            OleDbConnection con = new
OleDbConnection(ConfigurationManager.ConnectionStrings["ConnectionStrin
g"].ConnectionString);
            OleDbCommand cmd = new OleDbCommand();
            OleDbDataReader Reader;
            cmd.Connection = con;
            string Sql = "SELECT  Answers.ChoiceID  FROM Answers WHERE
Answers.IsTrue=-1 and  Answers.lectureID=" +
Request.QueryString["lec"].ToString() + " and Answers.ChoiceID=" +
ChoiceID + " and QuestionID=" + QuestionID.ToString();


            con.Open();
            cmd.CommandText = Sql;
            Reader = cmd.ExecuteReader();
            if (Reader.HasRows)
            {
                Image1.Visible = true;
                Image1.ImageUrl = "pic/emM7_prv.gif";
                lblAnswer.Text = "Correct Answer";
```

```
            }
            else
            {
                Image1.Visible = true;
                Image1.ImageUrl = "pic/doh.gif";
                lblAnswer.Text = "Wrong Answer";
            }

        }
        catch
        {
        }
    }
    protected void cmdCorrect_Click(object sender, EventArgs e)
    {
        string   i = "";

        foreach (MobileListItem item in SelectionList1.Items)
        {
            if (item.Selected == true)
            {
                i = item.Value;
            }
        }

        CheckCorrect(ViewState["counter"].ToString(), i);

    }
    protected void SelectionList1_SelectedIndexChanged(object sender,
EventArgs e)
    {

    }
}
```

```
using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;
using System.Data.OleDb;
using System.Configuration;

public partial class UpdateProf :
System.Web.UI.MobileControls.MobilePage
{
```

```
    protected void Page_Load(object sender, EventArgs e)
    {
        if (string.IsNullOrEmpty((string)Session["UserID"]))
        {
            RedirectToMobilePage("default.aspx", true);
        }

    }
    protected void Command1_Click(object sender, EventArgs e)
    {
        OleDbConnection con = new
OleDbConnection(ConfigurationManager.ConnectionStrings["ConnectionStrin
g"].ConnectionString);
        OleDbCommand cmd = new OleDbCommand();
        cmd.Connection = con;
        cmd.CommandText = "update  [Users] set learnStyle=" +
SelectionList1.SelectedIndex + " where UserID='" +
Session["UserID"].ToString() +"'";
        con.Open();
        cmd.ExecuteNonQuery();
        con.Close();

        RedirectToMobilePage("step1.aspx");
    }
    protected void Form1_Activate(object sender, EventArgs e)
    {

    }
}

using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;

public partial class test : System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {
        ViewState["counter"] = 0;
    }
    protected void Command1_Click(object sender, EventArgs e)
    {
        string  i="";

        foreach (MobileListItem  item in SelectionList1.Items)
        {
            if (item.Selected == true)
```

```
            {
                i = item.Value;
            }
        }
        Label1.Text = i;
    }
    protected void SelectionList1_SelectedIndexChanged(object sender,
EventArgs e)
    {

    }
}
```

```
@ Page Language="C#" AutoEventWireup="true" CodeFile="test.aspx.cs"
Inherits="test" %>
<%@ Register TagPrefix="mobile"
Namespace="System.Web.UI.MobileControls" Assembly="System.Web.Mobile"
%>

<html xmlns="http://www.w3.org/1999/xhtml" >
<body>
     <mobile:Form id="Form1" runat="server"><mobile:Command
ID="Command1" Runat="server"
        OnClick="Command1_Click">Command</mobile:Command>
        <mobile:Label ID="Label1" Runat="server">Label</mobile:Label>
<bgsound src="6-1.wav" mce_src="6-1.wav"></bgsound>
        <mobile:SelectionList ID="SelectionList1" Runat="server"
SelectType="Radio"
OnSelectedIndexChanged="SelectionList1_SelectedIndexChanged">
            <Item Text="Text1" Value="1" />
            <Item Text="Text2" Value="2" />
        </mobile:SelectionList>
    </mobile:Form>
</body>
</html>
```

```
using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;

public partial class Exams : System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {
```

```
    }
}
```

```
%@ Page Language="C#" AutoEventWireup="true" CodeFile="Exams.aspx.cs"
Inherits="Exams" %>
<%@ Register TagPrefix="mobile"
Namespace="System.Web.UI.MobileControls" Assembly="System.Web.Mobile"
%>

<html xmlns="http://www.w3.org/1999/xhtml" >
<body>
    <mobile:Form id="Form1" runat="server"><mobile:Link ID="Link1"
Runat="server" NavigateUrl="Questions.aspx?lec=1" >Lecture
1</mobile:Link><br />
    <mobile:Link ID="Link2" Runat="server"
NavigateUrl="Questions.aspx?lec=2">Lecture 2</mobile:Link>
<mobile:Label ID="Label1" Runat="server">Lecture
3</mobile:Label></mobile:Form>
</body>
</html>
```

```
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;

public partial class Step3 : System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {
        if (string.IsNullOrEmpty((string)Session["UserID"]))
        {
            RedirectToMobilePage("default.aspx", true);
        }
    }
    protected void Command2_Click(object sender, EventArgs e)
    {
        RedirectToMobilePage("Step2.aspx");
    }
    protected void Command1_Click(object sender, EventArgs e)
    {

        Session["Noize"] = SelectionList1.SelectedIndex;
        Session["VisualDistraction"] = SelectionList2.SelectedIndex;
        RedirectToMobilePage("Determine.aspx");
    }
}
```

```
@ Page Language="C#" AutoEventWireup="true" CodeFile="test.aspx.cs"
Inherits="test" %>
<%@ Register TagPrefix="mobile"
Namespace="System.Web.UI.MobileControls" Assembly="System.Web.Mobile"
%>

<html xmlns="http://www.w3.org/1999/xhtml" >
<body>
     <mobile:Form id="Form1" runat="server"><mobile:Command
ID="Command1" Runat="server"
        OnClick="Command1_Click">Command</mobile:Command>
        <mobile:Label ID="Label1" Runat="server">Label</mobile:Label>
<bgsound src="6-1.wav" mce_src="6-1.wav"></bgsound>
        <mobile:SelectionList ID="SelectionList1" Runat="server"
SelectType="Radio"
OnSelectedIndexChanged="SelectionList1_SelectedIndexChanged">
            <Item Text="Text1" Value="1" />
            <Item Text="Text2" Value="2" />
        </mobile:SelectionList>
    </mobile:Form>
</body>
</html>



using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;
using System.Configuration;
using System.Data.OleDb;

public partial class LecturesDtlText :
System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {

        if (!IsPostBack)
        {
            ViewState["counter"] = 0;
            FillGV();
        }
    }

    private void FillGV()
    {
```

```
        OleDbConnection con = new
OleDbConnection(ConfigurationManager.ConnectionStrings["ConnectionStrin
g"].ConnectionString);
        OleDbCommand cmd = new OleDbCommand();
        OleDbDataReader reader;
        cmd.Connection = con;
        cmd.CommandText = "SELECT * FROM [Users] WHERE [UserID] = '" +
Session["UserID"].ToString() + "'";
        con.Open();
        reader = cmd.ExecuteReader();
        reader.Read();
        string learnStyle, Focus, Abstraction,LearnerLocation;

        learnStyle = reader["learnStyle"].ToString();
        Focus = Session["Focus"].ToString(); // Full or Partial
        Abstraction = Session["Abstraction"].ToString();//High  or low
        LearnerLocation =
Session["LearnerLocation"].ToString();//stationary or On Move
        reader.Close();


        //IF the learner Focus of Attention ="Partial" Then Abstraction
Level = "High"
        if (Focus == "2" ||  LearnerLocation=="2")
        {
            Abstraction = "1";
        }




        cmd = new OleDbCommand();
        OleDbDataAdapter da = new OleDbDataAdapter(cmd);

        DataSet ds = new DataSet();
        cmd.Connection = con;
        string Sql = "SELECT Lecturs.LectureID, Lecturs.LO,
Lecturs.Level, Types.TypeID, Types.TypeDesc, Lecturs.body FROM Types
INNER JOIN Lecturs ON Types.TypeID = Lecturs.Type where ";
        Sql += " LectureID=" + Request.QueryString["lec"].ToString();
        if (Abstraction == "1")//high
        {
            Sql += " and  Level=2";//summary
        }
        else
        {
            Sql += " and  Level=1";//core
        }


        if (learnStyle == "1")
        {
            Sql += " and Type<>1 order by Type  ";//Sensing
        }
        else if (learnStyle == "2")
        {
```

```
            Sql += " and type <>1 order by Type DESC ";//Intuitive
        }
        else
        {
            Sql += "  order by Type  ";//Sensing
        }

        cmd.CommandText = Sql;
        da.SelectCommand = cmd;
        da.Fill(ds);
        if((int)ViewState["counter"]<ds.Tables[0].Rows.Count)

Response.Write(ds.Tables[0].Rows[(int)ViewState["counter"]]["body"].ToS
tring());

    }
    protected void Command3_Click(object sender, EventArgs e)
    {
        Response.Redirect("Courses.aspx");
    }
    protected void Command1_Click(object sender, EventArgs e)
    {
        if ((int)ViewState["counter"] > 1)
        {
            ViewState["counter"] = (int)ViewState["counter"] - 1;
        }
        FillGV();
    }
    protected void Command2_Click(object sender, EventArgs e)
    {
        ViewState["counter"] = (int)ViewState["counter"] + 1;
        FillGV();
    }
}

using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;

public partial class Exams : System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {
  }
}
```

```
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;

public partial class Step3 : System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {
        if (string.IsNullOrEmpty((string)Session["UserID"]))
        {
            RedirectToMobilePage("default.aspx", true);
        }
    }
    protected void Command2_Click(object sender, EventArgs e)
    {
        RedirectToMobilePage("Step2.aspx");
    }
    protected void Command1_Click(object sender, EventArgs e)
    {

        Session["Noize"] = SelectionList1.SelectedIndex;
        Session["VisualDistraction"] = SelectionList2.SelectedIndex;
        RedirectToMobilePage("Determine.aspx");
    }
}



using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;

public partial class test : System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {
        ViewState["counter"] = 0;
    }
    protected void Command1_Click(object sender, EventArgs e)
    {
        string  i="";
```

```
        foreach (MobileListItem  item in SelectionList1.Items)
        {
            if (item.Selected == true)
            {
                i = item.Value;
            }
        }
        Label1.Text = i;
    }
    protected void SelectionList1_SelectedIndexChanged(object sender,
EventArgs e)
    {

    }
}
using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;
using System.Configuration;
using System.Data.OleDb;

public partial class LecturesDtlText :
System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {

        if (!IsPostBack)
        {
            ViewState["counter"] = 0;
            FillGV();
        }
    }

    private void FillGV()
    {
        OleDbConnection con = new
OleDbConnection(ConfigurationManager.ConnectionStrings["ConnectionStrin
g"].ConnectionString);
        OleDbCommand cmd = new OleDbCommand();
        OleDbDataReader reader;
        cmd.Connection = con;
        cmd.CommandText = "SELECT * FROM [Users] WHERE [UserID] = '" +
Session["UserID"].ToString() + "'";
        con.Open();
        reader = cmd.ExecuteReader();
        reader.Read();
```

```
        string learnStyle, Focus, Abstraction,LearnerLocation;

        learnStyle = reader["learnStyle"].ToString();
        Focus = Session["Focus"].ToString(); // Full or Partial
        Abstraction = Session["Abstraction"].ToString();//High  or low
        LearnerLocation =
Session["LearnerLocation"].ToString();//stationary or On Move
        reader.Close();


        if (Focus == "2" ||  LearnerLocation=="2")
        {
            Abstraction = "1";
        }


        cmd = new OleDbCommand();
        OleDbDataAdapter da = new OleDbDataAdapter(cmd);

        DataSet ds = new DataSet();
        cmd.Connection = con;
        string Sql = "SELECT Lecturs.LectureID, Lecturs.LO,
Lecturs.Level, Types.TypeID, Types.TypeDesc, Lecturs.body FROM Types
INNER JOIN Lecturs ON Types.TypeID = Lecturs.Type where ";
        Sql += " LectureID=" + Request.QueryString["lec"].ToString();
        if (Abstraction == "1")//high
        {
            Sql += " and  Level=2";//summary
        }
        else
        {
            Sql += " and  Level=1";//core
        }


        if (learnStyle == "1")
        {
            Sql += " and Type<>1 order by Type  ";//Sensing
        }
        else if (learnStyle == "2")
        {
            Sql += " and type <>1 order by Type DESC ";//Intuitive
        }
        else
        {
            Sql += "  order by Type  ";//Sensing
        }

        cmd.CommandText = Sql;
      //  con.Open();
        da.SelectCommand = cmd;
        da.Fill(ds);
        if((int)ViewState["counter"]<ds.Tables[0].Rows.Count)

Response.Write(ds.Tables[0].Rows[(int)ViewState["counter"]]["body"].ToS
tring());
```

```
    }
    protected void Command3_Click(object sender, EventArgs e)
    {
        Response.Redirect("Courses.aspx");
    }
    protected void Command1_Click(object sender, EventArgs e)
    {
        if ((int)ViewState["counter"] > 1)
        {
            ViewState["counter"] = (int)ViewState["counter"] - 1;
        }
        FillGV();
    }
    protected void Command2_Click(object sender, EventArgs e)
    {
        ViewState["counter"] = (int)ViewState["counter"] + 1;
        FillGV();
    }
}

using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;
using System.Configuration;
using System.Data.OleDb;

public partial class LecturesDtlText :
System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {

        if (!IsPostBack)
        {
            ViewState["counter"] = 0;
            FillGV();
        }
    }

    private void FillGV()
    {
        OleDbConnection con = new
OleDbConnection(ConfigurationManager.ConnectionStrings["ConnectionStrin
g"].ConnectionString);
        OleDbCommand cmd = new OleDbCommand();
        OleDbDataReader reader;
        cmd.Connection = con;
```

```
        cmd.CommandText = "SELECT * FROM [Users] WHERE [UserID] = '" +
Session["UserID"].ToString() + "'";
        con.Open();
        reader = cmd.ExecuteReader();
        reader.Read();
        string learnStyle, Focus, Abstraction,LearnerLocation;

        learnStyle = reader["learnStyle"].ToString();
        Focus = Session["Focus"].ToString(); // Full or Partial
        Abstraction = Session["Abstraction"].ToString();//High  or low
        LearnerLocation =
Session["LearnerLocation"].ToString();//stationary or On Move
        reader.Close();


        //IF the learner Focus of Attention ="Partial" Then Abstraction
Level = "High"
        if (Focus == "2" ||  LearnerLocation=="2")
        {
            Abstraction = "1";
        }


        cmd = new OleDbCommand();
        OleDbDataAdapter da = new OleDbDataAdapter(cmd);

        DataSet ds = new DataSet();
        cmd.Connection = con;
        string Sql = "SELECT Lecturs.LectureID, Lecturs.LO,
Lecturs.Level, Types.TypeID, Types.TypeDesc, Lecturs.body FROM Types
INNER JOIN Lecturs ON Types.TypeID = Lecturs.Type where ";
        Sql += " LectureID=" + Request.QueryString["lec"].ToString();
        if (Abstraction == "1")//high
        {
            Sql += " and  Level=2";//summary
        }
        else
        {
            Sql += " and  Level=1";//core
        }


        if (learnStyle == "1")
        {
            Sql += " and Type<>1 order by Type  ";//Sensing
        }
        else if (learnStyle == "2")
        {
            Sql += " and type <>1 order by Type DESC ";//Intuitive
        }
        else
        {
            Sql += "  order by Type  ";//Sensing
        }

        cmd.CommandText = Sql;
      //  con.Open();
```

```
        da.SelectCommand = cmd;
        da.Fill(ds);
        if((int)ViewState["counter"]<ds.Tables[0].Rows.Count)


Response.Write(ds.Tables[0].Rows[(int)ViewState["counter"]]["body"].ToS
tring());

    }
    protected void Command3_Click(object sender, EventArgs e)
    {
        Response.Redirect("Courses.aspx");
    }
    protected void Command1_Click(object sender, EventArgs e)
    {
        if ((int)ViewState["counter"] > 1)
        {
            ViewState["counter"] = (int)ViewState["counter"] - 1;
        }
        FillGV();
    }
    protected void Command2_Click(object sender, EventArgs e)
    {
        ViewState["counter"] = (int)ViewState["counter"] + 1;
        FillGV();
    }
}

using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;

public partial class Exams : System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {
            }
}


%@ Page Language="C#" AutoEventWireup="true" CodeFile="Exams.aspx.cs"
Inherits="Exams" %>
<%@ Register TagPrefix="mobile"
Namespace="System.Web.UI.MobileControls" Assembly="System.Web.Mobile"
%>

<html xmlns="http://www.w3.org/1999/xhtml" >
```

```
<body>
    <mobile:Form id="Form1" runat="server"><mobile:Link ID="Link1"
Runat="server" NavigateUrl="Questions.aspx?lec=1" >Lecture
1</mobile:Link><br />
    <mobile:Link ID="Link2" Runat="server"
NavigateUrl="Questions.aspx?lec=2">Lecture 2</mobile:Link>
<mobile:Label ID="Label1" Runat="server">Lecture
3</mobile:Label></mobile:Form>
</body>
</html>

using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;

public partial class Step3 : System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {
        if (string.IsNullOrEmpty((string)Session["UserID"]))
        {
            RedirectToMobilePage("default.aspx", true);
        }
    }
    protected void Command2_Click(object sender, EventArgs e)
    {
        RedirectToMobilePage("Step2.aspx");
    }
    protected void Command1_Click(object sender, EventArgs e)
    {

        Session["Noize"] = SelectionList1.SelectedIndex;
        Session["VisualDistraction"] = SelectionList2.SelectedIndex;
        RedirectToMobilePage("Determine.aspx");
    }
}
using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
```

```
using System.Web.UI.HtmlControls;

public partial class Step3 : System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {
        if (string.IsNullOrEmpty((string)Session["UserID"]))
        {
            RedirectToMobilePage("default.aspx", true);
        }
    }
    protected void Command2_Click(object sender, EventArgs e)
    {
        RedirectToMobilePage("Step2.aspx");
    }
    protected void Command1_Click(object sender, EventArgs e)
    {

        Session["Noize"] = SelectionList1.SelectedIndex;
        Session["VisualDistraction"] = SelectionList2.SelectedIndex;
        RedirectToMobilePage("Determine.aspx");
    }
}

using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Web;
using System.Web.Mobile;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.MobileControls;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;
using System.Configuration;
using System.Data.OleDb;

public partial class LecturesDtlText :
System.Web.UI.MobileControls.MobilePage
{
    protected void Page_Load(object sender, EventArgs e)
    {

        if (!IsPostBack)
        {
            ViewState["counter"] = 0;
            FillGV();
        }
    }

    private void FillGV()
    {
```

```
        OleDbConnection con = new
OleDbConnection(ConfigurationManager.ConnectionStrings["ConnectionStrin
g"].ConnectionString);
        OleDbCommand cmd = new OleDbCommand();
        OleDbDataReader reader;
        cmd.Connection = con;
        cmd.CommandText = "SELECT * FROM [Users] WHERE [UserID] = '" +
Session["UserID"].ToString() + "'";
        con.Open();
        reader = cmd.ExecuteReader();
        reader.Read();
        string learnStyle, Focus, Abstraction,LearnerLocation;

        learnStyle = reader["learnStyle"].ToString();
        Focus = Session["Focus"].ToString(); // Full or Partial
        Abstraction = Session["Abstraction"].ToString();//High  or low
        LearnerLocation =
Session["LearnerLocation"].ToString();//stationary or On Move
        reader.Close();


        if (Focus == "2" ||  LearnerLocation=="2")
        {
            Abstraction = "1";
        }

        cmd = new OleDbCommand();
        OleDbDataAdapter da = new OleDbDataAdapter(cmd);

        DataSet ds = new DataSet();
        cmd.Connection = con;
        string Sql = "SELECT Lecturs.LectureID, Lecturs.LO,
Lecturs.Level, Types.TypeID, Types.TypeDesc, Lecturs.body FROM Types
INNER JOIN Lecturs ON Types.TypeID = Lecturs.Type where ";
        Sql += " LectureID=" + Request.QueryString["lec"].ToString();
        if (Abstraction == "1")//high
        {
            Sql += " and  Level=2";//summary
        }
        else
        {
            Sql += " and  Level=1";//core
        }


        if (learnStyle == "1")
        {
            Sql += " and Type<>1 order by Type  ";//Sensing
        }
        else if (learnStyle == "2")
        {
            Sql += " and type <>1 order by Type DESC ";//Intuitive
        }
        else
        {
            Sql += "  order by Type  ";//Sensing
        }
```

```
            cmd.CommandText = Sql;

            da.SelectCommand = cmd;
            da.Fill(ds);
            if((int)ViewState["counter"]<ds.Tables[0].Rows.Count)

Response.Write(ds.Tables[0].Rows[(int)ViewState["counter"]]["body"].ToS
tring());

        }
        protected void Command3_Click(object sender, EventArgs e)
        {
            Response.Redirect("Courses.aspx");
        }
        protected void Command1_Click(object sender, EventArgs e)
        {
            if ((int)ViewState["counter"] > 1)
            {
                ViewState["counter"] = (int)ViewState["counter"] - 1;
            }
            FillGV();
        }
        protected void Command2_Click(object sender, EventArgs e)
        {
            ViewState["counter"] = (int)ViewState["counter"] + 1;
            FillGV();
        }
}
```