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## Students' Acceptance of E-learning in Bahrain Secondary Schools

By

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A Doctoral Thesis Submitted in Partial Fulfilment of the Requirements for the Award of Doctor of Philosophy

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## ABSTRACT

The aim of this study was to investigate and measure students' acceptance of elearning as the main tool in the learning process in Bahrain's secondary schools. Schoolteachers' perceptions regarding the use of an e-learning system were also considered. This is deemed of value at a time when the Bahrain Ministry of Education is planning to implement an e-learning system in all government schools and at all school stages in the near future.

An extended version of the Technology Acceptance Model (TAM) was adopted in this study to identify the main factors that influence students' acceptance of elearning. Beside the basic beliefs incorporated in the TAM, two other factors were introduced into the model to provide a clearer explanation of users' acceptance and usage behaviour. These factors were perceived enjoyment and subjective norm. Via an extension of the TAM, the roles of extrinsic and intrinsic motivational factors were also examined.

A comprehensive research study was conducted using both quantitative and qualitative methods and data were collected during two fieldwork visits. The first visit was made at an initial stage when the students had little or no experience of using an e-learning system, while data from the second stage aimed to measure the impact on acceptance of one year's experience in using the e-learning system. Therefore, a mixed research approach was used. This included a questionnaire that was completed by 926 students in the initial stage and 803 in the second stage; additionally, interviews with schoolteachers and focus groups with students were conducted. In order to explore relationships among research variables and to test the research hypotheses, correlation, principal component analysis and multiple regression were used.

The study found that the TAM accounted for 49% of the variance in behavioural intention to use the e-learning system. Students' attitudes were found to be the major determinant of intention to use the system while intrinsic motivation factors had a greater influence on usage intention than extrinsic factors. Subjective norm was found to be a significant factor for initial and continued acceptance.

The results also showed that the traditional teacher-preparation programmes have not effectively provided teachers with sufficient experience regarding the integration of technology into education. A number of problems were identified by schoolteachers and students that affected their use of the e-learning system. Among them were the teachers' attitudes, lack of time, technical problems and lack of technical support. Finally, conclusions were drawn and further research possibilities and recommendations were suggested.

**Keywords:** E-learning, secondary school, Technology Acceptance Model, Kingdom of Bahrain, King Hamad's Schools of the Future Project, Edunet, extrinsic motivation factors, intrinsic motivation factors.

### **Publications**

In the course of completing this thesis, its contents have been drawn on for publications and poster conference presentation by the author:

Zewayed, N., Maynard, S. & Murray, I., 2009. *Examining students' acceptance of elearning in Bahrain Secondary Schools: a longitudinal study* [Poster presentation given at the 3<sup>rd</sup> Saudi International Conference "The Spirit of Scientific enquiry", Surrey, UK, 5 June 2009]. <<u>http://www.saudiinternationalconference.org/</u>>. (Appendix 7)

Zewayed, N., Maynard, S. & Murray, I., 2011. *Factors influencing students' acceptance of e-Learning*. [Paper presented at the] World Conference on E-learning in Corporate, Government, Healthcare, and Higher Education, 18-21 October, Hawaii, USA. <<u>http://www.aace.org/conf/elearn/</u>>.

## DEDICATION

## I dedicate this work

To my parents who devoted their lives to the achievement
 of this dream,
To my brothers and sisters who never stopped
 motivating me,
To my loving husband, DR. Mustafa, who shared
 my dream with me and,
To my bright children, Mohammed, Hissa and
 Aysha.

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## LIST OF ABBREVIATIONS

AOU	Arab Open University
BB	Bulletin Boards
BPR	Business Process Reengineering
CFA	Confirmatory Factor Analysis
CRC	Computing Resource Centre
DLE	Digital Learning Environment
DoI	Diffusion of Innovations
EDT	Expectancy Disconfirmation Theory
Edunet	Educational Network
EFL	English as a Foreign Language
ERP	Enterprise Resource Planning
FA	Factor Analysis
GCC	Gulf Cooperation Council
GDSS	Group Decision Support Systems
ICT	Information and Communication Technology
IDT	Innovation Diffusion Theory
ILM	Internet-based Learning Medium
IT	Information Technology
ITD	Information Technology Diffusion
ITG	Integrated Technology Group
KSU	King Saud University
LDCs	Less Developed Countries
LMS	Learning Management System
MIAC	Model of Intention, Adoption, and Continuance
MM	Motivational Model
МоЕ	Ministry of Education
PC	Personnel Computer
PLS	Partial Least Squares
SCW	Supreme Council for Women
SEM	Structural Equation Modeling
SPSS	Statistical Package for Social Science
ТАМ	Technology Acceptance Model
TEM	Technology Effectiveness Model
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technology
VLE	Virtual Learning Environment
WLS	Web-based Learning System

## CHAPTER ONE INTRODUCTION

#### 1.1Background

Recent developments in digital electronics are transforming many of our education processes and the management of learning. Changes in information and communications technologies, especially use of the Internet, and the rapid expansion and development of e-learning resources are instrumental in this transformation. These developments have enabled the evolution of e-learning systems that can be used by schoolteachers and learners to support the school curriculum. Internationally use of e-learning is growing very fast (Elango, Gudep & Selvam 2008, p.31; Abbad & Al bargothi 2010, p.2). Rapid development is also occurring in the Middle East as it is globally, as noted by Jarbi and Sheriffdeen (2010, p.2). Aldhafeeri, Almulla and Alraqas (2006, p.712) have described e-learning as the future of learning and as the "fastest growing learning tool in the Middle East". E-learning is considered as "the building block that supports the structure of modernization in the Arab region" (Abouchedid & Eid 2004, p.17). Increasingly it is used in schools, businesses, and in government and non-government organisations (Al-Khashab 2007, p.34).

In the Gulf region, this mode of learning is taken very seriously by Gulf governments (Weber 2009, p.99). It was estimated that the total amount spent on online education in the Gulf countries (Bahrain, Kuwait, UAE, Qatar, Oman and Saudi Arabia) will have reached \$240 million by the end of 2009 (Elango, Gudep & Selvam 2008, p.32).

The major benefits of e-learning have been identified by a number of researchers, such as Stokes (2000); Jamlan (2004); Song *et al.* (2004); Ndubisi (2006); Clarke *et al.* (2007); Hamad (2008); and Abbad and Al bargothi (2010). Typically, the key

benefits identified in the research are that it offers student-centred learning, flexible delivery and learning, savings in terms of time, and access to information resources anywhere and at any time. Vrana *et al.* [n.d.] comment that e-learning offers both learners and teachers access to information resources anywhere and anytime; it can also benefit students with physical disabilities. Through e-learning, students can interact with instructional materials in a variety of formats (pictures, text, video, sound, and so on) anywhere and at any time, as long they have access to the Internet (Lee 2006, pp.517-518). Berry (2005) comments that e-learning provides additional advantages, such as better integration of ICT tools, improved motivation, access to other learning styles, increased parental engagement, anytime and anywhere access, and opportunities for independent learning.

The Kingdom of Bahrain is in the process of developing and modernising its institutions since King Hamad Bin Salman took over in 1999. One of the sectors in the spotlight for modernisation and development is the education sector. Among the steps taken by the state in this respect is the phased introduction of an e-learning strategy which began in 2004/2005. This began with the implementation of King Hamad's Schools of the Future Project which started with 11 secondary schools and has now been extended to include both primary and intermediate schools. The primary goal of this strategy is to support and improve student learning. There is a minimum of two electronic classrooms in each school. Each school is equipped with a smart board, data projector, printer and fax; a computer is allocated to each student. The Ministry of Education has established a web-based learning system called Edunet. Thus, through the Edunet portal, students can access e-learning resources at any time and in any place. Therefore, the terms Edunet and e-learning system.

Overall, e-learning has received extensive attention from a number of information system researchers and has become a critical issue for technology implementation and management (Ong & Lai 2006, p.817). In other words, the availability of e-learning resources and e-learning systems in the education, business and other sectors has attracted many researchers to explore and investigate important elements of the learning process, including the perceptions and experiences of students and teachers and other users. Therefore, research studies vary in their focus. For example, Condie

and Livingston (2007, p.343) argue that the successful implementation of e-learning systems depends on teachers' readiness to use the systems whereas van Raaij and Schepers (2008, p.838) and Sánchez and Hueros (2010, p.1633) show that the success of e-learning systems depends to a considerable extent on students' acceptance and use of these systems. On the other hand, there is little research that addresses students' intention to accept and use educational technologies (Lau & Woods 2008, p.686; Friedrich & Hron 2010, p.64) especially in developing countries (Al-Fadhli 2008, p.419). Al-Khashab (2007, p.50) also reported that few studies have examined attitudes towards e-learning in the Arab world. Elango, Gudep and Selvam (2008, p.33) support the view that, in an e-learning context, few studies have addressed the challenges faced by students in the Arab world. For this reason, measuring the acceptance and usage of technology on the part of users is important and, as Al-Harbi (2007, p.8) suggests, understanding the factors that influence the acceptance and use of e-learning from the perspective of students will provide direction and guidance to educators and policy-makers for the future. Therefore, this study aims to investigate and measure students' acceptance of e-learning as the main tool in the learning process in Bahrain's secondary schools.

Studies reported in the literature review show a number of theoretical models that have been used by the researchers to study users' acceptance of technology, such as the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB), the Technology Acceptance Model (TAM), and the Unified Theory of Acceptance and Use of Technology (UTAUT). The TAM has been used as the theoretical basis for many studies of user technology acceptance (Ong & Lai 2006, p.817; Watts 2009, p.4205). It is the most widely used model for studying user acceptance of specific types of technology (Wang & Wang 2009, p.762; Ma, Andersson & Streith 2005, p.388). It has been extensively used to predict the acceptance of a new technology (Ngai, Poon & Chan 2007, pp.252-253). Similarly, Sánchez and Hueros (2010, p.1633) reported that the TAM provides a "stable and secure way" of predicting users' acceptance of new technology. However, its use in the educational field is limited whereas it has been extensively tested in business settings (Teo, Su Luan & Sing 2008, pp.266-267; Teo 2009, p.302; Ataran & Nami 2011, p.191). Al-Khateeb (2007, p.144) also added that few studies have tested the TAM in developing countries and none in the context of web-based learning (Saadé, Tan & Nebebe 2008, p.138). Lee (2006, p.519) reported that the TAM could be useful in predicting students' acceptance of an e-learning system. Therefore, the TAM has been selected for use in this study to identify the main factors that influence students' acceptance of e-learning.

### 1.2 Aims and objectives

#### 1.2.1 Aims

The aims of the study are:

- To investigate the level of student acceptance of e-learning in Bahrain's Secondary Schools
- To measure and analyse the nature and extent of students' acceptance of e-learning in Bahrain's Secondary Schools

### 1.2.2 Objectives

The study's objectives are as follows:

- To measure students' acceptance of an e-learning system using the TAM. This can be achieved by:
  - a. Integrating the subjective norm and enjoyment into the TAM and exploring the relationships between these two factors and the TAM's basic beliefs.
  - b. Identifying the main factors that influence students' intention to use an e-learning system.
  - c. Examining the role of both extrinsic (usefulness) and intrinsic (enjoyment) motivational factors in explaining students' acceptance of e-learning.
- To explore the perceptions of schoolteachers and students regarding the use of an e-learning system in Bahrain's Secondary Schools.
- To explore teachers' perceptions towards students' acceptance of e-learning.

- To identify the main factors that motivates students to use an e-learning system.
- To investigate students' use and acceptance of e-learning after one year of experiencing e-learning in order to establish the influence of this experience.
- To identify the main barriers that hinder the adoption of an e-learning system by schoolteachers and students.
- To provide recommendations and guidelines that can be used by secondary school authorities in their strategic planning for introducing e-learning.

### **1.3** Significance of the Study

The research is expected to generate new knowledge regarding both students' acceptance of e-learning and their teachers' perceptions of this acceptance. The findings may therefore inform decision making regarding resources, and the implementation of e-learning in schools. This research may also help in filling critical gaps in current research, as indicated by the following points:

- Al-Harbi (2007, p.2) argues that there is a lack of research concerning the acceptance of e-learning within education. Although there are large volumes of research concerning technology acceptance, very little research has been conducted in a secondary school context, indicating a significant gap in knowledge.
- The literature review revealed that the majority of research focused on teachers rather than students (Shea, McCall & Ozdorgu 2006, p.137; Keller & Cernerud 2002, p.56; Hamzah, Ismail & Embi 2009, p.381; Elango, Gudep & Selvam 2008, p.33). By explaining students' perceptions regarding e-learning, the findings of this research could help software designers to develop more user-friendly websites for students and also help decision makers to discover the best way to promote new e-learning tools (Chang & Tung 2008, p.72). Similarly, Hamzah, Ismail and Embi (2009, p.382) argued that allowing students to express their

views would not only benefit students, but also benefit teachers and school authorities.

- It is also important to stress that the great majority of the research into e-learning has been carried out in developed countries. A review of the available literature confirms that this research is the first in-depth study on this subject in Bahrain. This work will therefore contribute new knowledge about secondary school students' acceptance of e-learning in Bahrain where little is known about this at present.
- By identifying which factors encourage and which factors serve to hinder both teachers and students from bringing these technologies into their classrooms, this study will help decision makers in schools by providing guidelines that may be used to increase the acceptance and successful utilisation of online learning at school level.

#### **1.4 Structure of the Thesis**

This thesis consists of eight chapters; an outline of it is shown in Figure 1.1.

**Chapter One** gives a general introduction to the study. It presents the research's aims and objectives, and outlines the significance of the study.

**Chapter Two** provides an overview of the Kingdom of Bahrain, education in the kingdom, and King Hamad's Schools of the Future Project.

**Chapter Three** reviews the literature of previous studies on e-learning, factors that influence the acceptance of technology, and acceptance models. It examines research on students' use of an e-learning system using the Technology Acceptance Model, along with a critique of empirical research on e-learning and its use in developed and developing countries.

**Chapter Four** discusses the research philosophy, the research approaches and the methods used in the collection of data. The population and the methods used in selecting the sample for the study are also discussed. Data analysis methods and ethical issues are explained.

**Chapter Five** reports the analysis and results of the questionnaire that was completed by students in two fieldwork visits.

**Chapter Six** presents the results of the qualitative data derived from interviews with schoolteachers and focus group discussions with students in two fieldwork visits.

**Chapter Seven** offers a discussion regarding the main findings of the study and provides explanations of the results in the light of the reviewed literature and the research aims and objectives.

**Chapter Eight** summarises the study's conclusions, recommendations, contributions and limitations; it also points out areas for future research.



Figure 1.1 Thesis outline

# CHAPTER TWO BACKGROUND AND CONTEXT

### **2.1 Introduction**

This chapter presents a background to the location of the research. Information about Bahrain, its geography, economy, and population is briefly presented, as well as an overview of education in Bahrain and a description of King Hamad's Schools of the Future Project.

### 2.2 Kingdom of Bahrain

Bahrain is an Arab Islamic State which has long been a place of economic and cultural importance in the Middle East (McCoy 2004, p.14). The Kingdom of Bahrain is naturally greener compared to other Gulf countries (Bahrain: the complete residents' guide 2006, p.12) and is frequently called "the Pearl of the Arabian Gulf" (Oleynik, Alexander & Cherepanya 2000, p.22). Its name is derived from the Arabic words 'thnain Bahr' (two seas) and this refers to the sweet springs which come from under the sea and which mix with the salt water (Bahrain: the complete residents' guide 2006, p.3); this is believed to be the cause of the exceptional beauty of Bahrain's natural pearls. In addition, most trade to and from Bahrain has been conducted via the sea (McCoy 2004, p.14).

The rule of King Hamad bin Isa bin Salman al-Khalifa started in1999 (Bahrain: the complete residents' guide 2006, p.4); the Al Khalifa family has ruled Bahrain since 1783 (Bahrain: the complete residents' guide 2006, p.8). Its national day is December 16<sup>th</sup> - 17<sup>th</sup>, with the nation gaining independence in 1971 (Central Informatics Organisation 2007, p.5) and, in that year, the Kingdom became a member of the United Nations and the Arab League (Bahrain: the complete residents' guide 2006,

p.4). In addition, the Kingdom of Bahrain joined its five neighbours (Saudi Arabia, Qatar, Oman, the United Arab Emirates and Kuwait) to form the Gulf Cooperation Council (GCC) in 1981.

The Kingdom's official language is Arabic with English being taught as a foreign language in schools; this language is widely used for business purposes (Oleynik, Alexander & Cherepanya 2000, p.9). The Bahraini dinar is the Kingdom's currency (McCoy 2004, p.79), and Friday and Saturday are the official weekend for the government and most private sectors (Central Informatics Organisation 2007, p.5).

The Kingdom of Bahrain consists of five governorates: Al-Muharraq, Capital, Northern, Central and Southern (Central Informatics Organisation 2007, p.5) and in 2002, the Kingdom took major steps towards democratic reform (Al-Hassan 2003, pp.4-5). In February 14<sup>th</sup>, King Hamad bin Isa Al Khalifa announced that the country would be transformed into a constitutional monarchy so two councils were established by decree-law No. (15) for the year 2002: the Consultative (Shura) Council and the House of Deputies (Al Nwab) (Al-Hassan 2009, p.12). The task of the Shura Council is to offer opinions on various issues submitted to it by the Cabinet (Oleynik, Alexander & Cherepanya 2000, p.140). It includes representatives from the labour, business, professional and religious communities. The task of the House of Deputies is to monitor the actions and conduct of the executive powers.

In August 2001, the Supreme Council for Women (SCW) was established, headed by the King's wife, Shiekha Sabika bint Ibrahim Al Khalifa (Al-Hassan 2003, pp.103-104). This Council aims to empower Bahraini women in all quarters, whether at a domestic or national level. It emphasises and supports the critical participation of women in advancing the nation's standing. Therefore, in 2002, women in the Kingdom of Bahrain were awarded their political rights by being given the right to vote in municipal and parliamentary elections (Al-Hassan 2003, pp.4-5).

In the First Article, the constitution specifies that "citizens, men and women, have the right to participate in public affairs and enjoy political rights, which includes the right to vote and run for election" (Al-Hassan 2003, p.98). Overall, 2002 represented a shift in the situation of women in Bahrain and a number of events were organised by

the Supreme Council in order to prepare society for women's participation in public life (Al-Hassan 2003, p.105). Thus, women in the Kingdom of Bahrain join other Arab women in celebrating Arab Women's Day on the 28<sup>th</sup> January.

#### 2.2.1 Geography

Geographically, the Kingdom of Bahrain is an archipelago of 33 islands (Bahrain: the complete residents' guide 2006, p.3) lying in the middle of the Arabian Gulf near the East coast of the Kingdom of Saudi Arabia (Central Informatics Organisation 2007, p.5); see Figure 2.1. The Kingdom of Bahrain is linked to Saudi Arabia by the King Fahad Causeway which was opened in 1986 (Bahrain: the complete residents' guide 2006, p.4).

The total area of Bahrain for 2008 was 757, 50 sq. km (Central Informatics Organisation 2010, p.6); with the largest island being Bahrain where Manama, the capital, is located; most of the country's population and infrastructure can be found on this island (McCoy 2004, p.13). Bahrain Island accounts for approximately 85% of the total area of the Kingdom (Oleynik, Alexander & Cherepanya 2000, p.32). In addition to Bahrain Island, there are four other major islands: Hawar, Muharraq, Sitra and Umm an-Nasan. Bahrain Island is joined to Al-Muharraq and Sitra by bridges which were opened in 1941and 1976 respectively (Oleynik, Alexander & Cherepanya 2000, p.168).



Figure 2.1: Map of the Kingdom of Bahrain (University of Texas at Austin 2011)

In general, the Kingdom of Bahrain is almost flat, the highest point being Jebel Ad Dukhan which stands about 134m above sea level in the central region (Bahrain: the

complete residents' guide 2006, p.3); the majority of Bahrain's oil wells are in this area.

#### 2.2.2 Climes

The climate of Bahrain is hot in summer and mild in winter (Central Informatics Organisation 2007, p.5). Between November and April the weather is cool with an average temperature that ranges from 15-24°C. However, the average temperature between July and September is 36°C with a high percentage of humidity. There is very little rainfall in Bahrain (McCoy 2004, p.23). The annual rainfall is less than four inches and falls entirely during the winter months.

#### 2.2.3 Economy

Until the early 20th century, pearling was the principal source of income in the Kingdom of Bahrain (McCoy 2004, pp.62-63) but, in 1930, oil was discovered (Bahrain: the complete residents' guide 2006, p.3). Now, the oil industry is the main source of the nation's income despite efforts to reduce dependence on it (Al-Hassan 2003, p.69; Dew 2003, p.4).

In recent years the government has concentrated on diversifying the economy by developing a number of sectors, such as banking and finance, tourism, trade, construction, metal smelting and ship repairing (Bahrain: the complete residents' guide 2006, p.5). Overall, the Kingdom of Bahrain represents the financial capital of the Middle East because of the political, social and economic stability which exist in the country (Dew 2003, p.6).

With the establishment of the Aluminium of Bahrain Company (ALBA) in 1971, the Kingdom earned pioneering status in the aluminium industry among the countries of the Middle East (Al-Hassan 2003, p.71) as it became one of the biggest exporters of pure aluminium in the world markets. According to a UN Industrial Development Organisation (UNIDO) report, the Kingdom of Bahrain is rated top in the Arab world for quality of industrial production (Al-Hassan 2003, p.72). In addition, the Kingdom attracts foreign investment and has concluded several world-wide agreements with the nations of the world (Al-Hassan 2003, p.78).

In term of its tourism, Bahrain is becoming stronger in this field in the region due to its political stability and fortunate location (Al-Hassan 2003, p.79). All types of tourism are encouraged in the country, such as conferences, exhibitions, and family and cultural tourism. The country has many attractions such as resorts, islands and ancient sites.

#### 2.2.4 Population

The total population of the Kingdom of Bahrain reached 1,106,509 in year 2008 (Central Informatics Organisation 2009, p.7); approximately 51.4% of these are non-Bahraini. The annual population growth rate reached 1.33% during the period 2005-2010 (Central Informatics Organisation 2007, p.25).

#### 2.2.5 Religion

Although Islam is the official religion of the Kingdom, a small number of people follow other religions such as Christianity, Judaism and Hinduism (McCoy 2004, p.58). Khedouri (2007, p.11) noted that : "Bahrain has always enabled everyone of all faiths to find the fulfilment of their religious aspirations to avoid loss of their identity and welcomed their beliefs with open arms and helped them settle and expressed an overall concern for their well-being at all times". Generally people in the Kingdom of Bahrain are open and usually provide a warm welcome for foreigners (McCoy 2004, p.14). Therefore, foreign visitors can celebrate Christmas freely in a number of hotels and clubs in the Kingdom (Bahrain: the complete residents' guide 2006, p.14). Diwali, "the Hindu Festival of Light", can also be celebrated by Hindu people in various Indian clubs in Bahrain.

#### 2.3 Education in Bahrain

Bahrain has one of the highest literacy rates in the Arab world (McCoy 2004, p.79). The first primary school for boys was established in 1919 (Ministry of Education 2001, p.15) and for girls in 1928. Weber (2009, p.96) wrote: "except for Bahrain, modern public education did not reach the Gulf until the 1960s".

The education system consists of nine years of basic education, which covers both the primary and intermediate stages, and three years of secondary education (Ministry of Education 2004, p.37). In addition, education at public schools is offered separately

to males and females (Ministry of Education 2001, p.12) and so there are separate schools for boys and for girls, where students, teachers and administrative staff are all of the same gender.

#### 2.3.1 Pre-school Education

This level precedes primary education and is attended by children who have not attained official primary school age (Ministry of Education 2001, p.12). It comprises the following types:

**Nursery:** for children who are less than three years old. It is under the supervision and control of the Ministry of Labour and Social Affairs.

**Kindergarten:** for children between three and five years old. It is supervised by the Ministry of Education.

#### **2.3.2 Basic Education**

Basic education in the Kingdom of Bahrain is divided into two levels (Ministry of Education 2001 pp.12-13). These are:

**Primary Education:** it represents the first rung of the formal educational ladder in the country. It lasts for six years and covers the 6-11 years age range.

**Intermediate Education:** considered to be the third and final level of basic education. This stage lasts for three years and caters for students between 12 and 14 years. The subject teacher system is applied at this stage.

#### 2.3.3 Secondary Education

Secondary education began in 1940 when the first secondary school (Al-Kulliya) was opened (Al-Hassan 2003, p.57). It is complementary to the basic education stage and prepares students for entry to universities, higher institutes or the labour market. It caters for students between ages 15 and 17 years of age and lasts for three years; it is divided into six semesters and three levels (Ministry of Education 2001, p.13).

The credit-hours system applied at this stage enables students to choose any of the following tracks: scientific, literary, commercial, industrial (for boys only), printed advertisement, or textile and clothes (for girls only). The total number of credit hours

required to complete secondary education is 156 (Ministry of Education 2001, p.289). To obtain the Secondary School Certificate, students must attain an overall score of at least 50% for their final cumulative average and complete all the study requirements (p.292).

#### **2.3.4 Religious Education**

This is intended for boys only and is supervised by a specialised institution affiliated to the MoE (Ministry of Education 2001, pp.13-14). It follows the same direction as basic and secondary education, with the same duration of study and admission age, but focuses on Islamic studies.

#### 2.3.5 Private Education (Non-government)

Private schools in the Kingdom of Bahrain differ according to the educational systems they adopt and parties that govern the educational advisory bodies (Ministry of Education 2001, p.14). They are divided into three types: national private schools, foreign private schools and foreign community schools.

#### **2.3.6 Non-Formal Education**

The Ministry of Education organises this type of education for two categories of people: illiterates, and, for those who have overcome illiteracy and wish to continue their studies, a follow-up stage (Ministry of Education 2001, p.14). Literacy and adult education programmes last for six years and are divided into three stages, each lasting two years: the literacy stage, the follow-up stage and the consolidation stage.

#### 2.4 King Hamad's Schools of the Future Project

In response to educational innovations, the Ministry of Education (MoE) has made efforts to enhance the quality of education in Bahrain and to improve its standards, first to suit the learners' needs and, secondly, to address the requirements of the comprehensive development in the country (Kingdom of Bahrain Ministry of Education 2004, pp.47-48). To this end, it established King Hamad's Schools of the Future Project in 2004/2005 with eleven secondary schools.

King Hamad's Schools of the Future Project is considered to be "a substantial turning point in the field of education" as reported by the Minister of Education (Ministry of

Education 2004, p.20). It is "the first step toward the educational reforms in Kingdom of Bahrain" (Al-Ammary *et al.* 2010, p.14). The Director of the Scientific Analysis and Policies Division stated that King Hamad's Schools of the Future Project, if implemented effectively, would provide other countries with an excellent model to follow (Ministry of Education 2004, p.26).

King Hamad's Schools of the Future Project was established under the guidance of His Majesty the King of the Kingdom of Bahrain and was initiated by HM in order to provide all citizens with modern educational services in line with scientific and technological advancements (Ministry of Education 2004, p.19). Wefki *et al.* (2010, p.631) defined Future Schools as "a rich educational environment with resources and ICT is the impetus for this learning process".

The goals of the project include the following:

- Developing the educational system in the Kingdom of Bahrain,
- Accelerating the pace of human development,
- Establishing an 'Information Society', and
- Building a knowledge-based economy (Ministry of Education 2004, p.31).

Similarly, Douglas *et al.* (2010, p.3749) noted that the goal of the project is "to fundamentally change the way teaching and learning takes place by transforming the traditional classroom into an open, interactive environment based on a wide ranging use of technology".

Graduate students today need to be prepared for a work environment that differs completely from that of 25 years ago (Klassen & Vogel 2003, p.46). Students need to be prepared for lifelong learning and require the necessary skills to meet the demands of a changing business world.

E-learning provides a new challenge for Bahrain's secondary schools in order to shift from the previous traditional teaching methods towards using an e-learning system. Al-Koofi (2008) argues that the main purpose of the King Hamad's Schools of the Future Project is to use ICT in order to shift learning from traditional methods to online education which will enhance students' global collaborative learning. According to Panitz (1999, p.5), collaborative learning shifts the responsibility for learning from the teacher to the students. Thus, collaborative learning is a student-centered approach.

The authorities have demonstrated a positive belief in e-learning through their policies, plans and their sponsorship. According to Madar's research, the e-learning market in Bahrain was expected to reach \$9 million by the end of 2009 (United Nations Economic and Social Commission for Western Asia 2007, p.22).

The education authority in Bahrain has a policy of inclusion and all students have the right to access main-stream education in schools; this includes students with learning difficulties as well as more able students. Therefore, students with special needs have been integrated into regular classes (Kingdom of Bahrain Ministry of Education 2004, p.47) and the use of e-learning can help to meet the needs of all students, irrespective of ability. By taking into consideration the different learning abilities of the students, e-learning allows every student to learn according to his/her ability (Ministry of Education 2004, p.35).

The MoE originally started its project with 11 pilot schools spread over the five governorates (Ministry of Education 2004, p.31) with a minimum of two electronic classrooms in each school equipped with a smart board, data projector, printer and fax; there is a computer for each student. The Ministry provided these schools with the necessary equipment and linked them via a network. It established a platform called EduWave to provide e-learning services.

EduWave is "a web-based, end-to-end e-learning platform, fully developed by ITG. It is the most comprehensive e-learning platform available in the global marketplace" (Integrated Technology Group 2004, p.1). Furthermore, it is available in two editions: K-12 and Higher-Ed.

Efforts were first focused on the first level of the secondary stage for Science, Mathematics and English and this will be extended by the MoE to include all levels and subjects.

#### **Project Characteristics**

The project entailed the creation of a complete educational organisation that included an educational portal that would allow students, teachers, administrative staff and parents to access it each according to their needs but subject to certain restrictions (Ministry of Education 2004, pp.38-40).

#### Students

Students benefit by being able to interact with other students and teachers while pursuing their own individual and independent learning. They are able to ask questions, and give and exchange opinions and information with others, in their own school, with students in other schools, and in schools all over the world. Their parents, meanwhile, are able to interact with the school to access details of their children's academic performance, behaviour and attendance, thus keeping alive the useful links between home and school.

#### Teachers

Teachers are expected to benefit from the new project by being provided with a program where any given subject, after being transformed into an e-book or a series of e-books, can be taught electronically; indeed, any piece of knowledge can be taught via this program if deemed suitable by the teachers (Ministry of Education 2004, p.39). Teachers are also able to give live lectures to all the schools within the network; they can access a wide range of educational sites, thus increasing their access to learning resources.

#### The School Administration

The project also benefits school administrations by supplying them with a complete system which will allow them access to information about staff, teachers, students, parents, educational subjects, schedules and other administrative systems (Ministry of Education 2004, pp.38-39).

#### 2.5 Conclusion

This chapter provides the necessary background to the study in terms of a general overview of the Kingdom of Bahrain and its educational system. It also provides an
introduction to the King Hamad's Schools of the Future Project, its goals and characteristics. Overall, the project represents a fundamental turning point in the field of education, as stated by the Minster of Education. It ties all schools together as well as with the Ministry of Education (Ministry of Education 2004, pp.36-42). It allows different stakeholders to access an educational portal according to their needs and to share knowledge while enabling students to generate knowledge and become active members of an information society.

# CHAPTER THREE LITERATURE REVIEW

## **3.1 Introduction**

This chapter presents and analyses research related to the acceptance of technology, and in particular e-learning in secondary schools; this includes a study of theoretical models that have been used by researchers to study technology acceptance. It discusses the benefits of e-learning; the roles of both teachers and students in an e-learning environment are also presented. Barriers that hinder the adoption of elearning on the part of teachers and students are considered while the last section presents an outline of how the design of a successful e-learning system might be accomplished.

The following diagram (Figure 3.1) shows the main themes discussed in this chapter:



## **3.2 ICT in schools**

The recent developments in information and communication technology (ICT) have many beneficiaries, particularly in industry, education and management. Hughes, Bellis and Tocque (2002, p.14), quoting Ability, define ICT as "any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form". Such products include telecommunications, computers and broadcasting technology. ICT has the capacity to provide higher interactive potential for users to develop their individual intellectual and creative abilities (Aduwa-Ogiegbaen & Iyamu 2005, p.105).

ICT in schools has become a necessity to meet students' and teachers' needs and to facilitate learning processes. In addition, schools use ICT to enhance teaching and learning in two ways. The first way involves supporting learning, which is often referred to as "learning with technology", while the second way of using ICT supports constructivist approaches to learning; this is referred to as the "learning through technology" approach (Cuttance 2001).

It could be said that ICT changes the whole structure of schools (Anderson 2005, p.3). It has an impact on communication in and among secondary schools; the Internet and websites have become an essential part of school communication systems. Technology has become an important part of interaction and communication, as well as a source of information between teachers and learners who both use and interact with ICT to achieve successful learning processes.

In education, ICT has helped to provide new e-learning resources in the learning process and an e-learning system helps learners to acquire knowledge inside and outside the classroom (Mutula & Mutula 2007, p.137). Although the term e-learning has become well accepted by, and popular with, governments and the business sector, it has not been popular in primary and secondary education (Tarragó 2003, p.284). "ICT in schools is much broader than e-learning, and young e-learners are different from adults" (Tarragó 2003, p.290). Iahad *et al.* (2004, p.985) add that there is an increasing need for e-learning systems in developing countries because of increasing student numbers coupled with a shortage of human resources and available skills.

Since the main issue of this research is e-learning, it is essential to define and understand e-learning in education and identify in this research the benefits that it can bring.

#### 3.2.1 Understanding e-Learning

E-learning, represented as "learning with an "e" for electronic" (Rossett & Marshall 2010, p.35) have become a popular tool in teaching and learning (Pituch & Lee 2006, p.222). E-learning systems constitute "one of the most popular learning environments in the information age" (Liaw, Huang & Chen 2007, p.1067) as they extend traditional learning methods into a new mode of learning using computer and web technologies. Jarbi and Sheriffdeen (2010, p.13) described this model of learning as "a common language of this era".

E-learning covers a broad area within ICT education and comes in many media formats, as seen in Figure 3.2 (from Paris 2004, p.99).



\* NB Most resources can be replicated across platforms.

Figure 3.2 Media Formats of e-Learning

In the literature, there are various definitions of e-learning. For example, Anderson (2005, p.4), quoting Urdand and Weggen, defined 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".

Furthermore, Hamad (2008, no page number) described e-learning as "different types of technology-supported learning, such as computer-based training, web-based learning, distant learning, interactive classroom, virtual classroom, computer-aided instruction, online learning, etc.". Similarly, Khan (2001, p.51) defined e-learning as synonymous with web-based learning (WBL), Internet-based training (IBT), distributed learning (DL), advanced distributed learning (ADL), and online learning (OL). Liaw, Huang and Chen (2007, p.1079) described e-learning as the "new wave in learning strategy. Through innovative use of modern technology, e-learning not only revolutionizes education and makes it more accessible, it also brings formidable challenges for instructors and learners".

The main difference between traditional teaching and using e-learning is the medium through which instruction is transmitted (Hamid 2002, p.312). In a traditional setting, the teacher has total control over the learning environment whereas in an e-learning environment, the teacher is separated from the learner by cyberspace.

Tarragó (2003, p.288) argues that an e-learning system in school should provide online and offline facilities to all its users, adding that there are a number of components in the e-learning industry. These are: content, software, cost, copyright issues, issues of control, aspects of content maintenance, standards, bandwidth and relationships between servers, hosts, and operating systems (p.281). Among these, content and software are the main components of e-learning. Hamid (2002, p.312) added that "given that technology is equal, the content is now the only differentiating factor that separates an effective e-learning initiative from an ineffective e-learning initiative".

#### **3.2.1.1 Benefits of e-learning**

To increase the acceptance and successful utilisation of the e-learning system, it is important to demonstrate the benefits of such a method. In the literature, a number of researchers have highlighted the usefulness of e-learning systems from the perspectives of both students and teachers. Stokes (2000, no page number), for example, argues that e-learning will transform schooling outside the classroom by, for example: giving students online training in place of traditional help sessions after class; offering parents a more efficient means of assessing their children's progress via online access to student records, rather than through traditional quarterly report cards; and allowing students to access their learning materials from multiple locations.

Anderson (2005, p.5) asserts that e-learning embraces learning by, with and through ICT and notes a number of reasons for implementing e-learning into an educational system:

- E-learning has, because of the growth of information technology, become an important vehicle in the delivery of education and learning.
- It is information-rich: it offers access to information resources anywhere and at any time to both teachers and learners.
- It constitutes an alternative learning strategy as e-learning can reach people previously denied access to education, for example, students with disabilities.
- It can offer scope for blended learning as it can augment traditional classroom teaching, freeing up resources and offering these to larger numbers of campus-based students (Jamlan 2004, p.3).

Jamlan (2004, p.3) lists the possible benefits of e-learning as:

- Offering links to a range of useful learning materials.
- Providing online materials and self-assessments to guide and direct the learning processes of students.
- Allowing access to an increased number of rich learning materials.
- Facilitating interest via increased interaction.
- Providing immediate feedback and positive reinforcement.
- Creating a learning environment that is both flexible and conducive to students' busy lifestyles and employment schedules.
- Providing ongoing support for teachers.
- Creating a balance between many different sources of information.

• Facilitating dialogue between and among teachers and students.

In another study, Aldhafeeri, Almulla and Alraqas (2006, p.726) found that implementing e-learning in the schools of Kuwait made students more competent in a number of areas. These included: basic operations and computer concepts, ethical and human issues, and the use of productivity, research, communication and problem-solving tools. In addition, Song *et al.* (2004, p.65) found that convenience and the ability to complete classwork at more flexible times were additional strengths of online learning. In other words, online learning offers learners an opportunity to learn at a speed that meets their learning preferences (Clarke *et al.* 2007, p.14). In addition, Bruce (1999, p.663), Al-Heji (2002, p.49) and Saeed (2010, p.75) reported that increased opportunities to learn for students with disabilities and those who work is a significant benefit of online learning. Likewise, Al-Heji (2002, p.52) and Klassen and Vogel (2003, p.42) pointed out that e-learning helps shy students who are afraid to speak in class to feel more confident in writing comments online.

Some of the benefits of online learning to the user, as listed by Ndubisi (2006, p.586), include saving in terms of transport costs and time; the ability to learn at home or at the office; reduction in the need for paper and ink; and increased ease of accessing, downloading, uploading, storing and disseminating information. Teachers also found more time to accomplish other academic tasks, such as research and consultancy.

According to Li and Wood (2005, p.50), campus portals "provide a single entry point to a variety of resources, display customized and interactive information for various users, and support users in fulfilling their functions". Thus, a number of researchers indicated the influence on students' learning of colourful web portals and the use of multimedia facilities. Authors such as Large and Beheshti (2005, p.327) argue that a colourful web portal interface is necessary because it catches the user's attention. The use of multimedia facilities in the learning process, such as those provided by websites, attracts students and keeps them motivated. Therefore, by providing activities that stimulate students' interest, they will be motivated to learn (Lanham & Zhou 2003, p.282). In addition, Atkinson and Kydd (1997, p.59) note that "due to the colorful and moving images that come to a user through the WWW, it seems like fun to use it".

A variety of formats for course materials are available to students who have access to an e-learning system (Sánchez & Hueros 2010, p.1632). They can get, for example, text, image, sound, etc. Students can interact with other students and also with their teachers through chat rooms, message boards, forums, videoconferencing, etc.

Students benefit from interaction with other students and in an e-learning context this interaction is supported through various communications technologies in both synchronous and asynchronous formats (Garrison & Anderson (2003, p.44) and Alshehri (2002, p.38)). According to Negroponte, Resnick, and Cassell, quoted by Muir-Herzig (2004, p.114),

...digital technologies can enable students to become more active and independent learners. The Internet will allow new "Knowledge-building communities" in which children and adults from around the globe can collaborate and learn from each other. Computers will allow students to take charge of their own learning through direct exploration, expression, and experience.

Therefore, students will benefit by being able to interact with other students and teachers while pursuing their own individual and independent learning. They will be able to ask questions, and give and exchange opinions and information with others, both in their own school, with students in other schools, and in schools all over the world. Therefore, teachers should use creative teaching approaches that can facilitate the interactions in the learning process which enhance learning performance (Liaw, Huang & Chen 2007, p.1078).

The interaction between and amongst teachers plays a central role in learning (Garrison & Anderson 2003, p.45). With the availability of various networking tools, teachers can take advantage of developments in their own disciplines. Furthermore, a number of agents have been developed that are capable of retrieving information, making decisions and monitoring other resources on the network (Garrison & Anderson 2003, p.46). Examples of such agents are Internet search engines and spiders.

Moreover, e-learning systems also help learners to access databases and information resources, and to contact other students at any time and in interactive ways (Hamad (2008, no page number). E-learning involves "new mechanisms for communication: computer networks, multimedia, content portals, search engines, electronic libraries, distance learning, and web-enabled classrooms. E-learning is characterised by speed, technological transformation, and mediated human interactions" (Stokes 2000, no page number).

Since the main focus of this study is the student, the interactions amongst students and between students and teachers are a main concern. Web technologies facilitate and enhance communications between different stakeholders, especially among and between teachers and students, as pointed out by a number of researchers such as Jamlan (2004, p.3), Siemens and Yurkiw (2002, p.134), Al-Ajlan and Zedan (2008, p.58), Alturky (2010, p.155), Al-Gahtani (2010, p.34) and Bereeket (2011, p.254). Learners can benefit from interaction with others with common concerns. Similarly, Bajahzer, Al-Ajlan and Zedan (2008, p.51) and Abbad, Morris and Al-Ayyoub (2008, p.7) point out that, in a web-based learning system, various tools, such as e-mail, chat and discussion forums, are available to facilitate interaction.

The availability of course material anytime and anywhere enhances student-student and student-instructor communication (Selim 2003, p.357). E-mail, discussion boards, chat rooms and instant messaging provide effective interaction for e-learners (Al-Ghowainim 2002, p.18). Likewise, Abuhamdieh and Sehwail (2007, p.45) report that email is an important means of communication; they found in their study that both students and faculty actively used email for communication.

Furthermore, Sanders and Morrison-Shetlar (2001, p.252) argue that "active participation by the instructor played an important role in increasing student participation in online activities which, in turn, increased learning through interaction with one another." Therefore, receiving immediate feedback is one of the benefits of online learning, as noted by Jamlan (2004, p.3) and Al-Ghowainim (2002, p.18).

### 3.3 Roles of school learning stakeholders

The process of change in education is technically simple but socially complex, and therefore requires careful consideration and management (Fullan 1992, p.109). As a result, the implications of introducing an e-learning initiative must be first considered carefully, including aspects such as finance, staff workloads and changing roles as a result of its introduction (Wilson 2003, p.6).

The roles of teachers and students will certainly change in an e-learning environment. This is due to the impact of digital electronic resources and communication on the learning process. Siemens and Yurkiw (2002, p.123) describe e-learning as "a different way to learn. It is about a new interface between student and content. It is about rethinking the role of the instructor-a guide or a sage. As such, the process, the experience, the interface, the roles of student and instructor, all differ from traditional classrooms". With this in mind, the section below discusses and analyses the roles of the teacher and of the students.

#### 3.3.1 Teacher roles in an e-Learning environment

The introduction of e-learning resources into classrooms creates a learning environment and tools different from those in traditional learning processes. Teacher roles will be different, as expressed by a number of authors. For example, Hamzah, Ismail and Embi (2009, p.381) explored this and described the role of teachers as being at "the heart of any education change and ultimately it is they who have the power to ensure whether change is implemented successfully or not in the classroom". Similarly, Siemens and Yurkiw (2002, pp.134-135) described the role of the instructor as the "creator" and "curator" in an e-learning environment. The depth of student interaction, the frequency of contact with course material, and the liveliness of discussion are all influenced by the teacher. Moreover, it is the responsibility of the teacher to create and maintain an online environment where each student feels secure and respected. In an e-learning system, students no longer rely solely on teachers to "give" knowledge. Learning will happen while they are interacting with course material and their peers. Therefore, the role of teachers will be different and, according to the authors, teachers will perform the role of guiding and moderating (p.132). Al-Jowder (2004, p.37) support this contention.

Furthermore, Aduwa-Ogiegbaen and Iyamu (2005, p.111) argue that, while computers have allowed instruction to be less didactic, they have encouraged independent exploration, allowed for more activities to be tailored for individuals, and have offered more opportunities for teamwork. As noted above, the teacher's role then shifts from being the provider of information to the facilitator of knowledge construction. For this to occur, classrooms must be reorganised to allow greater interaction between the teacher and the students (Barron & Goldman 1994, p.84). Thus, students construct knowledge through experience, interpretation and interaction with their teachers and their peers (Shields & Behrman 2000, p.19). So, encouraging students to take a more active role in their own learning processes actually means the teachers take on other roles such as those of facilitator, guide and/or mentor (Condie & Livingston 2007, pp.344-345). Theng (2009, p.937), Bamefleh (2006, p.23) and other authors support this view.

Similarly, Abuhamdieh and Sehwail (2007, p.47) note that faculty "act as opinion leaders and role models for students. In fact, they are the ones who will demonstrate the use of portals to students, and the use of any particular module that they will subsequently use in their classes, such as BB [Bulletin Boards] or e-groups". It is also important to note that the teacher's role does not change by using any form of technology in the classroom, but change occurs depending on the extent of the responsibility given to the learners (Hannafin & Savenye 1993, p.28). Thus, a greater shift in the teacher's role occurs when there is more responsibility and freedom given to the learners.

## 3.3.2 Student roles in an e-Learning environment

Lee, Yoon and Lee (2009, p.1320) note that the paradigm shift from teacher-centred to student-centred learning is one of the most significant changes in education during the information age. In student-centred learning, responsibility to complete the work set lies with the students, whereas, in instructor-centred learning, the teacher is responsible for conveying the knowledge to be taught to the students (Lanham & Zhou 2003, p.281). In the latter approach, students rely purely on the teacher's feedback to determine their progress. Similarly, Wiske *et al.* (1990, p.44) report that, in student-centred learning, students take more responsibility for their own learning and work together with other students to solve problems.

Anderson (2005, p.3) compared the roles of students and teachers resulting from ICT integration (see Table 3.1).

Learning Environments	
Teacher-centred	Learner-centred
Student role	Student role
• Passive recipient of information	• Active participant in the learning
Reproduces knowledge	process
• Learns as a solitary activity	• Produces and shares knowledge,
	participates at times as expert
	• Learns collaboratively with
	others
Teacher role	Teacher role
• Knowledge transmitter, primary	• Learning facilitator,
source of information, content	collaborator, coach, mentor,
expert, and source of all answers	knowledge navigator, and co-
• Controls and directs all aspects of	learner
learning	• Gives students more options and
	responsibilities for their own
	learning

 Table 3.1 Student and teacher roles in teacher-centred and learner-centred environments

(Source: Anderson 2005, p.3)

As shown in Table 3.1, in student-centred learning, the student learns collaboratively with other students and has an active role in the learning process while the teacher acts as learning facilitator, mentor, and co-learner. In teacher-centred learning, the student reproduces knowledge and has passive role in the learning process while the teacher represents a primary source of information, is a knowledge transmitter, and controls all aspects of learning.

A number of studies have reported that students from Asian cultures prefer the traditional instructor-centred approach compared to students from western cultures. For example, Lanham and Zhou (2003, pp.279-284) argue that Australian students are seen to be more accepting of e-learning than Asian students. This is because their learning styles are different. The approach to learning adopted by many Asian

students is a reproductive approach (Ballard & Clanchy 1991, cited in Conlan 1996, no page number). This is dependent on "memorisation and rote learning". Students receive the learning content they need from teachers, from which they memorise the required material (Lanham & Zhou 2003, p.279). Students follow the instructions which their teachers provide them with very closely and they rely entirely on the feedback given by the teacher in order to measure their progress. However, many Australian students and those from similar western backgrounds have been encouraged to learn through "the questioning of facts and understanding of concepts" (Lanham & Zhou 2003, p.279). Students are encouraged to express their own opinions rather than to reproduce information. Student is responsible for collecting the relevant materials to complete the required activities and assessment. In studentcentred learning, which is the approach accepted by students from Australia, the responsibility lies with the students to complete the work. Due to this encouragement to understand concepts and to sustain an active role within their education, Australian students are seen to be more accepting of e-learning. Therefore, in all learning environments, and especially in online learning environments, it is important not to make generalisations in relation to students' cultural backgrounds. This is because each student has different needs (Lanham & Zhou 2003, p.280).

In summary, different cultures have different beliefs and approaches regarding learning styles. Thus, applying a "one learning style fits all" approach to e-learning does not seem to be appropriate (Lanham & Zhou 2003, p.280). Similarly, Bhuasiri *et al.* (2012, p.850) argue that the adoption of an e-learning system "is not a one-size-fits-all approach". Therefore, implementing e-learning in schools has to be "studied carefully to apply certain competencies that fit each educational stage individually" (Aldhafeeri, Almulla & Alraqas 2006, p.725). Therefore, it is important to acknowledge and recognise individual differences amongst different cultures (Conlan 1996, no page number), especially when designing learning materials.

## 3.4 Users' acceptance of technology

User acceptance is defined as a "potential user's predisposition toward personally using a specific system" (Swanson 1982, cited in Al-Gahtani 2001, p.39). Acceptance has been "conceptualised as an outcome variable in a psychological process that users

go through in making decisions about technology" (Dillon & Morris 1996, p.8). Similarly, Venkatesh *et al.* (2004, p.446) define acceptance as the "initial decision made by the individual to interact with the technology". A number of researchers, such as Mathieson (1991) and Davis (1989), have measured acceptance through usage intention. In the literature, there are a number of theoretical models that have been widely used by researchers to study users' acceptance of technology. Hussin, Jaafar and Downe (2011, p.217) and Lin, Chan and Jin (2004, p.181) note that there have been many user acceptance models in Information Systems (IS) research. These are explained below.

#### 3.4.1 Theoretical background

The technology adoption model is "a theory which explains how the users of technology accept the technology and use it" (Velupillai 2011, p.785). Saadé and Bahli (2005, pp.317-318) note that there are several theoretical models available in the literature that can be used to study the attitudes and behaviours of individuals in using Internet-based learning systems, such as the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB), and the Technology Acceptance Model (TAM); all of them agree that an individual's beliefs regarding IT have a significant impact on his/her usage. These models have been validated and tested in a number of studies using different information technologies. Similarly, Wang and Wang (2009, p.762) highlight the aforementioned models as the three most famous user intention theories available in the literature. Ma, Andersson and Streith (2005, pp.387-388) also note that there are several adoption theories that have been developed and empirically examined; these include TRA, TAM, TPB and the Diffusion of Innovations (DoI). In addition, Venkatesh et al. (2003) examined eight major acceptance models and integrated them into a model named the Unified Theory of Acceptance and Use of Technology (UTAUT).

It is therefore important to review these models and present studies that have researched user acceptance of technology based on these theoretical models.

#### 3.4.1.1 Theory of Reasoned Action (TRA)

The Theory of Reasoned Action (TRA) suggests that an individual's behaviour (the use or rejection of technology) is determined by a person's intention to perform the behaviour. According to TRA, an individual's intention is a function of two factors: one is personal in nature and the other reflects social influences (Ajzen & Fishbein 1980, p.6). The personal factor reflects attitudes toward the behaviour whereas social influences refer to the subjective norm. Similarly, Dillon and Morris (1996, pp.8-9) point out that intention is influenced jointly by the individual's attitude and subjective norm (see Figure 3.3). Ajzen and Fishbein (1980, p.6) suggest that, attitude can be defined as "the person's judgment that performing the behavior is good or bad, that he is in favor of or against performing the behavior".



Figure 3.3 Theory of Reasoned Action (TRA) from Dillon and Morris (1996, p.9)

Attitude also refers to "a learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object" (Fishbein & Ajzen 1975, p.6) whereas subjective norm refers to "the perceived social pressure to perform or not to perform the behavior" (Ajzen 1991, p.188). In other words, subjective norm can be defined as a "person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Fishbein & Ajzen 1975, p.302). In the context of technology usage, the key factors underlying subjective norm are peer influence and the influence of superiors (Taylor & Todd 1995a, p.152). According to this theory, attitude is determined by beliefs about the consequences of that behaviour and the effective evaluation of those consequences,

whilst the subjective norm is determined by an individual's normative beliefs and motivation to comply with perceived norms (Dillon & Morris 1996, p.9).

## 3.4.1.2 Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (TPB) was developed by Ajzen (1985, 1991) and the TRA was further developed in the Theory of Planned Behaviour (TPB) (Dillon & Morris 1996, p.12). TBP adds a third antecedent of intention to the TRA model: perceived behavioural control (see Figure 3.4).



Figure 3.4 Theory of Planned Behaviour (TPB) from Dillon and Morris (1996, p.13)

Perceived behavioural control can be defined thus: "the resources and opportunities available to a person must to some extent dictate the likelihood of behavioural achievement" (Ajzen 1991, p.183). It is determined by the availability of skills, resources and opportunities, as well as their perceived importance in achieving outcomes (Dillon & Morris 1996, p.12). This latter construct is sometimes considered to be similar to the concept of computer self-efficacy which represents "an individual's perceptions of his or her ability to use computers in the accomplishment of a task" (Compeau & Higgins 1995, p.191).

#### **3.4.1.3 Diffusion of Innovation (DoI)**

Rogers's (1995) Diffusion of Innovation (DoI) theory is widely applied in studies related to information technologies (van Slyke, Belanger & Communale 2004, p.34) to study users' adoption of new technologies (Carter & Belanger 2004, p.3). Rogers (1995, p.10) defines diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system". An innovation is "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers 1995, p.11).

Prescott and Conger (1995, p.21) note that many factors affect the diffusion of innovations. These are: innovations' characteristics, social systems, and communication channels. According to Rogers (1995, pp.15-16), the characteristics of innovations are:

- Relative advantage: "the degree to which an innovation is perceived as better than the idea it supersedes";
- Compatibility: "the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters";
- Complexity: "the degree to which an innovation is perceived as difficult to understand and use";
- Trialability: "the degree to which an innovation may be experimented with on a limited basis"; and
- Observability: "the degree to which the results of an innovation are visible to others".

These characteristics are helpful in explaining users' adoption of IT and decision-making processes (Chang & Tung 2008, p.73). Furthermore, Moore and Benbasat (1991, p.203) proposed additional factors that contribute to an individuals' adoption and use of innovations. These are image, result demonstrability, visibility and voluntariness. Overall, both DoI and TRA serve as theoretical foundations for technology acceptance models, such as the Technology Acceptance Model (TAM) (Mao & Palvia 2006, p.21).

#### 3.4.1.4 The Technology Acceptance Model (TAM)

The Technology Acceptance Model was produced in 1986 by Fred Davis as part of his doctoral dissertation: "A technology acceptance model for empirically testing new end-user acceptance of information systems: theory and results" (Spacy, Goulding & Murray 2004, p.553). The TAM has been widely used for predicting the acceptance, adoption and use of information technologies since its introduction by Davis (Selim 2003, p.344). It has also been used to assess the levels of technology acceptance (Jones 2011, p.6). The goal of the TAM is to predict information system acceptance and diagnose design problems before users experience the system (Dillon & Morris 1996, p.10). Therefore, the TAM model is "a promising practical tool for early user acceptance testing" (Al-Gahtani 2001, p.38).

The TAM developed the TRA further with its inclusion of the constructs of perceived usefulness and perceived ease of use. Perceived usefulness is "the degree to which a person believes that using a particular system would enhance his or her job performance", whereas perceived ease of use is "the degree to which a person believes that using a particular system would be free of effort" (Davis 1989, p.320). The TAM assumes that beliefs about usefulness and ease of use are always the primary determinants of IT/IS adoption in organisations. According to the TAM, these two determinants serve as the basis for attitudes towards using a particular system which, in turn, determine the intention to use it, and then generate the actual usage behavior (see Figure 3.5). Therefore, the diagnostic measures provided by the TAM should help practitioners identify and evaluate strategies for enhancing user acceptance (Al-Gahtani 2001, p.38). The TAM model can also be applied to understand the behaviour of both experienced and inexperienced users (Al-Gahtani



Figure 3.5 Technology Acceptance Model (TAM) from Dillon and Morris (1996, p.10)

Over a number of years, the TAM has received a great deal of empirical support because of its power in predicting the use of information systems; this has been achieved through validations, applications and replications (Lu *et al.* 2003, p.207) carried out by, among others, Davis (1989); Davis, Bagozzi and Warshaw (1989); Davis (1993); Davis and Venkatesh (1996); Mathieson (1991); Taylor and Todd (1995a); Venkatesh (1999); Venkatesh and Morris (2000); Horton *et al.* (2001). However, researchers have also recognised that the generality of the TAM fails to offer more meaningful information on users' opinions about a specific system (Lu *et al.* 2003, p.207) because the model has only two explanatory factors (perceived usefulness and perceived ease of use) (Ma, Andersson & Streith 2005, p.388). Similarly, Al-Gahtani (2008, p.5) points out that, "despite the impressive predictive power of TAM, a large proportion of the potentially explainable variance remains unaccounted for". Therefore, effort should be made to develop a model extension to provide a better explanation of user acceptance.

Davis and his colleagues (i.e. Davis 1993; Davis & Venkatesh 1996; Venkatesh & Davis 2000) meanwhile have validated and extended the TAM model using different situations to make it more explanatory (Lu *et al* 2003, p.208). Venkatesh and Davis (2000, p.186) developed and tested a theoretical extension of the TAM, known as TAM2. TAM2 was strongly supported across four organisations and three points of measurement (pre-implementation, one month post-implementation, and three months post-implementation). Legris, Ingham and Collerette (2003, p.202) supported the view of some researchers, however, that the influence of some factors on the intention to use varied at different stages in the implementation process. Legris, Ingham and Collerette (2003) also suggested that the TAM should be modified and integrated into a broader model to include other factors in order to increase its explanatory power.

Thus, TAM2 explains usefulness and usage intentions in terms of social influence (subjective norm, voluntariness and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability) (Selim 2003, p.345). The subjective norm was originally explored in the TPB but excluded from a later version of the TAM (Davis, Bagozzi & Warshaw 1989, p.986). The authors found that the subjective norm had no significant effect on intention over and above perceived

usefulness and ease of use. However, Venkatesh and Davis (2000, p.198) found that subjective norm had a direct effect on intentions over and above perceived usefulness and perceived ease of use for mandatory systems. This may explain why previous studies found the subjective norm to have a non-significant role on intention in voluntary contexts.

Within the IS domain, Davis, Bagozzi and Warshaw (1992, p.1112) applied motivational theory to understand the adoption and use of new technology. One factor was renamed (usefulness as an extrinsic motivation) and one additional factor was introduced (perceived enjoyment as an intrinsic motivation). In fact, usefulness and extrinsic motivation are quite similar (Sanchez-Franco & Roldan 2005, p.25). Furthermore, Venkatesh, Speier and Morris (2002) introduced an extended TAM, which integrates the intrinsic motivation factor from the Motivational Model (MM) with the original TAM.

In the final version of the TAM, attitude was omitted, because it did not fully mediate the effect of perceived usefulness on intention (Davis & Venkatesh 1996, p.21). In other words, people intend to use a technology because it is useful, although they do not have a positive attitude toward using it (Venkatesh 2000, p.343). However, a number of researchers, (for example, Davis, Bagozzi and Warshaw (1989); Taylor and Todd (1995a); Mathieson (1991); Morris and Dillon (1997); Thompson (1998); Klobas & Clyde (2000); Al-Gahtani (2001); and Lau and Woods (2008)) have found attitude to be a significant predictor of behavioural intention.

The TAM has been compared with other user acceptance models and theories, such as TPB and TRA. A number of researchers compared the predictive power of these models in explaining the behavioural intention. For example, Davis, Bagozzi and Warshaw (1989, pp.982-1000) conducted a longitudinal study to investigate the intentions of MBA students to use a computer system. The researchers assessed the ability of the TAM and TRA to explain the adoption of computer-based technology. The findings revealed that perceived usefulness was a strong determinant of behavioural intention and it explained more than half of the variance in intention. Perceived ease of use had a small but significant effect on intention, whereas subjective norm had a non-significant effect on intentions. Behavioural intention was

found to be a main determinant of usage behaviour. Overall, the study showed that TAM explained 47% of the variance on intention to use at time 1 and 51% of the variance at time 2. On the other hand, TRA accounted for 32% and 26% of the variance at times 1 and 2 respectively. Thus, the findings indicated that, although perceived ease of use is important, the usefulness of the system is even more so. Moreover, the variance explained by the TAM is much higher than TRA.

In his study, Mathieson (1991, pp.173-187) compared the Technology Acceptance Model and the Theory of Planned Behavior in predicting users' intention to use an information system. The findings revealed that both the TAM and the TPB were quite effective in predicting the intention to use an information system, with the TAM having a slight empirical advantage. The TAM is easier to apply and provides general information about ease of use and usefulness. On the other hand, the TPB provides more specific information, giving more insight into why users might be dissatisfied.

Taylor and Todd (1995a, pp.145-151) further extended and integrated the TAM and the TPB by establishing a "decomposed TPB". This model incorporates additional factors that are not present in the TAM but have been shown to be important determinants of behaviour (Lu *et al.* 2003, p.207). The Technology Acceptance Model (TAM) is useful in predicting IT usage behaviour while the decomposed TPB provides a more complete understanding of behaviour and behavioural intention by accounting for the effects of normative and control beliefs (Taylor & Todd 1995a, p.172).

By adopting the Theory of Planned Behaviour (TPB) and the Technology Acceptance Model (TAM), Ndubisi (2006, pp.571-588) investigated the main factors that influenced e-learning adoption among students in a Malaysian public university. The researcher compared the predictive power of these two models in determining the main influences on behavioural intention. The findings showed that both models predicted well the adoption of online learning. However, the total variance explained by the TAM was more than that explained by the TPB. The study also revealed that all three TAM variables (perceived usefulness, perceived ease of use, and attitude) were strong predictors of adoption intention whereas only two of the three TPB variables, namely, attitude and perceived behavioural control, were significantly associated with intention to adopt. In other words, subjective norm has no significant relationship with intention to adopt; this confirmed the findings of Davis, Bagozzi and Warshaw (1989).

In summary, the Technology Acceptance Model (TAM) is the most well-known and robust behavioural model for explaining the adoption and usage of IT (Cheung, Lee & Chen 2002, p.2). It is also the most widely used model for studying user acceptance of specific types of technology (Wang & Wang (2009, p.762); Ma, Andersson & Streith (2005, p.388)).

The TAM has been used as the theoretical basis for many studies of user technology acceptance (Ong & Lai 2006, p.817; Yuen & Ma 2008, p.230). These studies are: Adams, Nelson and Todd (1992); Chau (1996); Chau (2001); Davis (1989); Davis, Bagozzi and Warshaw (1989); Hu *et al.* (1999); Legris, Ingham and Collerette (2003); Mathieson (1991); Moon and Kim (2001); Taylor and Todd (1995a); Venkatesh (2000); Venkatesh and Davis (1996); Venkatesh and Davis (2000); Venkatesh and Davis (1996); Venkatesh and Davis (2000); Venkatesh and Morris (2000). In addition, although the TAM initially focused on system usage in the workplace, it has been used recently to help understand website usage (Abbad, Morris & Al-Ayyoub 2008, p.3), especially e-learning adoption (Abbad, Morris & de Nahlik 2009, p.14).

The TAM is noted as being one of the tools used to assess, predict and explain users' acceptance of ICTs; it has been widely used by researchers in recent years and among them, as listed by Li (2002, p.38), are: Davis and Venkatesh (1996); Al-Gahtani and King (1999); Straub, Keil and Brenner (1997); Venkatesh (2000). Authors such as Aggelidis and Chatzoglou (2009, p.116) also support this contention and have added that the model has been applied with different samples of users.

However, Teo, Su Luan and Sing (2008, pp.266-267) suggest that the research on the TAM and its application in education is limited whereas it has been extensively tested in business settings. Nonetheless, in recent years, the model has been used to investigate issues related to education by a number of researchers such as Gao (2005); Ngai, Poon and Chan (2007); Drennan, Kennedy and Pisarksi (2005); Lee, Yoon and Lee (2009); Abbad, Morris & de Nahlik (2009); Liu *et al.* (2010); and Lee (2010). Although the TAM had been extensively used for research in developed countries,

few studies have tested it in developing countries (Al-Khateeb 2007, p.144). In addition, the application of the TAM to e-learning is relatively new (Abbad, Morris & de Nahlik 2009, p.14).

#### 3.4.1.5 Unified Theory of Acceptance and Use of Technology (UTAUT)

A more recent development of the TAM, created by Venkatesh *et al.* (2003), constitutes a major step forward in research on IS user acceptance. The researchers examined eight major acceptance models and integrated them into a model named the Unified Theory of Acceptance and Use of Technology (UTAUT) (see Figure 3.6). The UTAUT consists of four constructs that were extracted from the eight models that affect the intention of behaviour. The four constructs are: performance expectancy, efforts expectancy, social influence and facilitating conditions. Additionally, four constructs (gender, age, experience and voluntariness of use) were hypothesised to moderate the relationship between behavioural intention or usage and their antecedents (Lin, Chan & Jin 2004, p.183).



Figure 3.6 Unified Theory of Acceptance and Use of Technology (Venkatesh *et al.* 2003, p.447)

In the UTAUT, there are three constructs that are not included in the model as direct determinants on intention. These constructs are self-efficacy, anxiety and attitudes (Venkatesh *et al.* 2003, p.455).

Although many models have been developed to investigate factors affecting users' acceptance of technology, the TAM is the model most commonly used by information system academicians and practitioners (Al-Ammary 2010, p.10).

#### **3.4.2 TAM-based studies**

As discussed in Chapter One, a number of studies have successfully applied the TAM to examine the acceptance of new technologies (Ngai, Poon & Chan 2007, pp.252-253). In addition, Gao (2005) points out that the TAM has been applied in numerous studies to test user acceptance of IT: for example, word processors (Davis, Bagozzi & Warshaw 1989), e-mail (Szajna 1996), spreadsheet application (Mathieson 1991), web browsers (Morris & Dillon 1997), telemedicine (Hu et al. 1999), websites (Koufaris 2002), e-collaboration (Dasgupta, Granger & Mcgarry 2002), and blackboard (Landry, Griffeth & Hartman 2006). Deng et al. (2005, p.749) added that perceived usefulness and perceived ease of use have been applied to various applications, such as e-mail, voice mail, microcomputers, telemedicine technology, smart cards and digital libraries. Furthermore, Lu et al. (2003, pp.209-211) summarise the most important studies with regard to the TAM in work and non-work related situations. Conversely, there are few studies which examine the acceptance of web-based learning systems (Ngai, Poon & Chan (2007, p.251); Sánchez & Hueros (2010, p.1633)). More specifically, there is little research that addresses students' intention to accept and use educational technologies (Lau & Woods 2008, p.686).

Nevertheless, the TAM could be useful in predicting students' acceptance of an elearning system (Lee 2006, p.519) and, in the Arab world, some studies have been found that have examined attitudes towards e-learning using the TAM, as highlighted by Al-Khashab (2007, p.50). According to Teo, Su Luan and Sing (2008, p.275), the TAM has been validated in a number of countries, such as the UK, USA, Switzerland, Brazil, Germany, Taiwan and some Arab countries. Similarly, Mao and Palvia (2006, p.20) note that most of the technology acceptance studies have been conducted in North America. Overall, the available studies are considered helpful in providing valuable information about users' acceptance and the use of educational technologies in developed and developing countries; these are critically reviewed in the following sections.

#### 3.4.2.1 TAM and work related studies

This section summarises the most important studies that have used the TAM in the work environment; it also highlights the main factors that have been used by the researchers together with their main findings. These studies have been conducted in both developed and developing countries.

A study conducted in Finland by Igbaria, Iivari and Maragahh (1995, pp.227-235) focused on two aspects of motivation: extrinsic and intrinsic. The researchers studied the influence of perceived enjoyment and usefulness on computer usage. Eighty one companies agreed to participate in this study. A total of 806 questionnaires were sent to workers, and 450 responses were returned, representing a 55% response rate. Computer usage was measured by three indicators: frequency of use, daily use, and the number of tasks for which the system was used. To test the hypothesised relationships, hierarchical multiple regression was used. Considering the overall information collected from the survey, the authors found that perceived usefulness had a stronger direct effect on all system usage dimensions than perceived enjoyment and perceived ease of use. This indicated that Finnish professionals and managers used computer technology mainly because they believed the computer to be a useful tool in improving their job performance. The findings revealed that perceived ease of use had very strong indirect effects on computer usage through perceived usefulness and enjoyment. Overall, the research variables explained 28% of the variance in frequency of use, 20% in time of use, and 26% in number of tasks; this indicates a need to examine other factors that might influence computer usage to gain a more comprehensive picture.

A cross-sectional survey was design by Gefen and Straub (1997, pp.389-398) to examine the effect of gender on perception and use of e-mail. The researchers examined the effect of gender on perceived usefulness, perceived ease of use, perceived social presence (SP), and the information richness of the medium (IR). Perceived social presence which is "the sense of human contact embodied in a medium" was combined with IR to become SPIR. In the airline industry, 392 workers on three continents (North America, Asia and Europe) participated in the study. The findings showed that a total of 34% of the variances were explained by the TAM constructs. Men and women differ in their perceptions but not in their use of e-mail. Women perceive a higher social presence and usefulness of e-mail than men. The findings also revealed that gender differences do not directly affect actual use of email because this indirectly influences e-mail usage through its direct effect on usefulness and SPIR. Overall, this study shows how gender plays a significant role in IT diffusion.

Based on the TAM, Igbaria *et al.* (1997, pp.279-294) investigated key factors affecting personal computing acceptance among users in small firms in New Zealand. The research variables included: intraorganisational factors (internal training and management support), extraorganisational factors (external user computing support and external training), perceived ease of use, perceived usefulness and system usage. To test the research hypotheses, structural equation modeling was used. Using a survey method, data were collected from 358 users from 203 small firms, representing a 60% response rate. The findings revealed that the model as a whole explained 25% of the variance in system usage. Both perceived ease of use and perceived usefulness were positively related to system usage. However, the effect of perceived ease of use on usage was greater than the effect of perceived usefulness. Extraorganisational factors and intraorganisational factors indirectly affected system usage through perceived usefulness and perceived ease of use.

Similarly, in a work environment, Karahanna and Straub (1999, pp.237-247) studied workers' acceptance and use of e-mail based on social presence theory, social influence theory, and Triandis's modifications to the theory of reasoned action. Their proposed model included social presence, social influence, accessibility and training as determinants of perceived usefulness and ease of use. A questionnaire survey was conducted, with 180 questionnaires being sent to employees of a Fortune 500 transportation company. One hundred responses were returned which represented a 55% response rate; interviews with 24 workers in ten different organisations were also conducted. To analyse the data, structural equation modeling was used. The findings showed perceived usefulness to be the main predictor of e-mail usage. However,

perceived ease of use also had an indirect effect on e-mail usage through perceived usefulness. Although social influence and social presence had a significant positive relationship with perceived usefulness, the availability of training and support had no significant direct effect on either perceived usefulness or perceived ease of use. A number of recommendations that would help in enhancing the acceptance and use of e-mail in organisations were provided to the managers.

In the context of the World Wide Web, Lederer *et al.* (2000, pp.269-280) conducted a study to examine workers' acceptance of a website. The researchers surveyed workers who used the web for their work. One hundred and sixty three users responded to an e-mail survey representing a 5% response rate; this is considered low compared to other survey methods. To test relationships between the variables, multiple regression was used. The study supported the TAM and confirmed that the use of websites depends on the usefulness and ease of use of the site. However, perceived usefulness had a significantly greater correlation with usage behaviour than did ease of use. Therefore, website developers should consider both factors to encourage individuals to revisit their websites. Further recommendations were provided for web researchers, developers and managers that would help in enhancing the use of websites in jobs.

In another study, Anandarajan, Igbaria and Anakwe (2002, pp.47-62) investigated factors that motivated computer users to accept the use of microcomputers in Nigeria. The study also examined the impact of microcomputer usage on job satisfaction. The proposed research model included perceived usefulness, perceived ease of use, perceived enjoyment and social pressure. Data were collected through a survey questionnaire administered to 175 individuals in nine organisations. Of the 200 distributed questionnaires, 143 responses were returned which represented a 71.5% response rate. To test the research hypotheses, Partial Least Squares (PLS) was used. The findings showed that the research variables explained 28% of the variance on usage and 24% of the variance on job satisfaction. Perceived ease of use and social pressure were major factors affecting microcomputer usage whereas perceived usefulness and perceived enjoyment had no direct effect on usage. This finding is inconsistent with Igbaria, Guimaraes and Davis (1995) where perceived usefulness was found as the main determinant of microcomputer usage. A possible explanation

for the differences in the results could be related to the area of the study, the sample and the context. The findings of this study also showed that usage was positively related to job satisfaction. Perceived enjoyment and perceived usefulness had the strongest direct effect on job satisfaction. Overall, the study's findings showed the importance of microcomputer usage and perceived usefulness in mediating the relationship of perceived ease of use on job satisfaction. It also showed that a large percentage of usage and job satisfaction variance remained unexplained, which suggests there is a need to investigate other variables that might contribute to the acceptance of microcomputers.

In organisational settings, Venkatesh, Speier and Morris (2002, pp.297-313) redefined the TAM within a motivational framework. The integrated model examined the influence of pre-training and training environment interventions to understand user behaviour over time. Thus, the model included constructs from the TAM and a motivational model and tested them longitudinally. A structural equation modeling technique was used to analyse the data. The findings showed that intrinsic motivation factors, perceived usefulness and perceived ease of use had significant positive effects on behavioural intention (BI). However, intrinsic motivation influenced BI indirectly through both perceived usefulness and perceived ease of use. This study shows the importance of pre-training and the training environment in understanding the acceptance of technology over time; the research model provides a better understanding of the factors influencing user behaviour immediately after training and over an extended period of time.

In Taiwan, Ong, Lai and Wang (2004, pp.795-801) surveyed 140 engineers from six international companies to investigate factors that influenced engineers' acceptance of an e-learning system. Based on the TAM, the study examined the effects of perceived usefulness, perceived ease of use and perceived credibility on the intention of engineers to use an e-learning system. Perceived credibility referred to "the degree to which a person believed that using a particular system would be free of privacy and security threats" (p.797). Similar to Davis and Venkatesh's study (1996), the researchers removed "attitude" from the model and added computer self-efficacy as a determinant of perceived usefulness, perceived credibility and perceived ease of use. The findings showed that perceived usefulness, perceived ease of use and perceived ease of use and perceived ease of use.

credibility had a significant positive effect on behavioural intention to use. Perceived usefulness was found to be the most significant factor affecting users' acceptance of e-learning. Computer self-efficacy was also found to be a significant determinant of perceived usefulness, perceived ease of use and perceived credibility. Overall, the proposed model accounted for 44% of the variance in behavioural intention to use which indicates there is a need to investigate other factors that might contribute to the acceptance of e-learning system.

A study conducted in the USA by Burton-Jones and Hubona (2006, pp.706-714) examined the role of external variables in the TAM. Researchers tested the direct effect of system experience, the level of education and age on usage behaviour and their indirect effects through perceived usefulness and perceived ease of use. A questionnaire was sent to 125 employees of a large government agency in order to investigate their perceptions, beliefs and usage behaviours with respect to two applications: e-mail and word processing. Usage was further divided into two sub-dimensions: frequency and volume. To analyse the data, partial least squares and structural equation modeling tools were used. The findings showed that perceived usefulness was the main predictor of usage which is consistent with Karahanna and Straub's (1999) research results. For the e-mail application, experience of the system had a significant direct effect on the volume and frequency of usage, greater than its indirect effects through perceived usefulness and perceived ease of use. In terms of the word processor application, experience of the system and age had significant direct effects on usage frequency, greater than their indirect effects through perceived usefulness and perceived ease of use. Overall, this study showed that the TAM is significantly better at predicting frequency than volume of usage. External variables have a stronger direct effect on usage than their effect on beliefs and attitudes.

In another cultural context, Mao and Palvia (2006, pp.20-28) studied the acceptance and use of e-mail of Chinese employees based on an integrated model that incorporated constructs from the TAM, TRA and IDT models. In this research, the proposed research variables were perceived usefulness, perceived ease of use, attitude, subjective norms, compatibility, visibility, trialability, image and result demonstrability. A cross-sectional survey was carried out in 30 Chinese organisations and a total of 533 usable questionnaires were returned. Using Structural Equation Modeling (SEM), the findings revealed that perceived usefulness had the strongest effect on behavioural intention whereas subjective norm played a more important role in influencing intention than attitude. Perceived usefulness, visibility, compatibility and result demonstrability were significant determinants of attitude. Overall, the study's findings confirmed the applicability of TAM, TRA and IDT as theoretical foundations to study e-mail acceptance among Chinese employees. The proposed model accounted for 21% of the variance in the intention to use e-mail. However, investigating other factors that might contribute to the acceptance of e-mail, such as political, economic and demographic factors, could have given the study a more comprehensive picture.

Based on the TAM, Tseng and Hsia (2008, pp.815-818) integrated internal locus of control and computer self-efficacy to examine their impacts on perceived usefulness and perceived ease of use of an e-learning system. Locus of control is "a psychological construct that is used to identify if a person feels self-control over an external environment" (p.816). A total of 320 surveys were distributed to employees from 12 high-tech companies in Taiwan. However, only, 204 usable responses were returned, representing a 63.7% response rate. In line with Lee (2006), the findings of this study showed that perceived usefulness had the most significant direct effect on behavioural intention to use e-learning, followed by computer self-efficacy and perceived ease of use. Computer self-efficacy had a significant positive effect on perceived ease of use and perceived usefulness. Overall, the findings strongly support the extended TAM and the proposed model accounted for 50% of the variance in intention to use e-learning.

In another study, Hsia and Tseng (2008, pp.39-43) integrated perceived flexibility and computer self-efficacy to examine the applicability of the TAM in explaining employees' acceptance of an e-learning system. The researchers surveyed 362 employees from 16 high-tech companies in Taiwan. A total of 233 useful responses were returned. The findings revealed that perceived flexibility was the most significant factor affecting users' acceptance of e-learning. Computer self-efficacy was found to be a significant determinant of perceived ease of use, perceived flexibility and perceived usefulness, which is consistent with the findings of Ong, Lai

and Wang (2004) and Lee (2006). The overall model accounted for 27% of the variance in intention to use e-learning; this indicates there is a need to explore other variables that might have an effect on workers' acceptance of an e-learning system.

Hashim (2008, pp.253-260) investigated the acceptance of web-based training among a sample of employees in Malaysia. Based on the TAM, the proposed model included perceived usefulness, perceived ease of use, perceived support and perceived comfortableness. Perceived support is "the employees' beliefs that the web-based training will be supported by management" whereas perceived comfortableness "refers to how comfortable the respondents are with the web-based training" (Hashim 2008, p.257). Using a convenience sampling method, a total of 261 employees in several companies participated in this study. The findings revealed that perceived usefulness, perceived ease of use and perceived comfortableness were significantly related to employee attitude in using the web-based training. These factors accounted for 74% of the variance in attitude. The findings also showed that the participants in this study rarely used the Internet and web-based features. Some suggestions were provided for organisations that were planning to adopt web-based training at their workplaces.

In a health care context, Ortega Egea and Román González (2011, pp.319-330) studied physicians' acceptance of electronic health care records (EHCR) based on the TAM. The proposed research model assessed the predictive value of both the TAM's original constructs (perceived ease of use, perceived usefulness, and attitude towards usage), trust and risk perceptions (e.g. institutional trust, perceived risk, and information integrity). A questionnaire was administered to 1500 physicians in southern Spain. Only 254 were completed and valid questionnaires were returned, representing 18.04% response rate. The proposed research model and research hypotheses were tested using Confirmatory Factor Analysis (CFA) and Structural The findings provided support for most of the Equation Modeling (SEM). relationships proposed in the research model. Attitude was the only direct determinant of physicians' intention to use the EHCR system and it explained 96.4% of the variance in intention to use. Institutional trust and perceived usefulness accounted for 99.6% of the variance in attitude towards usage. The findings also revealed that perceived ease of use and institutional trust were the main determinants

of perceived usefulness. Both perceived risk and information integrity explained 82.2% of the variance in institutional trust. Overall, the results highlighted the importance of attitudinal factors and the perceptions of usefulness in determining physicians' intention to use an EHCR system.

In Turkey, Karaali, Gumussoy and Calisir (2010, pp.343-354) identified the factors affecting blue-collar workers' decision to use a web-based learning system in the automotive industry. Based on the TAM, the proposed model included anxiety, facilitating conditions and social influence as external factors that might influence workers' perceptions of web-based learning systems. A survey methodology was employed in which 546 workers participated in the study. The research hypotheses were tested using structural equation modeling. The findings confirmed all of the research hypotheses and the proposed model accounted for 94% of the variance in intention to use web-based learning systems. Perceived usefulness, attitude toward use and social influence were found to be significant predictors of the behavioural intention to use the system. Both perceived usefulness and perceived ease of use have significant effects on attitude toward use. The findings also revealed that facilitating conditions have a positive effect on perceived ease of use, whereas anxiety has a negative effect on perceived ease of use. Perceived usefulness is explained by social influence and perceived ease of use. Overall, the proposed model had high explanatory power (94%) which provides additional support to the findings of other studies in the TAM domain conducted in various countries.

In a work environment and outside of the technologically advanced world, Rose and Straub (1998, pp.39-45) used the TAM to study IT diffusion in less developed countries (LDCs). The model was tested in five Arab nations (Jordan, Egypt, Saudi Arabia, Lebanon and the Sudan). Questionnaires were distributed to knowledge workers in the Arab world who were capable of using IT. Two hundred and seventy four workers across five Arab countries participated in this study, representing an 80% response rate. The results of the study showed that the TAM transferred successfully to the Arab world and the research model explained 40% of the variance in the use of IT; this is compatible with the findings of previous TAM studies. Furthermore, practical recommendations were provided for government planning agencies in developing countries to support the adoption of IT in these countries.

In another study, Al-Gahtani (2008, pp.1-19) investigated the applicability of the TAM model in the Arab culture and extended the TAM by adding three moderating factors: age, gender and educational level. Using a survey method, the researcher collected data from 56 private and public organisations in Saudi Arabia. A total of 722 knowledge workers who used desktop computer applications in their employment participated in the study. The findings revealed that the structure of the TAM held well in the Saudi setting, and that the research variables explained about 51% of the variance in intention to use; this is compatible with the findings of previous TAM studies (e.g.Davis, Bagozzi & Warshaw 1989; Smarkola 2007). The study also showed that gender and educational level moderated the influence of perceived ease of use on attitudes. Overall, the findings of the study added more support to previous studies concerning the applicability of the TAM in the Arab context; they also showed that most of the key relationships in the model were moderated.

Similarly, in a work environment, Kamhawi (2008, pp.166-178) studied factors that influenced managers' acceptance of business process reengineering (BPR) in the Kingdom of Bahrain. Hammer and Champy (1995, p.32) defined BPR as "the fundamental rethinking and redesign of business process to achieve dramatic improvements in critical contemporary of performance, such as cost, quality, service, and speed." Adopting the TAM, the research variables included perceived usefulness, perceived ease of use, behavioural intention, individual differences, BPR beliefs, organisational capabilities and competitive pressures. Of the 210 questionnaires distributed, 104 were returned, giving a 49.5% response rate. To identify the main factors that influence the intention to use BPR, multiple regression analysis was used. The findings revealed that both perceived usefulness and perceived ease of use were significant determinants of intention to use BPR; this accounted for 61.6% of the total variance. Project management and the need for change variables were significant determinants of perceived usefulness while education, cognitive style, BPR beliefs, project management, need for change and competitive pressures had a significant effect on perceived ease of use.

In the UAE, Mouakket (2010, pp.38-49) extended the TAM to investigate employees' utilisation of Enterprise Resource Planning (ERP) systems. ERP are "software suites

that help organizations integrate their information flow and business processes" (Abdinnour-Helm, Lengnick-Hall & Lengnick-Hall 2003, p.258). The proposed model included perceived ease of use, perceived usefulness, computer self-efficacy and ERP systems design features. Design features refer to "any information, components, and features used in developing IS" (p.41). A total of 550 questionnaires were distributed to employees working in private and public organisations in Dubai and Abu-Dhabi. Three hundred and sixty five questionnaires were returned; however, only 344 responses were usable. To analyse the data, SEM was used. The findings confirmed the impact of perceived usefulness and perceived ease of use on the utilisation of ERP systems. Computer self-efficacy positively and directly affected perceived ease of use, but had no effect on perceived usefulness. The findings also showed that ERP design features have a significant impact on perceived ease of use and perceived usefulness which, in turn, influence employee utilisation of the systems.

In organisational settings, Lee, Hsieh and Ma (2011, pp.355-360) examined factors that influence employees' adoption and use of e-learning systems based on the TAM. The study investigated the impact of some external variables (e.g. subjective norm, organisational characteristics, task characteristics and individual characteristics) on employees' perceived usefulness, perceived ease of use and intention to use e-learning systems. A web-based and mailed survey was used to collect data from four industries (manufacturing, marketing and service, information technology, and government agencies) in Taiwan. A total of 200 web-based questionnaires and 400 mailed surveys were distributed to employees from 12 firms; only 357 usable responses were returned, representing a 59.5% response rate. Using Structural Equation Modeling (SEM), the findings revealed that organisational characteristics (organisational support and management support) had a significantly impact on perceived usefulness, perceived ease of use, subjective norm and intention to use while individual characteristics (individuals' experience with computers and computer self-efficacy) had significant positive effects on perceived ease of use. The combined effects of perceived usefulness and perceived ease of use explained 50% of the variance of behavioural intention, which is consistent with the findings of Tseng and Hsia (2008) and those of Hsia and Tseng (2008).

#### **3.4.2.2 TAM and education related studies**

Friedrich and Hron (2010, p.64) reported that, within an e-learning context, "there are hardly any studies that refer to pupils and the school sector". The researchers added that studying technology acceptance in school education is a "relatively young research subject" (p.75). This section presents most studies that applied the TAM to study users' acceptance of technology in educational settings. Most of these studies consider students in higher education; only a few studies focus on school education and consider mainly teachers' acceptance and the use of educational technologies.

Although the TAM focuses mainly on extrinsic motivational drivers, Lee, Cheung and Chen (2005, p.1096) found that intrinsic motivators based on emotions, such as happiness, frustration, pity or anger, also play an important part in explaining acceptance and usage. In line with this view, Davis, Bagozzi and Warshaw (1992, pp.1111-1125) conducted two studies, one involving the adoption of a word processing software by US MBA students, and another concerning the adoption of business graphics programs. The researchers examined the effects of usefulness and enjoyment on intentions to use and on the actual usage of computers in the workplace. A questionnaire was administered to 200 MBA students at a mid-western university. Using regression analysis, the findings showed that usefulness and enjoyment explained 62% (study 1) and 75% (study 2) of the variance in usage intentions. Perceived usefulness had a strong effect on usage intentions in study 1 ( $\beta$ =0.68) and study 2 ( $\beta$ =0.79). However, enjoyment had a small but significant effect on usage intentions in study 1 ( $\beta$ =0.16) and study 2 ( $\beta$ =0.15). Both perceived usefulness and enjoyment were found to mediate fully the effects on intentions of perceived output quality and perceived ease of use. The findings also showed significant effects of ease of use on both usefulness and enjoyment in both studies. Finally, a number of suggestions were provided to enhance the acceptability of computer programs among potential users. Among them is the need to increase the output quality and ease of use of a system which is expected to have a positive effect on usefulness and enjoyment.

In an academic setting, Igbaria, Guimaraes and Davis (1995, pp.87-111) used the TAM and TPB to investigate the main determinants of microcomputer usage. The researchers extended the TAM by investigating the impact of certain external factors (individual characteristics, organisational characteristics, and system characteristics)
on technology acceptance. Based on the TAM and TPB, the research variables included: user training, organisational support, system quality, perceived usefulness, perceived ease of use, and microcomputer usage. A total of 280 questionnaires were distributed to part-time M.B.A. students at an eastern university. Two hundred and thirty six questionnaires were returned; however, only 214 responses were usable. Using the Structural Equation Modeling (SEM) approach, the findings revealed that perceived usefulness was the main determinant of microcomputer usage; it also mediated the relationship between perceived ease of use and system usage. The tested model confirmed the effect of individual, organisational and system characteristics on perceived usefulness and perceived usefulness. The findings suggest that other factors that might affect user beliefs and usage (e.g. organisational size, peer support, social pressure and the accessibility of the system) might have been added to the model to gain a more comprehensive picture.

Evers and Day (1997) examined the influence of cultural factors on user preferences in interface design. Based on the TAM, the proposed model included culturally specific design preferences, usefulness, ease of use, attitude of satisfaction and use behaviour. Data were collected from students at the University of New South Wales in Australia using a survey method. Participants consisted of 206 international students (from Indonesia, China and other Asian countries). In addition, a control group of 38 Australian students participated in the study. Using Pearson Correlations, the researchers found significant relations between usefulness and attitude of satisfaction, between ease of use and attitude of satisfaction, and between attitude of satisfaction and system use behaviour. The attitudes of Australian students were directly influenced by design preferences. Thus, the Australians felt satisfied when the interface design of the system met with their preferences. A cultural difference was found between Chinese and Indonesian students. Indonesians liked soft colours, and black and white displays more than the Chinese students. They also seemed to like new technology and alternative input and output (e.g., sounds, touch screens, and multimedia) more than their Chinese counterparts. On the other hand, the use of many different colours seemed more appropriate to the Chinese. In addition, Chinese students found usefulness a main factor that influenced system use behaviour while Indonesian students found ease of use more important than usefulness.

In another study, Atkinson and Kydd (1997, pp.53-60) examined the influence of the individual characteristic of playfulness on WWW usage. The researchers considered its effect on use for entertainment purposes and course requirement purposes. The proposed model included: perceived usefulness, perceived ease of use, perceived enjoyment, computer ability, and playfulness. Two samples of students were surveyed in this study (graduate and undergraduate students) and the data were analysed using simple linear regression. The findings showed that playfulness was significantly related to WWW use. However, the relationship between playfulness and WWW use was stronger for the graduate students. The study also revealed that, for entertainment purposes, intrinsic motivation variables (ease of use and enjoyment) significantly influenced WWW use whereas perceived usefulness influenced WWW use for course requirement purposes. The findings therefore provided some suggestions for the design of future course and training programmes.

Fenech (1998, pp.629-630) examined student acceptance of the World Wide Web based on the TAM. A questionnaire was distributed to undergraduate students of the business school at an Australian university to determine their attitudes towards using the World Wide Web. To test the influence of perceived usefulness and perceived ease of use as predictors of usage acceptance of the World Wide Web, SEM was used. The researcher also tested the inclusion of computer self-efficacy within the TAM as a predictor of user acceptance of the World Wide Web. Although a detailed analysis was not provided in this article, the results indicated a poor fit for the model until the computer self-efficacy construct was included in the TAM. In other words, the addition of the computer self-efficacy construct improved the TAM's predictive value.

A study based on technology adoption theories was undertaken by Al-Gahtani and King (1999, pp.277-289), who studied users' acceptance of information technology. In other words, the researchers investigated the main factors that influence users' attitudes, satisfaction, and the usage of spreadsheets. The research model was built based on the TAM and included belief variables (relative advantage, ease of use, enjoyment) and some external variables (course of study, training, computer experience, computing support, system rating, compatibility and image). Through a

questionnaire, data were collected from 329 final year university students who had spent one year working in industry as part of a sandwich degree programme. The findings showed a strong positive correlation between satisfaction and usage. However, users' attitudes were the main predictor of usage. The study also revealed that compatibility had a strong effect on belief variables. This study confirmed the general structure of the TAM model and also confirmed the importance of individual, organisational and IT characteristics in influencing the attitudes, satisfaction and usage of users. TAM is a valuable tool for predicting user attitudes, satisfaction and usage from beliefs and external variables incorporated into the model.

In the Internet environment, Lin and Lu (2000, pp.197-206) investigated the reasons why users accepted or rejected a World Wide Web site and how users' acceptance was affected by the features (e.g. the information quality of a website, response time and system accessibility) provide by a website. Based on the TAM, the researchers included these features as determinants of perceived usefulness and perceived ease of Using a questionnaire, a total of 145 undergraduate students at Soochow use. University in Taiwan participated in this study; however, only 139 responses were usable. The findings showed that the proposed model accounted for 64% of the variance in the intention to reuse the website. Although perceived usefulness had a significant and direct effect on intention to use the website, ease of use had an indirect effect. Therefore, a company should promote the website's usefulness more than its ease of use in order to promote users' intention to reuse a site. The study also revealed that the response time of a website played a significant role in affecting user's beliefs (perceived usefulness and ease of use) regarding such a website. This implies that web page providers need to design a rapid web page to enhance the use of the site.

Moon and Kim (2001, pp.217-227) extended and empirically validated the TAM for a World-Wide-Web (WWW) context. The researchers argued that perceived usefulness and perceived ease of use might not explain users' behaviour toward WWW. Therefore, the researchers proposed a new factor (perceived playfulness) to enhance understanding of an individual's WWW acceptance behaviour. Another purpose of the study was to assess the effect of the intrinsic and extrinsic motivational factors on explaining students' acceptance of the WWW. A questionnaire was administered to

208 graduate students in the School of Management; 152 responses were received and analysed. The hypothesised relationships were tested using regression analysis. The results showed that attitude had a strong significant influence on behavioural intention  $(\beta=0.285)$  while perceived usefulness  $(\beta=0.269)$  and playfulness  $(\beta=0.245)$  had a significant effect on behavioural intention. The researchers also found a strong positive relationship between behavioural intention to use and actual WWW use. In addition, perceived ease of use had a more significant effect on users' attitudes than perceived usefulness. In fact, perceived playfulness had a more significant effect on users' attitudes than perceived usefulness. This implies that intrinsic motivational factors (perceived ease of use, and perceived playfulness) have a more powerful effect in building a positive attitude than an extrinsic factor (perceived usefulness). Thus, the extended TAM explains the individual's acceptance behaviour better than the original TAM. In other words, the extended TAM explained 39% of variance regarding behavioural intention to use the WWW, whereas the original TAM explained only 35% of the variance. Therefore, considering both intrinsic and extrinsic motivational issues is critical in user interface design. Although this study was conducted using a "snapshot research approach", it nevertheless provided valuable information about user acceptance of the WWW.

In another study, Al-Gahtani (2001, pp.37-44) investigated the applicability of the TAM in the United Kingdom. The research model included: perceived usefulness, perceived ease of use and students' attitudes. Three hundred and twenty four university students completed the survey questionnaire, achieving a response rate of 65%. To analyse the data, SEM was used. SEM "allows for the simultaneous examination of the effects of the antecedents on user acceptance" (p.39). The finding provides strong support for the applicability of the TAM in the UK. In this study, perceived usefulness was found to have a greater effect on usage than perceived ease of use. This finding is inconsistent with that of Igbaria *et al.* (1997) that the total effect of perceived ease of use has a greater effect on attitude than perceived usefulness.

In Hong Kong, Chau (2001, pp.26-31) examined the influence of computer attitude and self-efficacy on IT usage behaviour based on the TAM. Computer attitude and

self-efficacy were incorporated in the research model as external variables affecting perceived usefulness and perceived ease of use. Data were collected via a survey questionnaire from 360 university students. The results showed that computer attitude had a significant positive effect on perceived usefulness and perceived ease of use whereas computer self-efficacy had a relatively small negative effect on perceived usefulness. Computer self-efficacy had no significant effect on perceived ease of use. The addition of computer attitude and self-efficacy into the TAM improves the explanatory power of the model on the variance of perceived usefulness. These findings are consistent with Fenech's (1998) research results. The percentage of variance in perceived usefulness explained by perceived ease of use, computer attitude and self-efficacy was 41%. Overall, the proposed model explained 50% of variances in behavioural intention.

Within the e-learning context, McFarland (2001, pp.2-5) surveyed industry professionals and high school students in the USA to investigate the role of age and computer efficacy on users' attitude and computer usage behaviour. Based on the TAM and self-efficacy theory, the researcher examined the direct and indirect relationships between age, efficacy, perceived usefulness, perceived ease of use, and system usage. A questionnaire was administered to 700 high school students and 700 industry professionals. Only 676 responses were usable, representing a 48% response rate. The conceptual model and the research hypotheses were tested using structural equation modeling techniques. As opposed to the TAM, which posits that external variables will influence usage primarily through mediating other variables, the results show that age had a significant direct effect on computer usage and on the mediating variables (perceived ease of use, computer-efficacy and perceived usefulness). Overall, the findings of this study support use of the TAM and self-efficacy theory within an educational domain. However, by investigating additional external factors that might influence IT behaviours within an educational setting, the study could have attained a more comprehensive picture about the adoption of e-learning in the USA.

Selim (2003, pp.343-357) investigated the acceptance of course websites as a teaching and learning tool in higher education institutions in the United Arab Emirates. Based on the TAM, the researcher proposed a comprehensive model to identify the critical factors contributing to the usefulness, ease of use and usage of course websites. A survey instrument was distributed to 450 undergraduate students and 403 usable responses were obtained, representing an 89.6% response rate. A structural equation modeling technique was used to validate the model and to test the research hypotheses. The findings showed that usefulness and ease of use were key determinants in the acceptance and usage of the course websites. The study also revealed four major factors regarding the perceived usefulness of course websites. These are as follows:

- They improve course work interactivity. For example, they may include an electronic discussion forum that enhances interaction among students. In addition, course materials could be available electronically via the course website in different formats.
- Students can complete their course work quickly as because course websites can provide them with on-line components such as animations and multimedia modules.
- Studying course material is made easier as the course material can be made available anytime, anywhere.
- Students' productivity and effectiveness can be increased as they can finish their course work quickly and can achieve their objectives efficiently using the tools available on the course website (p.357).

Three critical determinants of course website ease of use were also identified. These were: consistency, flexibility and efficiency of use, and understandability. Overall, the proposed model had high explanatory power (83%) of the total variance in course website acceptance and usage, which provided additional support for the use of the TAM within an academic setting and in Arab countries.

In another study, van der Heijden (2003, pp.541-547) extended the TAM to explain the individual acceptance and usage of a Dutch portal site by adding the "perceived visual attractiveness" construct; this was added to the TAM in order to examine its impact on usefulness, ease of use and enjoyment. Perceived visual attractiveness defined as "the degree to which a person believes that the website is aesthetically pleasing to the eye" (p.544). In addition, the researcher examined the impact of perceived usefulness, perceived ease of use and enjoyment on the attitude towards using, intention to use and actual use. The survey was distributed to every 20th subscriber who entered the portal and, of 887 responses received, 825 were usable. By conducting multiple regression analysis, the findings confirmed all of the research hypotheses. The researcher found actual usage was predominantly explained by intention to use; this supported the role of intention as a mediator between beliefs and actual usage. Perceived visual attractiveness helped to explain enjoyment better than it helped to explain perceived usefulness. Therefore, the inclusion of the visual attractiveness construct to the TAM was enhanced when enjoyment was explicitly included. Although some previous researchers have found that attitude was not a key factor that affected intention to use, the study's findings showed that attitude is a powerful mediator between beliefs and the intention to use; thus, the researcher recommended using the construct attitude in subsequent research. These findings are consistent with the findings of Klobas and Clyde (2000, p.32) that intention to use is most dominantly influenced by attitude and less by usefulness and enjoyment.

A cross-sectional survey design was employed by van der Heijden (2004, pp.696-699) to examine users' acceptance of hedonic information systems. The author argued that intention to use a system is dependent on the utilitarian or hedonic nature of the information system. Hedonic information systems "aim to provide self-fulfilling rather than instrumental value to the user, are strongly connected to home and leisure activities, focus on the fun-aspect of using information systems, and encourage prolonged rather than productive use" (p.695), whilst utilitarian systems "aim to provide instrumental value to the user" (p.696). An e-mail questionnaire survey was conducted, with 5,500 questionnaires being sent to users; 1,144 users completed the survey. The findings showed that perceived enjoyment and perceived ease of use were stronger determinants of intentions to use a hedonic information system. However, perceived usefulness played a significant role in explaining the acceptance of a utilitarian system. Therefore, the predictive importance of the determinants changed according to the purpose of the system (utilitarian or hedonic).

In Pennsylvania, Gabbard (2004, pp.2-86) examined students' attitudes towards online/distance education courses based on the TAM. The proposed model included: perceived ease of use, perceived usefulness and attitude. Data were collected from students in the Community College of Beaver Country (CCBC). Two online questionnaires were employed to collect data for this study. One questionnaire was

developed to measure students' beliefs, perceptions and behaviour. A second questionnaire was developed to investigate student satisfaction with the course instructor, the course content and the grading system. The TAM questionnaires were administered three times (at the beginning of the semester, in the middle of the semester, and at the end of the semester) and logistic regression was used to analyse the data. The findings revealed that there is a relationship between student satisfaction and attitudes towards accepting online education. Overall, the study provides additional support for the applicability of the TAM in both asynchronous and synchronous learning environments.

Gao (2005, pp.237-244) examined the validity of the TAM's theoretical relationships when applied to one type of educational hypermedia: a course companion site. A questionnaire was administered to students and separate linear regression analyses were conduct to test the research hypotheses. Although the researcher did not provide enough information in the article about the response rate and how the pilot study was conducted, the findings showed that most of the students who participated in the study were very familiar with the web browser and spent a lot of time using the Internet for information and entertainment. However, the study revealed that the assumed relationship between perceived ease of use and attitude towards using was not supported. Rather, the simple and user-friendly interface of a web browser significantly reduces the direct impact of ease of use on users' attitudes.

Based on the TAM, Pan *et al.* (2005, pp.285-301) investigated factors affecting students' use of WebCT. Thus, the research model included: perceived usefulness, perceived ease of use, subjective norms, computer self-efficacy, attitude toward using WebCT and actual use of WebCT. An online questionnaire was administered to psychology and engineering students at the University of Central Florida (UCF). Using structural equation modeling, the findings showed that the extended model was not as suitable for engineering students as for psychology students. Although research model is capable of explaining the attitudes of students taking a psychology course, it does not predict well how frequently or how long students make use of WebCT. Perceived usefulness was the main predictor of students' attitudes toward using WebCT. These results suggest that to improve student attitudes toward WebCT,

attention should be given to improving students' perception of the usefulness of the system.

Another study based on technology adoption theories was undertaken by van Schaik, Barker and Moukadem (2005, pp.157-163) who investigated students' acceptance of a virtual university server in Lebanon (VUSIL). Based on the TAM, the researchers examined the effect of perceived usefulness, disorientation and perceived ease of use on the intention of students to use the VUSIL system. Woods (1984, pp.229-230) called disorientation the "getting lost" phenomenon which occurs when "the user does not have a clear conception of relationships within the system, does not know his present location in the system relative to the display structure, and finds it difficult to decide where to look next within the system". Using a questionnaire, a total of 110 VUSIL users participated in this study. To analyse the data, multiple regression analysis was conducted. The findings revealed that the levels of acceptance of the VUSIL were high whereas students' level of disorientation was low. The study results showed that perceived usefulness had a direct effect on intention to use the VUSIL whereas perceived ease of use had indirect effects via perceived usefulness. Students also highlighted a range of subjects that they would like to study using a virtual university system. These were: finance, publishing, science and the Internet.

By integrating a motivational perspective into the TAM, Lee, Cheung and Chen (2005, pp.1095-1102) investigated students' acceptance of an Internet-based Learning Medium (ILM). The model captured both extrinsic (perceived usefulness) and intrinsic (perceived enjoyment) motivators for explaining students' intention to use the ILM. Data were collected from 544 undergraduate students at a university in Hong Kong and a structural equation modeling technique was used to analyse the data. The findings showed that both perceived usefulness and perceived enjoyment significantly influenced students' attitudes and intentions to use the new learning medium. An unexpected finding was that perceived ease of use did not have a significant impact on students' attitudes or intentions regarding ILM usage. Therefore, this finding is consistent with the notion that learning to use the Internet is generally easy and thus, ease of using the ILM. Therefore, academic institutions should try to make learning through an ILM both useful and fun. Overall, the

research model explained only 35% of the variance in the use of the ILM, which implies there is a need to explore other variables that might have an effect on students' adoption decisions towards an ILM. Furthermore, some guidelines were provided for instructors, course designers and academic institutions that would help in enhancing the adoption of an ILM.

Similarly, from a motivational perspective, Saadé, Tan and Nebebe (2008, pp.137-144) extended the TAM to include an intrinsic motivator in order to examine students' acceptance of a Web-based Learning System (WLS). Thus, the proposed model included both extrinsic (perceived usefulness & perceived ease of use) and intrinsic (enjoyment) motivation constructs to explain student acceptance of WLS. This study was conducted using two different subjects (China vs. Canada). A survey was administered at two universities, one in Canada and the other in China where a total of 120 students in China and 362 students in Canada completed the survey. Using Partial Least Squares (PLS), the findings revealed that perceived usefulness and enjoyment had a significant impact on students' intention to use WLS in the two groups. However, in contrast to the Chinese group, Canadian students did not consider that ease of use had an impact on their intention to use WLS. However, with the Chinese subjects, the relationship between ease of use and intention to use WLS was significant. Overall, the proposed model explained 70.5% of variances in behavioural intention for the Chinese group and 25.2% for the Canadian group. This implies that, in the Chinese group, perceived usefulness and perceived ease of use explained a higher percentage of variance in intention to use and that the relationships between these variables were stronger and more significant.

In another study, Sheng, Jue and Weiwei (2008, pp.312-315) examined the main factors influencing learners' acceptance of Web-based Learning Systems (WLSs) from both intrinsic and extrinsic perspectives. Based on the TAM, the model captured both extrinsic (perceived usefulness) and intrinsic (perceived enjoyment) motivators for explaining learners' acceptance of WLS. An online survey was used to collect data at a business college in a south-central province in China; the data were analysed using Structural Equation Modeling (SEM). The findings revealed that perceived enjoyment played a critical role as a predictor of behavioural intention. In other words, behavioural intention increased when a student enjoyed interacting with the

WLS. Overall, both types of motivations significantly influenced learner behaviour. The study findings support the inclusion of intrinsic motivation for a better understanding of student WLS acceptance and usage, which is consistent with the findings of Saadé, Tan and Nebebe (2008).

Pituch and Lee (2006, pp.222-238) investigated factors that influenced students' intention to use an e-learning system in Taiwan. An extended model was developed that incorporated constructs from the TAM, as well as characteristics of the system and participants. Thus, the model included three system characteristics (system functionality, interactivity and response) and two user attributes (self-efficacy and Internet experience) as determinants that affected use and belief constructs. Data were collected from 259 college students and the Structural Equation Modeling (SEM) approach was applied to test the research model. The findings showed that the characteristics of the system were the strongest predictors that influenced use and belief constructs. This suggests that developers, designers and institutional purchasers of e-learning systems need to consider users' needs and the value of the systems to ensure their effective use.

Using an extension of the TAM, Lee (2006, pp.517-536) investigated factors that influenced the adoption of an e-learning system in mandatory and voluntary settings. The researcher tested the influence of computer self-efficacy, course attributes, content quality and perceived network externality on perceived usefulness and perceived ease of use. Network externality refers to an "increase in the value of a product or service to a consumer, not because of the inherent quality of the product or service, but because of increasing numbers of others adopting it" (Katz & Shapiro 1985 cited in Lee (2006, p.522)). Subjective norm was also incorporated into the model to predict whether social influence was an important determinant that influenced users' decision to use the system. An online survey was created for the purpose of collecting empirical data from nine universities in Taiwan. A total of 1,085 questionnaires were returned and regression analysis was used to observe associations among the proposed constructs. The findings revealed that perceived usefulness was the strongest predictor of behavioural intention, which is consistent with the findings of Lee, Cheung and Chen (2005) and Ong, Lai and Wang (2004). As expected, content quality, perceived network externality, computer self-efficacy,

subjective norm and perceived ease of use significantly and positively influenced perceived usefulness whereas the effects of course attributes on perceived usefulness were negatively significant. Only computer self-efficacy and perceived network externality significantly influenced perceived ease of use. Although subjective norm significantly influenced perceived usefulness in mandatory and voluntary settings, it had no direct effect on intention in either setting. Finally, several implications were provided to enhance students' adoption of the e-learning system in Taiwan.

In another study, Roca, Chiu and Martinez (2006, pp.683-693) investigated attributes of e-learning continuance intention based on an integrated model that incorporated constructs from the TAM, TPB and Expectancy Disconfirmation Theory (EDT). Therefore, the proposed model included: perceived quality (information, service and system quality), perceived usability (perceived usefulness, cognitive absorption, perceived ease of use), perceived behavioural control (computer self-efficacy, Internet self-efficacy), subjective norm, confirmation and satisfaction. Using a web-based survey, data were collected from 184 participants; however, only 172 responses were usable. The study found that perceived usability and perceived quality played a significant role in explaining user satisfaction. Moreover, perceived usefulness and information quality were critical to the success of the e-learning system. In other words, the influences of perceived usefulness and information quality on satisfaction were much stronger than that of other research variables. This study used a comprehensive theoretical framework which was able to identify the main attributes of e-learning continuance intention. Sixty five percent of variance in e-learning satisfaction was explained by the research variables.

A longitudinal study was conducted by Sivo, Pan and Hahs-Vaughn (2007, pp.861-872) who examined the effect of students' attitudes and subjective norms on their grades, online frequency and their intentions to take more courses using WebCT. Online questionnaires were administered three times during the semester (at the beginning, around the midpoint and at the end of the semester). Two hundred and seventeen undergraduate students at a large metropolitan university in the south-east of the USA participated in this study. To analyse the data, structural equation modeling was used. The study revealed that subjective norms played a significant role in influencing students' attitudes. Moreover, student attitudes towards WebCT were found to be the major determinant of student grades. This study showed that examining students' attitudes and perceived social pressure are significant in seeking to understand student outcomes. By investigating other factors that might have influenced students' use of WebCT, the study could have achieved a more comprehensive picture, by, for example, investigating the influence of learner characteristics on students' use of WebCT and on their final grade.

Similarly, in Hong Kong, Ngai, Poon and Chan (2007, pp.250-264) investigated factors affecting the acceptance of Web Course Tools (WebCT) based on the TAM. WebCT is "one of the best course-management systems available, and provides a number of learning tools" (p.252) and is used in almost all higher education institutions in Hong Kong. The researchers extended the TAM to include "technical support" as a precursor. The research model consisted of perceived usefulness, perceived ease of use, technical support, attitude, intention to use and system usage. Data were collected via a questionnaire survey distributed to both undergraduate and postgraduate students in seven universities in Hong Kong. The findings show that technical support had a strong direct effect on perceived usefulness and perceived ease of use, while perceived usefulness and perceived ease of use were the most dominant factors affecting students' attitude. An unexpected finding was the weak effect of attitude on system usage and the strong effect of perceived usefulness and perceived ease of use on system usage. The direct effects of perceived usefulness and perceived ease of use on system usage were stronger than the effect of attitude. These findings are inconsistent with the findings of other studies, such as that of van der Heijden (2003) who found intention to use was most dominantly influenced by attitude and less by usefulness. One of the possible explanations of such a finding, as reported by the researchers, is that university students used the WebCT because it was required by their lecturers. Therefore, whether students held positive or negative attitudes towards WebCT, this might not generate a change in the actual use of the system. Overall, the proposed model explained 12% of the variance in the use of webbased learning systems. The low value of  $R^2$  in the proposed model might imply a need to explore other variables that might have an effect on system usage.

In another study, Smarkola (2007, pp.65-75) investigated student teachers' and experienced teachers' computer usage based on the TAM. Data were collected from

160 student teachers and 158 experienced teachers. To analyse the data, multiple regression analysis was conducted. The results revealed that both perceived usefulness and perceived ease of use explained 48% of the variance in computer usage intentions for student teachers whereas, for experienced teachers, they explained 50% of such intentions. This shows that about 50% of the variance in computer usage intentions was not explained by the research model. To increase the explanatory power of the model, suggestions were provided to include behavioural control issues.

Based on the TAM, Abuhamdieh and Sehwail (2007, pp.40-47) explored the perceptions of faculty and students of a portal's ease of use and usefulness. In addition, the researchers examined use patterns and user acceptance of a campus portal and its modules in an educational institution. Using an online survey, 209 students and 42 faculty members participated in the study. The findings revealed that students and faculty showed different attitudes and use patterns for the portal and its modules. Students perceived the portal in general as more useful and easy to use than faculty did. In other words, students were more "receptive" to the portal and they used its modules more often than faculty. One of the barriers pointed out by the students was difficulty in logging into the portal. Overall, both students and faculty did not see the campus portal as an important educational medium.

Another study based on technology adoption theories was undertaken by Liaw, Huang and Chen (2007, pp.1066-1079) who surveyed instructors' and learners' attitudes toward an e-learning system. Through the use of a questionnaire, 30 instructors and 168 students at a university in Taiwan participated in this study. Multiple regression analysis was used to analyse the data and the findings showed that instructors and students generally had positive attitudes toward use of the e-learning system. Instructors' behavioural intention to use e-learning was influenced by perceived usefulness and perceived self-efficacy. The study also revealed that self-paced, teacher-led, and multimedia instruction factors were the main factors that influenced students' attitudes towards the e-learning system. The researchers also provided guidelines for developing e-learning environments. According to the researchers, four factors should be considered when developing e-learning environments. These are: multimedia instruction, autonomous learning, instructor-led interaction, and improving learning effectiveness. In an e-learning context, Masrom (2007, pp.2-7) investigated critical factors influencing students' acceptance of e-learning technology based on the TAM. A survey was conducted on undergraduate students at the College of Science and Technology, in the University Technology of Malaysia. Of the 198 questionnaires distributed, 122 were returned, giving a 62% response rate. Regression analysis was used to analyse the data and the findings revealed that perceived usefulness had a significant effect on intention to use an e-learning system. Perceived usefulness was more important in determining intention to use than attitude toward using the system. These findings are inconsistent with the findings of other studies, such as those of Moon and Kim (2001) and van der Heijden (2003) who found that intention to use was most dominantly influenced by attitude and less by usefulness. The effect of perceived usefulness and attitude toward use explains 39.9% of the variance of usage intentions, which implies there is a need to explore other variables that might have an effect on students' adoption of an e-learning technology.

Another study based on technology adoption theories was undertaken by Lau and Woods (2008, pp.685-696) who investigated how users' beliefs and attitudes influenced learning-object use among higher education learners. A web-based survey was employed to collect data from learning-object users and 481 undergraduate students participated in the study. To examine the significance and strength of the hypothesised relationships in the research model, structural equation modeling was used. The findings revealed that learners' attitudes towards the use of the learning object were significantly influenced by their perception of its usefulness and ease of use. User perceptions concerning usefulness had a stronger influence on attitudes than users' perceptions of the learning object's ease of use. Both learner beliefs and attitudes were found to have significant positive relationships with behavioural intention and behavioural intention was found to be a significant predictor of future behaviour. Furthermore, practical recommendations were provided for educators and instructional designers to promote end-user acceptance of learning objects.

In Taiwan, Chang and Tung (2008, pp.71-81) studied students' behavioural intentions to use online learning course websites based on an integrated model that incorporated innovation diffusion theory and the technology acceptance model. The researchers omitted attitude and added compatibility, perceived system quality and computer self-

efficacy to the model. A total of 736 questionnaires were sent to undergraduate students and 247 surveys were returned, although only 212 responses were usable. To analyse the data, structural equation modeling was used to study causality among all the parameters constructed in the model. The findings showed that perceived usefulness, perceived ease of use, perceived system quality, compatibility and computer self-efficacy were significant factors affecting students' behavioural intentions to use the online learning course websites. Compatibility had a strong positive and direct effect on perceived usefulness and behavioural intention to use the websites. Overall, computer self-efficacy was the most significant factor that affected the behavioural intention to use the online learning course websites.

In another study, van Raaij and Schepers (2008, pp.838-845) investigated students' acceptance and use of a Virtual Learning Environment (VLE) in China. A conceptual model was built to include subjective norm, personal innovativeness and computer anxiety. Forty five Chinese managers, who were enrolled on an Executive MBA programme, participated in this study. The findings showed that perceived usefulness had a direct effect on the use of the virtual learning environment whereas perceived ease of use and subjective norm had indirect effects via perceived usefulness. Computer anxiety and personal innovativeness had direct effects on perceived ease of use only. Overall, the proposed model explained 31% of the variance in VLE use, which is comparable to the findings of earlier studies on the acceptance and use of e-learning (e.g. Ong, Lai & Wang 2004; Moon & Kim 2001). The study also revealed that the core TAM relationships hold as well in a Chinese setting as they do in Western countries.

In Taiwan, Sun *et al.* (2008, pp.1183-1196) investigated critical factors influencing e-learners' satisfaction. An integrated model with six dimensions (learners, instructors, courses, technology, design and environment) was developed by the researchers. The proposed model included 13 variables: learner computer anxiety, learner attitude toward computers, learner Internet self-efficacy, instructor response timeliness, instructor attitude toward e-learning, e-learning course flexibility and quality, technology quality, Internet quality, perceived usefulness, perceived ease of use, diversity in assessment, and learner perceived interaction with others. An e-mail questionnaire survey was conducted, with 645 questionnaires being sent to students in

public universities; 295 responses were received, resulting in a response rate of 45%. To test the research hypotheses, stepwise multiple regression analysis was conducted. The findings revealed that learner computer anxiety, instructor attitude toward elearning, e-learning course flexibility, e-learning course quality, perceived usefulness, perceived ease of use, and diversity in assessment were the most critical factors influencing student satisfaction. These seven variables explained 66.1% of the variance of learners' satisfaction. The findings also showed that course quality had the strongest association with satisfaction. Moreover, some guidelines were provided for e-learning management and academic institutions that would help in improving learner satisfaction in Taiwan.

In another study, Rezaei *et al.* (2008, pp.85-91) proposed a model to examine students' adoption of e-learning. Based on the TAM, the researchers' model included Internet experience, computer anxiety, age, computer self-efficacy and affect as external factors that might influence students' perceptions of e-learning. Affect refers to "an individual's feelings of joy, elation, pleasure, depression, distaste, discontentment, or hatred with respect to a particular behavior" (Triandis 1980 cited in Rezaei *et al.* (2008, p.87)). A total of 120 graduate students of agriculture at the University of Tehran were selected as a sample in this study and regression analysis was used to test the research hypotheses. Results showed that perceived usefulness, Internet experience, computer self-efficacy and affect had a positive relationship with students' intention to use the e-learning system whereas age and computer anxiety had a negative relationship with their intention to use the system.

In an e-learning context, Abbad, Morris and Al-Ayyoub (2008, pp.1-28) investigated the main factors influencing students' adoption of e-learning in Jordanian universities. An extended version of the TAM was developed; this included subjective norm, Internet experience, technical support, self-efficacy, and system interactivity. A survey method was used to gather data from undergraduate students using the e-learning system at the Arab Open University (AOU). Structural equation modeling was used to analyse the data and the findings showed that the TAM provided an adequate explanation (75%) of the variance in students' intention to use the e-learning system. As hypothesised, students' intention to use was affected by perceived ease of use, perceived usefulness, subjective norm, Internet experience, self-efficacy, system

interactivity, and technical support. In addition, subjective norm was found to be a strong determinant of behavioural intention in the context of e-learning. This is consistent with what was suggested by Hartwick and Barki (1994) and Taylor and Todd (1995a). The findings also showed that self-efficacy is an important determinate of perceived ease of use; this is also consistent with some other prior studies (e.g. Davis 1989; Venkatesh & Davis 1996).

Through the use of the TAM, Al-Ammari and Hamad (2008, pp.1-16) investigated factors affecting the acceptance and use of an e-learning system at the University of Bahrain. This study is one of the few that identifies factors affecting students' intention to use an e-learning system in the Gulf region. Using an extension of the TAM, the researchers examined the effects of computer self-efficacy, content quality, subjective norms and some cultural factors on students' attitudes toward using the elearning system. Of the 200 questionnaires that were distributed, 155 were returned giving a response rate of 77.5%. To analyse the data, Pearson Correlation was used. The findings showed that perceived ease of use and perceived usefulness were significantly correlated to the behavioural intention to use the e-learning system. In other words, perceived usefulness and perceived ease of use had a significantly positive effect on the students' behavioural intention to use the e-learning system. Moreover, through perceived usefulness and perceived ease of use, content quality and computer self-efficacy had a positive indirect effect on the behavioural intention to use the e-learning system. The effects of subjective norms and cultural factors on the behavioural intention to use e-learning were also significant.

In Thailand, Wangpipatwong (2008, pp.6093-6097) investigated the factors that influenced students' intention to use e-learning. The participants consisted of 1,580 undergraduate students at Bangkok University. The researcher investigated two primary aspects: computer attitude (computer confidence, liking of computers, and computer usefulness) and e-learning perception (usefulness, enjoyment, ease of use, ease of understanding). Using multiple regression analysis, the findings showed that all e-learning perception factors positively influenced students' intention to use e-learning. However, only one factor (computer confidence) of all the computer attitude factors had a positive influence on students' intention to use e-learning whereas perceived usefulness had the greatest influence on intention to use. Overall,

the proposed model accounted for 51.6% of the variance in intention to use e-learning which is compatible with the findings of previous TAM studies, such as that of Tseng and Hsia (2008).

Based on the TAM, Teo, Su Luan and Sing (2008, pp.265-274) examined the intentions of pre-service teachers to use computers in Singapore and Malaysia. A survey methodology was employed in which 495 responses were received from both countries. To analyse the data, Structural Equation Modeling (SEM) was used. The findings revealed that perceived usefulness, perceived ease of use and computer attitudes were significant determinants of both Singaporean and Malaysian pre-service teachers' behavioural intention. Although differences were found between the Singaporean and Malaysian participants in terms of perceived usefulness, perceived ease of use and computer attitudes of use and computer attitudes, pre-service teachers in both countries liked integrating technology into their teaching or administrative work.

In the USA, Holden and Rada (2009, pp.848-855) surveyed 77 school teachers to investigate factors that influenced their acceptance and usage of educational technologies. Based on the TAM, the research model included perceived usefulness, perceived ease of use, attitudes toward using the technologies, usage behaviour and some external factors. External factors were divided into teachers' individual factors (e.g. demographic variables, computer skill level, personal system and general perception about computers) and teachers' environmental factors (organisational feasibility and organisational structure). Of the 77 questionnaires distributed, 26 were returned, giving a 33.7% response rate. The researcher used Cronbach Alpha and Factor Analysis to measure the reliability of the research variables whereas Pearson Correlation was used to measure the relationships of each item with a certain variable. The findings showed a significant relationship between each of the teachers' external factors and teachers' perceived usefulness, perceived ease of use and attitudes. The proposed research model confirmed the effect of external factors on perceived usefulness and perceived ease of use.

In another study, Wang and Wang (2009, pp.763-772) studied instructors' adoption of web-based learning based on an integrated model that incorporated constructs from the TAM, and DeLone and McLean's information system success model. The

proposed research model consisted of system quality, information quality, service quality, subjective norm, and self-efficacy. Via an online questionnaire, data were collected from 268 university instructors in Taiwan, representing a response rate of 88.7%. The proposed model was examined using structural equation modeling. The findings showed that perceived usefulness and subjective norm had a significant impact on an instructor's intention to use the web-based learning system. This implies that instructors who believed the systems were useful, or who felt social pressure to use the system, had more intention to use them. On the other hand, self-efficacy had no significant direct effect on an instructor's intention to use web-based learning systems. This indicates that confidence in the instructor's ability to use the system is not enough to increase intention to use the system; other factors have a greater influence on intention to use, as verified in this study. The findings also showed that system quality and service quality had a significant impact on perceived ease of use.

In Singapore, Theng (2009, pp.937-945) investigated students' perceptions of mobile learning and the factors that influenced their perceptions. Mobile learning, as used here, "delivers learning materials to students who are not in a fixed location or through the use of mobile or portable technology" (p.938). Adopting the TAM, the research factors included perceived usefulness, perceived ease of use and behavioural intention. The researchers also examined the influence of some external factors on perceived usefulness and perceived ease of use. These factors were: learning through communication with people on a mobile device, accessibility anytime/anywhere with the system, mobile self-efficacy and prior experience with a mobile. A total of 80 students from different schools within a local university participated in the study; the research hypotheses were tested using cross-tabulation. The findings showed that perceived usefulness and perceived ease of use were important determinants of students' intention to use mobile devices as a learning tool. The relationship between overall learning through communication between people on mobile devices and perceived usefulness was found to be statistically significant, whereas the relationship between accessibility and perceived usefulness was not significant. The study also revealed that the relationship between mobile self-efficacy, prior experience with mobile devices and perceived ease of use was statistically significant. Overall,

students had positive perceptions toward the use of mobile devices in order to achieve effective learning.

Based on the TAM, Chuang, Hsieh and Ho (2009, pp.367-370) studied factors that influenced college students' intention to use an e-learning system in Taiwan. Through questionnaires, data were collected from 623 students at the National Yunlin University of Science and Technology. To analyse the data, t-test, one-way ANOVA and path analysis were used. The findings revealed that students showed positive attitudes towards the digital learning environment. The research model confirmed the effect of the characteristics of teaching materials, the digital learning environment and the system platform on perceived usefulness. The model also confirmed the influence of the system platform, the characteristics of teaching materials, the digital learning environment and digital learning ability on perceived ease of use.

In Korea, Park (2009, pp.150-158) studied university students' acceptance of elearning. The researcher examined the effect of e-learning self-efficacy, subjective norm and system accessibility on perceived usefulness and perceived ease of use. Data were collected via questionnaires from 628 students at Konkuk University's Seoul campus. The proposed model was examined using structural equation modeling. The findings revealed that e-learning self-efficacy and subjective norm were the most significant factors influencing attitude and behavioural intention to use e-learning. System accessibility had no effect on perceived usefulness, but had an effect on perceived ease of use. Overall, this study provided additional support for using the TAM to understand behavioural intention to use e-learning.

In Taiwan, a large-scale survey was conducted by Chen *et al.* (2009, pp.1481-1485) to identify main factors influencing college students' continuance intentions to use e-learning systems. Based on the TAM, the study proposed a comprehensive model that included perceived usefulness, perceived ease of use, usage and continuance intention. The researchers modelled perceived enjoyment and system characteristics as determinants of perceived usefulness whereas media richness of teaching materials and self-efficacy were used as determinants of perceived ease of use of use of e-learning systems. A questionnaire was administered to 398 students from a technical-vocational college. A total of 252 questionnaires were returned of which 214 were

usable, giving a 53.8% response rate. Partial Least Squares (PLS) was used to validate the causal relationships between the research variables and the continuance intentions to use the e-learning systems. It was also used to assess the proposed model. The findings revealed that the research variables explained 50% of the variance in usage and 79.2% of the variance in students' continuance intentions. In addition, perceived ease of use, perceived enjoyment and system characteristics together explained 54.1% of the variance in perceived usefulness. However, media richness of teaching materials and self-efficacy explained 63.8% of the variance in perceived ease of use. Both perceived enjoyment and self-efficacy had the most significant effect on perceived usefulness and perceived ease of use regarding elearning. In line with McFarland's (2001) findings, this study supports the use of the TAM within an educational domain, and the research model has strong explanatory power in predicting students' usage and continuance intentions in an e-learning context.

In another study, Almobarraz and Farag (2009, pp.1098-1102) measured the perceptions and behaviour towards e-learning of students in a doctorate program in the Department of Library and Information in Imam Mohammed Ibn Saud Islamic University. Based on the TAM, the research variables included perceived usefulness, perceived ease of use, and attitudes. Of the 16 questionnaires that were distributed, 13 were returned giving a response rate of 81.25%. The findings revealed that the participants had a positive attitude toward implementing e-learning in higher education. Students found the e-learning system easy to use and useful. However, usefulness was the main factor that motivated students to use the e-learning system.

In South Korea, Lee, Yoon and Lee (2009, pp.1320-1327) studied students' adoption of e-learning based on an integrated model that incorporated constructs from the TAM, flow theory and service quality. The proposed model consisted of four independent variables (instructor characteristics, teaching materials, design of learning contents and playfulness), two belief variables (perceived usefulness and perceived ease of use), and one dependent variable (intention to use e-learning). Data were collected using a questionnaire. Of the 250 distributed questionnaires, 214 responses were returned which represented a 85.6% response rate. To test the research model and the hypotheses, regression analysis was used. The findings showed that perceived usefulness was the main predictor of intention to use elearning, in line with the findings of Ong, Lai and Wang (2004) and Lee, Cheung and Chen (2005). Instructor characteristics and teaching materials were positively related to perceived usefulness whereas the design of the learning contents was positively related to perceived ease of use. This study used a comprehensive theoretical framework which was able to identify critical factors that influenced learners' adoption of e-learning in South Korea. The proposed model had high explanatory power (65.6%) compared with other models. Overall, the findings of this study provide additional support to the findings of other studies in the TAM domain conducted in various countries, especially in relation to the influence of the belief construct (perceived usefulness and perceived ease of use) on the intention to use elearning.

In Taiwan, Liaw et al. (2009, pp.488-491) investigated students' intention to use a medical information portal. This portal enabled students to access and discuss news, exchange opinions, discuss schoolwork and view announcements. Based on the TAM, the researchers tested the influence of computer self-efficacy and computer-related experience on perceived usefulness and perceived ease of use. An online questionnaire survey was administered to the students at one of the medical universities at central Taiwan. Only 112 complete and valid questionnaires were received. Pearson Product-moment Correlation was used to analyse the correlation of each variable while multiple step-wise regression was used to analyse which factor predicted perceived ease of use, perceived usefulness and behavioural intention. The findings revealed that perceived ease of use significantly predicted the perceived usefulness of the medical information portal. In addition, computer self-efficacy significantly predicted the perceived ease of use of this portal. Overall, computer selfefficacy, computer experience, perceived ease of use and perceived usefulness significantly predicted the intention to use the medical information portal.

In another study, Liu, Liao and Pratt (2009, pp.599-606) studied users' acceptance of using streaming media for e-learning based on an integrated model that incorporated the TAM, flow theory and media richness theory. Besides attitude, perceived usefulness, concentration and ease of use research variables, the researchers added e-learning presentation types (text-audio, audio-video, and text-audio-video) as

determinants of perceived usefulness and concentration. Students enrolled on a systems analysis and software development course at Chung Yuan University in Taiwan participated in this study and regression analysis was used to test the research hypotheses. The researchers found a strong relationship between e-learning presentation types and users' intention to continue using streaming media for e-learning. Therefore, the most media-rich presentation interface (text-audio-video presentation) generated a higher level of perceived usefulness and concentration than text-audio-based or audio-video-based presentations. The findings also showed that perceived usefulness and the attitude of the user were the main predictors of intention to use. Overall, the study supports the use of different combinations of media presentations, such as audio and video, to enhance users' acceptance of streaming media for e-learning.

Rouibah and Hamdy (2009, pp.1-19) considered factors that influenced instant messaging usage and user satisfaction based on an integrated model that incorporated the following constructs from the TAM, theory of flow and the innovation diffusion theory: perceived usefulness and perceived ease of use from TAM; curiosity from the theory of flow; compatibility from the innovation diffusion theory; and prior similar experience. The study revealed two types of usage: usage magnitude and socialisation. Data were collected via questionnaires from 609 students at Kuwait University and to analyse the data, SEM was used. The findings revealed that compatibility and prior similar experience had a direct effect on perceived ease of use. There was also a direct effect between compatibility and curiosity, perceived ease of use and curiosity. In addition, perceived ease of use indirectly mediated the effect of compatibility and prior similar experience on curiosity. There was also a direct effect between compatibility and perceived usefulness and between perceived ease of use and perceived usefulness. The strongest direct effect on usage magnitude came from curiosity. The findings also revealed that socialisation was driven by perceived ease of use and user satisfaction was driven by ease of use and compatibility. Overall, the proposed model explained 40% of variance in perceived ease of use, 40% of variance in curiosity, 46% of variance in perceived usefulness, 17% of variance in usage magnitude, 25% of variance in socialisation and 14% of variance in users' dissatisfaction.

In Jordan, Abbad et al. (2009, pp.4-7) identified the main factors affecting students adoption of an e-learning system. An extended TAM was developed to examine the influence of some of external factors on perceived usefulness and perceived ease of use. The proposed model included: subjective norms, self-efficacy, technical support, Internet experience, system interactivity, perceived usefulness, perceived ease of use, intention to use and actual usage. Of the 654 distributed questionnaires, 486 responses were returned which represented a 74.3% response rate. The proposed model was examined using structural equation modeling. The findings revealed that beliefs in usefulness and ease of use partially mediated the relationship between external factors (subjective norms, Internet experience, system interactivity, selfefficacy, technical support) and intention to use. Self-efficacy had the strongest indirect effect upon students' intention to use the e-learning system. However, system interactivity did not show any indirect role in influencing either intention to use or actual use of the system. The research model explained 75% of the variance in intention to use and 21% of the variance in actual use of the system. Overall, the model was highly successful in explaining the variance in intention to use the elearning system than it was in explaining actual use.

In an e-learning context, Sanchez-Franco (2010, pp.37-44) examined the influence of affective reactions in explaining WebCT acceptance. Based on the TAM, the proposed model included: perceived usefulness, perceived ease of use, flow and perceived affective quality. An online questionnaire survey was sent to the undergraduate students of the University of Seville in Spain. Using Partial Least Squares (PLS), the findings revealed that perceived usefulness and flow had significant impacts on behavioural intention whereas perceived ease of use had no significant impact on behavioural intention. Perceived affective quality had significant impacts on perceived usefulness, flow and perceived ease of use. In addition, the research variables accounted for 38.5% of the variance in behavioural intention which is comparable to the findings of earlier studies on the acceptance and use of educational technologies (e.g. Moon & Kim 2001). This suggests a need to explore other variables that might have an effect on students' adoption and use of WebCT. Overall, the proposed model was found significantly to predict behavioural intention to use the WebCT and provided strong support for the inclusion of perceived usefulness, perceived ease of use and flow in the TAM to develop a strong intention to use the WebCT.

Sánchez and Hueros (2010, pp.1632-1638) researched the factors that influenced the acceptance of a Moodle platform by university students in Spain. Using an extension of the TAM, the researcher tested the influence of computer self-efficacy and technical support on perceived usefulness and perceived ease of use. Using a questionnaire, 226 university students participated in this study while to analyse the data, principle components analysis and SEM were used. The findings showed that technical support had a direct effect on perceived usefulness and perceived ease of use and an indirect effect on attitude. Moodle usage was directly influenced by attitude and perceived ease of use. Overall, the proposed model explained 41% of the variance in system use which indicated the need to investigate other factors that might influence usage.

In the United Arab Emirates, Al-hawari and Mouakket (2010, pp.299-309) examined students' satisfaction and retention within the context of the use of a blackboard system. The study highlighted the significance of TAM factors in the light of some external factors (enjoyment and design features) on students' e-retention and the mediating role of e-satisfaction within the e-learning context. E-satisfaction "measures the degree in which users are both satisfied/dissatisfied and pleased/displeased with blackboard services" (p.301). Students' e-retention can be defined as the "degree to which users exhibit repeat behavior to the blackboard system, and possess a positive attitudinal and cognitive disposition" (p.303). A paperbased questionnaire was distributed to 720 undergraduate university students from different colleges in the university. Only 340 complete and usable questionnaires were received. Structural equation modeling was used to analyse the data and test the research hypotheses. The findings revealed that perceived usefulness had a direct and positive relationship with students' e-satisfaction and e-retention while perceived ease of use had only a direct relationship with students' e-retention. Design features and enjoyment had only a significant relationship with students' e-satisfaction. Students' e-satisfaction had a direct relationship with students' e-retention. Overall, the research model explained 69% of the variance regarding e-retention.

Using an extension of the TAM, Alenezi, Abdul Karim and Veloo (2010, pp.22-32) investigated the role of enjoyment, computer self-efficacy, computer anxiety and Internet experience in influencing students' intention to use e-learning in Saudi universities. Of the 480 questionnaires that were distributed at five governmental universities, 408 were returned, giving a response rate of 85%. To test the proposed hypotheses, three analysis techniques were used. These included: stepwise regression analysis, hierarchical regression analysis and product-moment correlation analysis. The findings revealed that enjoyment, computer anxiety and computer self-efficacy significantly influenced students' intention to use e-learning while Internet experience was insignificant in influencing the intention to use. This study confirmed the importance of attitude in mediating the relationship between beliefs and the intention to use, which are consistent with the findings of Klobas and Clyde (2000) and van der Heijden (2003).

In another study, Afari-Kumah and Achampong (2010, pp.1-12) examined the computer usage intentions of students in tertiary institutions in Ghana. Based on the TAM, the researchers examined the influence of age, the level of the student and prior experience with computers on perceived usefulness and perceived ease of use. Thus, the proposed model included: prior experience, student background, perceived ease of use, perceived usefulness, attitude and behavioural intention. Of the 250 distributed questionnaires, 185 responses were returned which represented a 74% response rate. Multiple regression analysis was used to determine the extent to which dependent variables were predicted by independent ones. The findings revealed that external variables (age, level of student and prior computer experience) did not significantly influence the students' perception of usefulness. However, prior experience with computers significantly influenced perceived ease of use. Contrary to the findings of other studies, this study found students' attitude did not significantly influence behavioural intention.

Based on the TAM, Jan and Contreras (2011, pp.845-849) investigated critical factors which influenced engineering students' acceptance of an Academic Administrative Information System (AAIS) in private universities in Lima, Peru. The proposed research model consisted of perceived ease of use, perceived usefulness, perceived compatibility, attitude, subjective norm and intention to use the AAIS. Data were

collected via questionnaires from 89 students in two private universities. Through the correlation of variables, the findings confirmed the influence of perceived usefulness and subjective norm on attitude toward technology. It also confirmed the following relationships: perceived usefulness with subjective norm; perceived usefulness with behaviour intention; and attitude with behaviour intention. However, the results did not confirm the influence of perceived ease of use and perceived compatibility on attitude toward technology.

In an e-learning context, Abbad (2010, pp.25-35) identified the main factors influencing students' intention to adopt a Learning Management System (LMS). Group interviews were conducted with fifty two students at the Arab Open University (AOU) in Jordan. Content analysis was used to analyse the qualitative data obtained from the group interviews. Based on literature concerning IT systems' acceptance and prior studies that had applied the TAM, the main categories used to analyse the data were: ease of use, perceived usefulness, subjective norms, prior Internet experience, system interactivity, self-efficacy and the availability of technical support. The findings revealed that the main constructs of the TAM model and the five external factors explained students' intention to use e-learning systems. Students' Internet experience, for example, influenced students' adoption of an e-learning system through perceived usefulness and perceived ease of use. The findings also showed that students who had strong subjective norms had greater motivation to use the e-learning system. Technical support (e.g. training and support) was found to have an effect on intention to use.

Similarly, in German, Friedrich and Hron (2010, pp.63-73) investigated critical factors that influence students' acceptance of e-learning system in secondary schools. Based on the TAM, the proposed model included: personal variables (gender, computer related self-efficacy, computer related attitude) and technology related variables (perceived usefulness and perceived ease of use). Data were collected via questionnaires from 125 students (in years 11 and 12) from eight high schools in January and July 2005. Regression analysis was used to examine the relationships between the independent variables (personal variables and technology related variables) and students' acceptance of the e-learning system. The findings revealed that perceived usefulness was a significant positive predictor of students' acceptance

of the system, whereas personal variables and perceived ease of use had no influence on acceptance. Overall, the proposed model accounted for 51% of the variance in intention to use e-learning which is compatible with the findings of previous TAM studies, such as those of Wangpipatwong (2008) and Tseng and Hsia (2008).

In another study, Abbasi et al. (2011, pp.30-45) examined the acceptance behaviour of individuals regarding the Internet within the context of educational institutions. An extended version of the TAM was developed; this included subjective norms, perceived usefulness, perceived ease of use, government support, institute support and moderating factors (voluntariness and experience). A cross-sectional survey was adopted to gather data from academics working in higher educational institutes in Of the 953 questionnaires distributed, only 380 completed and valid Pakistan. Data were analysed using Structural Equation questionnaires were received. Modeling (SEM). The findings revealed that the research model with moderating factors showed a higher explanatory power in comparison to the model without the moderating factors. The impact of government and institute support were both significant on perceived usefulness as well as on behaviour usage. The results also show that perceived usefulness was found to be the most important construct in terms of Internet acceptance.

In their study, Šumak *et al.* (2011, pp.91-98) investigated factors that affected the acceptance and use of an e-learning system, namely Moodle. Based on the TAM, the proposed model included: perceived ease of use, perceived usefulness, attitude toward using an e-learning system and behavioural intentions. Using an online questionnaire, data were collected from 235 students in the Faculty of Electrical Engineering and Computer Science at the University of Maribor. The proposed research model and research hypotheses were tested using confirmatory factor analysis and Structural Equation Modeling (SEM). The findings revealed that the actual use of Moodle depended on two main factors: behavioural intentions and attitudes toward using Moodle. Consistent with the findings of other researchers, such as Pan *et al.* (2005) and Lee (2006), perceived usefulness was found to be the most important predictor of attitudes regarding the use of Moodle.

In Spain, Escobar-Rodriguez and Monge-Lozano (2012, pp.1085-1093) investigated university students' perceptions concerning the use of the Moodle platform, together with factors that influenced their intention to use it. Based on the TAM, the researchers examined the influence of training, perceived usefulness for professors and perceived compatibility with students' tasks on perceived usefulness and perceived ease of use. Data were collected via questionnaires from 162 students of business administration in a Spanish public University. The findings revealed that perceived usefulness had a significant positive relationship with intention to use Moodle. This is consistent with the findings of other researchers, such as Pan et al. (2005), Lee (2006) and Šumak et al. (2011). A significant relationship was also found between perceived compatibility with students' tasks and perceived ease of use. The findings also showed that student perceptions regarding the usefulness of the Moodle platform for teachers had a significant relationship with perceived usefulness and intention to use the platform. Training positively influences perceived usefulness, but no significant relationship was found between training and perceived ease of use. Overall, the addition of three external variables in this study provides insight into those factors that contributed to an intention to adopt the Moodle. Overall, the proposed model accounted for 47% of the variance in intention to use the platform.

## 3.4.2.3 Summary critique of TAM-related studies

A large number of studies concerning technology acceptance have been carried out in developed countries (e.g.Sanchez-Franco (2010); Daim *et al.* (2011); Escobar-Rodriguez & Monge-Lozano (2012)). At present there are few studies that consider technology acceptance in developing countries, especially in Arab countries (see Appendix 6).

In educational context, most TAM studies considered university students' acceptance of educational technologies. For example, Moon and Kim (2001), Sun *et al.* (2008), Chuang, Hsieh & Ho (2009), Ahmed (2010), Chigona and Dagada (2011), Vu, Nguyen and Lin (2011), Escobar-Rodriguez and Monge-Lozano (2012).

Two important constructs that have received very little attention in the context of TAM research are social influence and gender (Venkatesh & Morris 2000, p.116), yet these two constructs could play an important role in determining how users make

decisions about whether or not to adopt and use new technologies and, as such, are critical to gaining an understanding of user acceptance. Gefen and Straub (1997), Al-Gahtani (2008) and Friedrich and Hron (2010) examined gender effects in the context of the Technology Acceptance Model. On the other hand, Karahanna and Straub (1999), Mao and Palvia (2006), Lee (2006), Roca, Chiu and Martinez (2006), Pan *et al.* (2005), Sivo, Pan and Hahs-Vaughn (2007), Wang and Wang (2009), van Raaij and Schepers (2008), Abbad, Morris and Al-Ayyoub (2008), Al-Ammari and Hamad (2008), Karaali, Gumussoy and Calisir (2010), Yuen and Ma (2008), Lee, Hsieh and Ma (2011) focused on social influence in the adoption of technology. Burdwell (2006) considered both social influence and gender when examining factors associated with the actual use of group decision support systems (GDSS). Similarly, Al-Ammary (2010) examined the influence of both gender and subjective norms on computers acceptance.

A number of researchers constructed their models based on a range of theoretical models. For example, Mao and Palvia (2006) used TAM, TRA and IDT models to study employees' acceptance and use of e-mail in China. Abdalla (2007) incorporated the TAM and the technology effectiveness model (TEM) to evaluate the effectiveness of an e-blackboard instructional platform system. Wang and Wang (2009) used the TAM and DeLone and McLean's information system success model to study instructors' adoption of web-based learning. In Hong Kong, Lai (2008) integrated the TAM and expectation confirmation theory in order to examine the influence of technology on employee behaviour. Liu, Liao and Pratt (2009) used the TAM, flow theory and media richness theory to investigate users' acceptance of using streaming media for e-learning. Rouibah and Hamdy (2009) used the TAM, IDT and theory of flow to determine factors that influenced instant messaging usage and user satisfaction. Pynoo et al. (2011) assessed which factors influenced secondary school teachers' acceptance of a digital learning environment (DLE) using Unified Theory of Acceptance and Use of Technology (UTAUT). Similarly, Chen (2011) integrated educational compatibility with the UTAUT to examine the effects of technological expectancy and educational compatibility on students' e-learning acceptance. In South American context, Maldonado et al. (2011) added the "e-learning motivation" construct to the UTAUT in order to examine the role of e-learning motivation in the use and adoption of e-learning systems. Based on the Theory of Planned Behaviour

(TPB), Dartt (2011) investigated teachers' attitudes toward the use of technology for instruction.

A number of studies extended the TAM by examining the influence of external variables on perceived ease of use and perceived usefulness. For example, Igbaria, Guimaraes and Davis (1995) extended the TAM by investigating the impact of certain external factors (individual characteristics, organisational characteristics, and system characteristics) on technology acceptance. In another study, Burton-Jones and Hubona (2006) tested the direct effect of system experience, the level of education and age on usage behaviour and their indirect effects through perceived usefulness and perceived ease of use. Tseng and Hsia (2008) examined the influence of internal locus of control and computer self-efficacy on perceived usefulness and perceived ease of use of an e-learning system. In Singapore, Teo (2009) examined the influence of computer-self efficacy, technological complexity and facilitating conditions on perceived usefulness and perceived ease of use. Furthermore, Karaali, Gumussoy and Calisir (2010) extended the TAM by investigating the impact of anxiety, social influence and facilitating conditions on acceptance of a web-based learning system. Al-Ammary (2010) extended the TAM by examining the influence of subjective norms, computer anxiety, previous experience, motivation, education and income on the acceptance and use of computers by elderly people in the Kingdom of Bahrain. In Taiwan, Lee, Hsieh and Ma (2011) examined the influence of subjective norm, organisational support, management support, task characteristics, individuals' experience with computers, and computer self-efficacy on perceived usefulness and perceived ease of use. In Iran, Ataran and Nami (2011) extended the TAM by investigating the impact of job relevance, subjective norm and education on perceived usefulness and perceived ease of use. In Vietnam, Vu, Nguyen and Lin (2011) examined the influence of self-efficacy, computer anxiety, Internet connect quality, Internet access convenience, didactical methods and language capability on perceived usefulness and perceived ease of use. In the context of the Moodle platform, Escobar-Rodriguez and Monge-Lozano (2012) extended the TAM by adding three external variables to study university students' use of the Moodle.

Most of the aforementioned studies used a questionnaire survey to examine learners' adoption of technology and to identify which key factors influenced this adoption.

However, other researchers have used a mixed method approach (both quantitative and qualitative approaches) to studied users' acceptance of technology. For example, Almquist (2006) studied the adoption and use of electronic information resources by automotive service technicians through interviews, observation and a survey Both quantitative (questionnaire) and qualitative (in-depth phone instrument. interviews) methods were employed by Albirini (2004) to examine the attitude of EFL teachers in Syrian high schools towards the use of ICT in education. In Africa, Totolo (2007) used a mixed method design to examine the perceptions of school principals regarding the use of computer technology in school. Similarly, Shin (2010) used a mixed method approach to investigate the main factors that influence teachers' use of ICT in Korean schools. A triangulated, mixed method design was used by Fanning (2011, pp.11-42) to study the adoption and use of online programs in a school district in South Carolina. Data were gathered from students and teachers through a survey and focus group interviews collected within the same time frame; thus, the researcher chose a concurrent mixed research approach.

Furthermore, some comparative studies examined users' acceptance of IT in different parts of the world. For example, Gefen and Straub (1997) examined the effect of gender on perception and use of e-mail in three continents (North America, Asia and Europe). Rose and Straub (1998) studied IT diffusion in the Arab region (Jordan, Egypt, Saudi Arabia, Lebanon and Sudan) while Teo, Su Luan and Sing (2008) used a two country sample from Singapore and Malaysia to examine the intentions of pre-service teachers to use computers. Kucuk and Arslan (2001) used the TAM to examine and compare attitudes toward the acceptance of Web Marketing Facilities (WMF) in Britain, Denmark and Turkey. Based on the TAM, Park *et al.* (2009) examined factors that influenced users' adoption of a digital library system using data from a number of institutions in Asia, Africa and Central/Latin America. Arenas-Gaitán, Ramírez-Correa and Rondán-Cataluña (2011) examined cultural differences and technology acceptance regarding students from two universities, one from Spain and the other from Chile.

As mentioned earlier, the majority of studies reviewed concern students' acceptance of educational technology in higher education institutions; however, there are some studies of the non-student population. For example, Nink (2004) identified the main factors that influenced teachers' perceptions of the Internet. In Hong Kong, a longitudinal study was conducted by Hu, Clark and Ma (2003) to examine the technology acceptance and decision-making of individual teachers before and after an intensive training program on Microsoft PowerPoint. In addition, Holden and Rada (2009) and Watts (2009) investigated the main factors that influenced school teachers' acceptance and usage of educational technologies. Teo, Su Luan and Sing (2008) examined the intentions of pre-service teachers to use computers, whereas Wang and Wang (2009) studied instructors' adoption of a web-based learning system. Similarly, Charbaji, Al-Hajhouj and Beyruti (2006) examined the intentions of university teachers to use WebCT. Al-Ammary (2010) investigated factors affecting the acceptance and use of computers by elderly people in the Kingdom of Bahrain. In the USA, Jones and Bartlett (2009) studied factors that influenced career and technical education (CTE) teachers' integration of technology in the teaching and learning process. Based on the TAM, Al-Busaidi and Al-Shihi (2010) examined instructors' acceptance of a Learning Management System (LMS). Similarly, Waheed (2010) examined instructors' acceptance of a web-based learning system based on the TAM. In Turkey, Teo, Ursavaş and Bahçekapili (2011) investigated the factors that drove pre-service teachers' intention to use technology based on the TAM. Based on the TAM, Chigona and Dagada (2011) identified factors that influenced the adoption and use of e-learning by lecturers at Wits University in South Africa while Ataran and Nami (2011) identified the main factors that influenced high school teachers' technology acceptance decisions in Iran. In a secondary education context, Smet et al. (2012) identified the critical factors that influenced the acceptance of Learning Management Systems (LMS) by secondary school teachers.

## 3.4.3 Factors influencing the acceptance of technology

Based on the reviewed literature, a variety of factors have been found to affect the acceptance and usage of technology. For example, Fung and Yuen (2005, p.16) summarised the major factors affecting technology acceptance and usage from a number of key authors in the field. These are as follows: resistance to change, perceived usefulness and perceived ease of use, computer self-efficacy, attitude, motivation, prior experience, lecturers' involvement, and mandatory versus voluntary use. In addition, an individual student's demographics, learning style, particular life

characteristics, access to the necessary technical resources, past experience with the technology, and the need for interaction and Internet connectivity, are all likely to have a role in a student's adoption of technology.

Similarly, Koohang (1989, p.137) stated that: "one factor in the successful implementation of computers in the classroom is user acceptance, which may be influenced a great deal by users' attitudes". Attitudes, chiefly positive ones, are assumed to be "fundamental in the acceptance, implementation and success of new technologies" (Spacey, Goulding & Murray 2003, p.65). In addition, Munger and Loyd (1989, p.167) argued that students with positive attitudes to computers were better at using them than students with more negative attitudes. Moreover, it has been shown that positive attitudes enhance the knowledge, performance and creativity of computer users; negative attitudes, on the other hand, have the opposite effect, hindering the use of the computer as a technological tool for learning (Al-Jabri 1996, p.70).

Furthermore, Woodrow (1991, p.165) has noted that monitoring the attitudes of teachers and students is important if the utilisation of the computer as a learning and teaching tool is to be maximised. Similarly, Liaw, Huang and Chen (2007, pp.1067-1069) argue that users' attitudes are a key factor affecting the usage of IT. Thus, when users' attitudes regarding an e-learning system become more positive, they will have greater intention to use the system, no matter how advanced the technology or the system. Therefore, understanding teachers' and learners' attitudes towards educational technologies helps decision makers to make learning more effective and interesting (Liaw, Huang & Chen 2007, p.1077).

There are indications that a lack of experience with computers increases the likelihood that an individual will hold less positive attitudes towards computers. Abouchedid and Eid (2004, p.25) found that individuals who had computer experience were more likely to have favourable attitudes towards e-learning than inexperienced individuals. Waheed (2010, p.1267) supported this contention. Further, Ong and Lai (2006, p.825) found that computer self-efficacy was a significant determinant of perceived usefulness and perceived ease of use for both men and women. In other words, users who have a higher computer self-efficacy are likely to have more positive usefulness

and ease of use beliefs. Sanders and Morrison-Shetlar (2001, p.259) noted that "as the gap between levels of computer experience becomes smaller and smaller among students, improvement in student attitudes toward web-based instruction will be observed". Students like the interactive element of using computers and perhaps it is this aspect that would be most beneficial for designers to consider in the development of computers as a learning tool.

People's perceptions reflect their social experiences with significant others, including parents, teachers and peer groups. Parents and teachers, both as role models and as "important socialisers, play an important role in socialising boys and girls to have different expectations and values regarding various school subjects" (Shashaani 1997, p.39). Peer influence is critical in the lives of teenagers (Focus Adolescent Services, 1999) and students' peers play an important role in encouraging students to accept a new system (Martins & Kellermanns 2004, p.21).

Motivation is another factor that is considered to affect a user's acceptance of technology and there are two main classes of motivation: extrinsic and intrinsic (Venkatesh 2000, p.348). In 1992, Davis, Bagozzi and Warshaw tested a motivational model of technology usage. The researchers compared the influence of extrinsic (perceived usefulness) and intrinsic (enjoyment) motivation on intentions to use computers in the workplace (pp.1112-1124). The study revealed that people's intentions to use computers in the workplace are influenced mainly by their perceptions of how useful the computers are for improving their job performance, and then by the degree of enjoyment they experience in using them.

Furthermore, children learn in different ways and, according to Gardner's theory, there are seven intelligences (seven learning styles). These are: verbal/linguistic, logical-mathematical, visual/spatial, bodily-kinesthetic, musical, interpersonal and intrapersonal (Shiratuddin & Landoni 2000, p.1703). Therefore, the design of an e-book should take into account the diversity and attitudes of each user, particularly when designing for young children. Kim, Liu and Bonk (2005, p.337) supported this argument and reported that e-learning is not for everyone. Thus, in order to increase the number of students involved in online courses, different learning styles need to be addressed.
Moreover, three factors that influence teachers' decisions regarding the use of technology in the classrooms were identified by Wiske *et al.* (1990, p.38). These included: (1) teachers' knowledge of computers, (2) access to necessary resources and support, and (3) incentives that encourage or discourage the use of technology in the classroom.

On the other hand, Becker (2000, p.53) found six factors affecting how students experienced computers in school: These were:

- (1) The availability of computers in the classroom,
- (2) Teachers' computer expertise,
- (3) Teachers' philosophy and objectives for computer use,
- (4) The collaboration and leadership of teachers,
- (5) Teachers' judgments regarding the ability of their classes, and
- (6) The school's level of socioeconomic status (SES).

Similarly, Selim (2007, p.409) specified the critical factors affecting the adoption of e-learning as perceived by students at the United Arab Emirates University. These included:

- Student characteristics (computer competency, interactive collaboration, and elearning course content and design);
- (2) Teacher characteristics (attitude towards and control of the technology, and teaching style);
- (3) Technology (ease of access and infrastructure);
- (4) Support.

These factors were perceived by the university students who participated in the study as critical determinants of e-learning acceptance.

In summary, measuring users' acceptance and usage of technology is important and, according to Davis, Bagozzi and Warshaw (1989), it must be examined over a length of time rather than just as a cross-sectional snapshot (Venkatesh, Morris and Ackerman (2000, p.34). Understanding factors that influence the intention to adopt e-learning will help to create a more favourable environment for more effective

adoption; this will also help in designing strategies to encourage acceptance (Ndubisi 2004, p.253).

#### **3.5** Barriers that hinder the adoption of an e-learning system

The level of e-learning adoption in developing countries is different from that in developed countries because of a lack of facilities such as infrastructure, technology, low connectivity and low levels of training (Dadzie 2009, p.207). The next section includes the main obstacles that influence the acceptance of online learning from the perspective of both teachers and students.

#### 3.5.1 Teachers

Siemens and Yurkiw (2002, pp.132-136) argued that the greatest determinant of student success is the teacher. Students rely on the teacher to be an anchor, especially students who are new to an e-learning environment. Therefore, teachers should be willing to try new techniques, new resources, and new modes of delivery. However, a number of barriers were found in the literature to influence teachers' adoption of new technology.

One of the main problems regarding the introduction of e-learning is the skills, knowledge and ability that teachers and students need to acquire in order to cope with an e-learning environment. Teachers need to be competent, well trained, and able to deal with e-learning resources (Abbas (2002, p.34), Alsaygh (2005, p.38) and Wefki *et al.* (2010, p.636)). Jones (2003, p.3) states that "no matter what educational systems mandate and expect, in the end, effective learning is very dependent on the competence and will of the teacher". Therefore, e-learning demands new skills from both teachers and students (Vrana *et al.* [n.d.], p.3) and thus all teachers need to be familiar with e-learning and competent in the use of ICT.

Furthermore, Selim (2007, p.398) highlighted the importance of teachers having control over IT and being able to perform basic troubleshooting tasks. In addition, Drent and Meelissen (2008, p.195) note that a lack of ICT competence is an obstacle for the further integration of ICT into education. Wefki *et al.* (2010, p.636) found that secondary school teachers in Kingdom of Bahrain have inadequate skills in managing

e-classroom. Soong *et al.* (2001, p.106) argue that, if teachers have inadequate skills, they will not make effective use of online resources.

The issue of teachers' confidence in their ICT competence is a major factor in integrating technology into teaching; this is also reported in other studies. For example, Mooij and Smeets (2001, p.266) state that: "if teachers are not confident in their ability or competence to handle computers, this may hamper their willingness to introduce technology into their classroom". Shields and Behrman (2000, p.20) also found that a key factor affecting teachers' use or non-use of technology was their degree of confidence that the available software or Internet content could be effective in enhancing the curriculum, consistent with their teaching philosophy. With computer competence, teachers' anxiety decreases and their attitudes towards computers improve with hands-on computer literacy courses (Muir-Herzig 2004, p.115). Lal and Al-Gendi (2010, p.57) also found in their study that young teachers (with less than five years' work experience) were more highly motivated to use educational technology than older teachers who had spent many years using traditional teaching methods.

A three year grant given by the Australian Research Council (ARC), as described by Forgasz (2006, pp.77-90), was used to determine factors that secondary teachers consider encourage and/or discourage the use of computers in their mathematics classes. It was found that the three most frequently mentioned encouraging factors in 2001 and in 2003 were related to software, access to the hardware, and teachers' skills and confidence. Teachers' confidence, experience, skills and/or enjoyment of computers comprised the third most important factor in 2001 (32%) and was ranked second in 2003 (37%). Student enjoyment was mentioned by a higher proportion of teachers in 2003 than in 2001 (23% compared to 8%), while factors such as being encouraged by the school (e.g., by mathematics coordinators or others), and technical support, were also considered important by some. This set of encouraging factors and the relative rankings are similar to those reported by computer users in Zammit's study (1992, p.58). These included, as the five top-ranked categories: access to computers, the availability of software, teacher's self-motivation to stay up-to-date, the need for students to learn to use technology, and the existence of a supportive computer coordinator. However, access to computers and/or computer laboratories

was the most prevalent inhibiting factor, according to 60% of the teachers who responded to the item in 2001, and according to 67% in 2003. In 2001, the perceived need for professional development, technical problems, lack of technical support, and old equipment were ranked equal second as discouraging factors by 31% of the teachers. In 2003, professional development issues, as well as time related issues, were ranked equal second as inhibitors to computer use by 22% of the teachers. Therefore, the findings of this study direct attention to areas that require further study in order to enable teachers to use computers more in their teaching. In particular, greater access to hardware, more technical support, the availability of high quality software, and ongoing professional development were the most significant issues identified by the teachers.

Barron and Goldman (1994, p.85) found that teacher education (in-service and pre-service), and support for teachers throughout the entire restructuring process, were very important if any effort to restructure was to be successful. Furthermore, Ball 1990 and Lortie 1975, as quoted in Barron and Goldman (1994, p.85), argued that "teachers tend to teach as they were taught", and "very few teachers have experienced as students the environment envisioned for the restricted classroom".

In Syria, Albirini (2004, p.127) investigated high schools teachers' attitudes towards the use of ICT in education. The study considered mainly the perceptions of EFL (English as a Foreign Language) teachers. Using a mixed method approach, the researcher found that the major obstacles that influenced teachers' attitudes toward ICT were: low level of computer competence, lack of time, lack of computer resources and lack of training.

In the United States, Brown-Joseph (2010, p.119) explored the main barriers that prevented elementary and high schools teachers from integrating technology into the curriculum. The researcher found that lack of time, lack of training, lack of support and a need for more hardware and software were the most frequently cited barriers.

Therefore, teachers need to train and develop their skills outside of the regular school day so they can concentrate on instruction and training objectives. Shields and Behrman (2000, p.22) state that, in order for teachers to make informed decisions about using technology to enhance student learning, they must be provided with

training. By having training, teachers will know what software applications and technology-supported practices are available which might be appropriate for their classes, and how they can be integrated effectively into the curriculum.

Similarly, Aldhafeeri, Almulla and Alraqas (2006, pp.711-726) carried out a study in order to investigate school teachers' perceptions regarding the impact of e-learning on the public education system in Kuwait. They found that providing teachers with computer training and knowledge about the implications of e-learning for education was an important element for such learning to be successful.

Training and support within a school district may not always be planned or may not meet the needs of the teachers. Teachers, like other professionals, need technical support to maintain the hardware and troubleshoot glitches with software (Shields & Behrman 2000, p.23). Therefore, technical support is critical and e-learning will not succeed if technical support is lacking (Selim (2007, p.399) and Al-Muneea (2008, p.36)). Technical support is needed to maintain computers and to provide help and support to a system's users. Condie and Livingston (2007, p.346) also argued that teachers need to be supported in ways that benefit both students and teachers.

In a country of the Gulf, Schoepp (2005, pp.1-10) investigated what faculty members at U.A.E. University perceived to be barriers in their attempts to integrate ICT into their teaching. The researchers found that the most cited barriers were the faculty's skills and having an inadequate reward structure. Lack of training, lack of program standards, and lack of technical support were other barriers that influenced the integration of technology.

Similarly, in girls' colleges in Saudi Arabia, Almuqayteeb (2009, pp.144-145) identified the main barriers that influenced female faculty members' use of computer technology in teaching. The findings revealed that the barriers that limited teachers' use of technology were lack of technical support, lack of administrative support, lack of effective training, lack of time, lack of software, and lack of equipment and infrastructure.

Delay in receiving responses is one of the weaknesses of online learning, as noted by Song *et al.* (2004, p.61). In Vonderwell's (2003, pp.83-84) study, the researcher reported that the lack of a "one-on-one relationship" with the instructor and delays in receiving immediate feedback were disadvantages in terms of online learning. In addition, Hamad (2008, no page number) listed a number of difficulties and obstacles which hindered the implementation of e-learning in a higher education system. Among these were:

- Low levels of computer literacy and English language capability of both staff and students;
- Lack of skilled personnel, inadequate support, resistance to change, skill shortages;
- Inadequate telecommunication infrastructure (network and electricity);
- Lack of effective mechanisms for accountability and evaluation;
- Lack of qualified teachers with technical skills.

Another study was conducted by Hamzah, Ismail and Embi (2009, p.379) who examined the impact of technology change on teachers and students of Islamic Education in Malaysian Smart Schools. The major barriers identified by teachers and students were: lack of training, lack of computers and available resources, time constraints, the pressure of a heavy syllabus and examination-centred learning.

At the University of Ghana, Dadzie (2009, p.211) explored the perceptions of faculty towards an e-learning system. The researcher found that some problems were experienced by faculty when accessing the Internet. These included: lack of computers, network overload, lack of time, unfamiliarity with technology and slow networks.

Lack of time was found to be another major barrier to the use of ICT in school placements (Galanouli & McNair 2001, p.402). Teachers have found that the use of ICT, both for training and teaching, requires a significant investment in terms of time. A similar result was found by Means, Olson and Singh (1995, p.72) who reported that teachers need time to design activities, to try them out, and to gain feedback regarding their strengths and weaknesses. In the USA, Smerdon *et al.* (2000) found that

teachers reported, as the major barriers, a lack of release time to learn how to use computers or the Internet (82%), lack of time in the daily schedule for students to use computers in class (80%), and insufficient numbers of computers (78%). Similarly, Al-Senaidi, Lin and Poirot (2009, p.583) found that lack of time and lack of institutional support were the two main obstacles that prohibited faculty members from adopting technology in Oman.

Furthermore, the introduction of ICT in schools has encountered significant problems related to the attitudes of teachers who are responsible for its use in the classroom (Demetriadis *et al.* 2003, p.20). Bullock (2004, p.233) argued that teachers' attitudes are a major enabling/disabling factor in the adoption of technology. Similarly, Kersaint *et al.* (2003, p.560) noted that teachers who believe a technology is more important tend to be those who are more comfortable with using it and usually incorporate it into their teaching. In fact, the success of any new educational programme depends strongly upon the support and attitudes of the teachers involved (Woodrow 1992, p.216).

It has been shown in recent studies that, if educational technologies are to be successfully implemented, the attitudes of educators, who will determine how such technologies are used in the classroom, are of great importance (Albirini 2006, p.3). Therefore, teachers play a significant role in students' learning processes and, as Sun et al. (2008, p.1194) noted, teachers with negative attitudes toward e-learning will not expect to have students with high levels of motivation toward this type of learning. Similarly, Baylor and Ritchie (2002, p.398) stated: "regardless of the amount of technology and its sophistication, technology will not be used unless faculty members have the skills, knowledge and attitudes necessary to infuse it into the curriculum". Therefore, teachers are the most important agents of change (Albirini 2006, p.2) and, according to Griswold, quoted by Woodrow (1992, p.202), "negative teacher attitudes promote a resistance to learning about computers and influence the acceptance and use of technology in the classroom". Wiske et al. (1990, p.39) reported that a number of teachers do not believe that technology will significantly improve education. Therefore, uncertainty and a lack of understanding about educational changes that are imposed on teachers lead to resistance to change (Hamzah, Ismail & Embi 2009, p.381).

Grey (1999, p.17) argued that teachers who work in a computer room feel more stressed than teachers who work in a more conventional classroom. According to Hannafin and Savenye (1993, p.27), fear is often cited as a reason which prevents teachers from using any form of technology in the classroom. Therefore, the avoidance of new technologies by certain individuals indicates the existence of technophobia, as pointed out by Brosnan (1998, p.10).

Technophobia has been defined as:

(a) anxiety about current or future interactions with computers or computer-related technology; (b) negative global attitudes about computers, their operation or their societal impact; and/or (c) specific negative cognitions or self-critical internal dialogues during actual computer interaction or when contemplating future computer interaction (Rosen & Weil 1990, p.276).

In their study, Condie and Livingston (2007, p.345) found that "some teachers may feel threatened by changing from whole-class teaching to supporting groups of students learning on their own. Others may fear a loss of identity and control of the students and be unsure about how or when to intervene". Alabady (2002, p.23) and Bamefleh (2006, p.23) support this contention.

Overall, teachers who have fears and negative attitudes about technology will not be confident role models when they attempt to teach their students about computers and their use. Thus, they will create a new generation of technophobic adults (Rosen & Weil 1995, p.27). Furthermore, Zhao and Cziko (2001, p.27) noted three conditions that are necessary for teachers to be able to use technology to its best effect:

- Effectiveness: they must believe that technology can achieve or maintain higher goals than had previously been attained;
- Disturbance: they must believe that using technology will not cause disturbances to other higher level goals that they evaluate as more important than the one being maintained;
- Control: they must believe that they are able to use technology and that they have the resources to accomplish this.

In addition, Hadley and Sheingold (1993, p.283) reported a set of barriers to computer use identified by teachers. These included: lack of appropriate software or information about it; teachers' doubts or knowledge about computers; inadequate administrative support; inadequate numbers of computers; and a lack of maintenance, support, advice and upkeep.

Aduwa-Ogiegbaen and Iyamu's study (2005, p.104) examined the major obstacles facing the use of ICT in secondary education in Nigeria. As the major blocks to the adoption of ICT, it identified: the high cost of computer hardware and software; weak infrastructure; lack of human skills and knowledge in ICT; and a lack of relevant software that was appropriate and culturally suitable to Nigeria.

In Virginia, Stamey (2011, p.104) explored teachers' perceptions regarding the use of the Internet in classroom education. The researcher found that teachers complained about the slowness of the Internet and lack of computer access. They were worried about students who did not have complete Internet access at both home and at school.

#### 3.5.2 Students

From the perspective of students, Siemens and Yurkiw (2002, p.138) argued that most students have the ability to do well in an e-learning environment. Prensky (2003), as quoted in Condie and Livingston (2007, p.346), described students as "digital natives" while teachers were described as "digital immigrants". In other words, students are more likely to use technology at home and accept it as part of their wider culture than their teachers. However, many students do not succeed because of barriers that delay students' interaction with course material. In their study, Abuhamdieh and Sehwail (2007, p.44) found that difficulty in logging into the campus portal was one of the barriers that influenced students' acceptance of the portal and its modules. Therefore, if students are unable to make the technology work and do not receive support, they will give up (Alexander 2001, p.246). Students must be convinced of the benefits of e-learning, must enthusiastically support its introduction, and must be able to function in the new environment if any educational transformation is to succeed. In other words, students have a key role to play in the success or failure of any system.

As noted by Hamid (2002, p.314), in an e-learning environment, a student "is prone to frustration because of the technical skills required, the isolation, and because an online class lacks the built-in conventions of the traditional classroom". In addition, Vrana *et al* ([n.d.], p.8) argued that support and training are vital in encouraging students' positive attitudes and in removing their anxieties.

Furthermore, Al-Khashab (2007, p.12) listed a number of disadvantages of e-learning. These included: cost, developer limitation, access capabilities, Internet connection speed/bandwidth, and learners' motivation. The author added that not all content is suitable for e-learning and the loss of the physical presence of teachers may influence some learners. Lack of content in a native language is another problem faced by e-learners, as pointed out by Sehrt (2003, p.46) and Weber (2009, p.96).

In Nigeria, Folorunso, Ogunseye and Sharma (2006, p.496) investigated the critical factors affecting the acceptability of e-learning as perceived by university students. The results showed that lack of awareness, low computer literacy levels and cost were identified as the most critical factors affecting students' acceptance of e-learning.

Maynard and Cheyne (2005, p.112) found that although electronic textbooks were helpful in assisting in teaching and learning, some factors hindered their acceptance. For example, schools might be unable to afford computer equipment and some titles from publishers might be subject to limited availability. As with the previous studies, Galanouli and McNair (2001, p.402) found that the lack of appropriate equipment was another major barrier to students' use of ICT in their school.

Tarragó (2003, p.289) highlighted an important issue that needs to be considered by decision makers; this is user privacy which, the author argues, is a key issue in developing learning portals for schools. Students' activities, files and their interactions with teachers are their intellectual property and no one should be allowed to access their work, ideas and feelings without permission.

In one of the developing countries, Bada and Khazali (2006, pp.1-2) presented the perceptions of the public and education service providers, as well as those of students at seven higher educational institutions, concerning the future of e-learning in

Uganda. Using questionnaires and interviews, the researchers identified a number of barriers highlighted by the participants of the study. These included: poor management, lack of clear framework, inadequate training, high Internet subscription costs, poor infrastructure, and resistance to change.

In United States, Armstrong (2011, p.224) investigated undergraduate students' perceptions regarding online courses. Based on interviews, observations and online focus groups, the researchers found that students felt more independent but missed direction from and communication with teachers.

Although in political and economic terms, ICT is a major modern development, educationally, it is still struggling to make an impact (Sherlock 2002, p.32). Therefore, there are many more questions and debates to consider.

#### **3.6 Critical success factors**

Professor John Rockard has defined critical success factors as "those things that must be done if a company is to be successful" (Freund 1988, p.20). Success is not automatic (Jönsson 2005, p.581) and understanding students' and teachers' views is important in order to implement successfully any educational change in schools (Hamzah, Ismail & Embi 2009, p.380). Without student involvement, even the best developed system cannot be successful (Sheng, Jue & Weiwei 2008, p.312).

Stokes (2000, no page number) has argued that the success of e-learning systems depends on the capacity of school administrators, parents, policy leaders, teachers and education businesses to collaborate effectively. In addition, Garrison and Anderson (2003, p.24) have indicated that successful e-learning "depends on the ability of the educator to create learning environments that motivate students and facilitate meaningful and worthwhile learning activities and outcomes".

Furthermore, Sehrt (2003, p.45) argues that, for an e-learning system to be successful, it should be kept as simple as possible; a number of support mechanisms also need to be developed (Jönsson 2005, p.581). Sehrt (2003, p.46) notes that "for e-learning to succeed in the developing world, it needs to build on another important pillar: the existence of infrastructure, along with some degree of connectivity". Another study, conducted at an Australian University by Volery and Lord (2000, pp.216-222),

identified critical success factors in online education. Data were collected through questionnaires administered to business students. From the students' perspective, the critical success factors were the technology (ease of access, interface design and level of interaction); the teacher (attitudes towards students, the teacher's technical competence and classroom interaction); and the previous use of technology. The researchers argued that teachers will continue to play a central role in online learning. Authors such as Selim (2007), and Condie and Livingston (2007), also support this contention: that the successful implementation of e-learning systems depends on teachers' readiness to use the systems. Teachers' ability to accept new ideas and be flexible with changes (Barak 2007, p.32) is an important factor influencing the successful integration of new teaching methodologies. Similarly, Alrasheedi (2009, p.139) and Sang et al.'s (2009, p.814) findings suggest that successful ICT integration into classroom teaching depends on teacher beliefs, motivation and teacher attitudes toward ICT. Al-Fadhli (2008, p.418) highlighted the importance of the perception of both teachers and students in achieving successful implementation while Abuhamdieh and Sehwail (2007, p.47) added that user feedback is critical for the successful implementation of any system as this influences user acceptance.

From the perspectives of both students and teachers, the critical success factors that need to be considered for online learning systems are: human factors; teachers' and students' technical competency; teachers' and students' mindsets (about learning); levels of collaboration in the course; and the level of perceived IT infrastructure and technical support (Soong *et al.* 2001, p.101).

Bhuasiri *et al.* (2012, p.853) identified the critical success factors that influenced the acceptance of e-learning systems in developing countries. The study found six dimensions for implementing e-learning system in developing countries, including learners' characteristics, instructors' characteristics, institution and service quality, infrastructure and system quality, course and information quality, and extrinsic motivation. From the perspectives of both ICT experts and faculty, the most important dimension for ICT experts was learners' characteristics whereas infrastructure and system quality were the most important dimensions from a faculty perspective. The most influential factors that impacted on e-learning success in developing countries from an ICT expert's perspective were: computer training,

perceived usefulness, attitude toward e-learning, computer self-efficacy and program flexibility (p.849). From a faculty perspective, the most important factors were: perceived usefulness, attitude toward e-learning, program flexibility, clear direction and course quality.

In another study, Barbour (2008, pp.357-362) presented secondary students' perceptions regarding the usefulness and challenging characteristics of web-based learning environments. The researcher investigated the perceptions of secondary students who had completed courses from a virtual high school in Canada. The most important factors identified by students for success on a virtual school course were: the time management of students, the motivation of students, and well-organised content. Similarly, Law, Lee and Yu (2010, p.218) asserted that a "student's learning motivation is also a crucial enabler of the success of learning". While Chigona and Dagada (2011, p.95) argued that motivation is an important determinate for successful e-learning adoption and use, Alwadie (2011, p.4) asserted that having the necessary technical and behavioural characteristics is important to achieve a successful online program. Students' satisfaction with e-learning is also a key factor influencing students' decision to use or not use a system (Khodabandeh, Afshari & Manian 2010, p.5026).

Another study conducted by Lee, Yoon and Lee (2009, p.1320) in South Korea noted that "the success of e-learning in a large part depends on the implementation of an educational model which addresses the learners' needs and educational objectives". Similarly, Glushkova (2007) and Engelbrecht (2003, p.38) wrote that the successful implementation of an e-learning system depends on building a strategy that meets learners' needs and the goals of the institution.

Students come to school with a wide range of different home experiences. In addition to this, their skills, knowledge and preferred learning styles vary from one to the other. In his study, Mumtaz (2002, p.155) showed that children who have experience of ICT in the home, as well as at school, have a better understanding of computer systems and their functions. These variations make the teaching process more complex and teachers need to think of the best method to suit all their students.

Therefore, for e-learning to be effective, it should consider each student's learning preferences and skills (Schiaffino, Garcia & Amandi 2008, p.1).

It can be concluded from the discussion above that, for e-learning to be successful, a number of factors must be considered by the decision makers in educational institutions. These are: technology, teachers' characteristics, students' characteristics, support, training, user privacy, user feedback, time management, learners' needs, incentives, teachers' knowledge and skills, and the availability of resources.

#### **3.7 Conclusion**

This chapter has examined the literature related to the issues considered by this study. It defined e-learning, discussed its benefits and explained the new role of students and teachers within an e-learning environment. It discussed the main theoretical models that have been used by researchers to study users' acceptance of technology. Reviews of the literature help to identify the theoretical research model to be used in this study and the main factors that have been found to be significant in terms of students' acceptance of educational technology.

Regarding the methods used in previous research related to the adoption of technology in an educational field, most of these used the survey research method. Furthermore, the most common data collection technique applied in those researches was questionnaires.

Iahad *et al.* (2004, p.985) noted that there is an increasing need for e-learning in developing countries because of increasing student numbers and a shortage of human resources and available skills. An analysis of the relevant literature revealed that no comprehensive research has taken place which examines students' adoption of e-learning in Bahrain secondary schools. Most of the available studies concerning technology acceptance have been conducted in developed countries (Al-Fadhli 2008, p.419). Although there are a number of studies that have considered users' acceptance of technology in developing countries, most of them focus on students in higher education. Therefore, this study will contribute new knowledge about the adoption of an e-learning system in Bahraini secondary schools. Teachers' opinions regarding the e-learning system are also investigated using a qualitative method.

Based on the information gathered from the literature review, the next chapter discusses the research philosophy and approaches adopted for this study.

## CHAPTER FOUR RESEARCH METHODOLOGY

### 4.1 Introduction

The literature review in the previous chapter identified the research model adopted in this study. Based on the Technology Acceptance Model (TAM), the model integrates subjective norms and perceived enjoyment factors and proposes a new TAM model to identify the main factors that influence students' intention to use an e-learning system.

A mixed method approach was used in the current study to investigate and measure students' acceptance of e-learning as the main tool in the learning process in Bahrain's secondary schools. The use of mixed methods is appropriate in the current study to give a better understanding of the phenomenon under investigation.

Therefore, this chapter provides an overview of the approach used in the research to fulfil the aim and objectives of the study. It discusses the philosophy underlying particular approaches and provides a justification for the methods selected. The theoretical model, which is based on the Technology Acceptance Model (TAM), is also discussed. An explanation is given of the research design, scope of the study, research sample, instruments, and data analysis methods; ethical issues are also discussed.

#### 4.2 Philosophical assumptions

Myers (2007, no page number) indicates that all research, whether it is qualitative or quantitative, is "based on some underlying assumptions about what constitutes 'valid' research and which research methods are appropriate". Therefore, the selection of an appropriate methodological approach requires an understanding of these assumptions. Burrell and Morgan (1979, p.1) identified four assumptions concerning the nature of social science. These are discussed below.

The first of Burrell and Morgan's assumptions is the ontology. This assumption addresses whether the situation being investigated (or the "reality") is "external" (i.e. it is "out there" in the world and imposes itself on the individual) or is the product of someone's mind and thoughts (i.e. internal). In short, the ontological perspective asks whether knowledge is objective or subjective (Burrell & Morgan 1979, p.1).

Epistemology is the second assumption. The term, which is derived from the Greek word epistêmê, means "the philosophy of knowledge or of how we come to know" (Trochim 2006, no page number). In other words, this assumption considers the nature of knowledge, how knowledge is obtained, and how an individual can differentiate between what is true and what is false. It asks if knowledge consists of hard facts or is perceived, subjective (even spiritual) and based on personal experience (Burrell & Morgan 1979, p.1).

The third assumption considers the nature of the relationship between people and the environment (Burrell & Morgan 1979, p.2). Human beings can respond mechanistically or in an almost pre-determined way. According to this view, humans and their experiences may be products of their environment and, as such, are conditioned by external experiences. On the other hand, human beings can also be seen as more creative and capable of exercising their free will to control their actions. From this perspective, human beings are the creators and the controllers, not merely puppets. This gives rise to the debate of determinism against voluntarism.

The three sets of assumptions have direct implications for the fourth assumption (Burrell & Morgan 1979, p.2). This assumption is the methodological assumption

which is concerned with the process of the research. In other words, methodology refers to the "overall approach to the research process" (Collis & Hussey 2003, p.50). It is "an approach to the process of the research, encompassing a body of methods" (Collis & Hussey 2009, p.67). In other words, it refers to the study of methods. A method is "a technique for collecting and/or analysing data" (Collis & Hussey 2009, p.67).

Hussey and Hussey (1997, p.54) defined methodology as "the overall approach to the research process, from the theoretical underpinning to the collection and analysis of the data". According to Jayaratna (1994, p.37), methodology is

An explicit way of structuring one's thinking and actions. Methodologies contain model(s) and reflect particular perspectives of 'reality' based on a set of philosophical paradigms. A methodology should tell you 'what' steps to take and 'how' to perform those steps but most importantly the reasons 'why' those steps should be taken, in that particular order.

Based on the foregoing assumptions, philosophers of science and methodologists have been engaged in a 'long-standing epistemological debate' about how best to conduct research (Amaratunga *et al.* 2002, p.18). This debate has centred on two schools of thought. These are positivism and interpretive science. Other authors refer to them by different names, such as quantitative and qualitative, or positivist and phenomenological paradigms (Collis & Hussey 2003, p.47).

### 4.3 Research paradigm

A research paradigm is "a philosophical framework that guides how scientific research should be conducted" (Collis & Hussey 2009, p.55). Hussey and Hussey (1997, p.47) also define the term paradigm as "the process of scientific practice based on people's philosophies and assumptions about the world and the nature of knowledge". The positivist and interpretive paradigms are the two main research paradigms.

#### 4.3.1 Positivist vs. Interpretive paradigm

The positivist paradigm in social sciences is historically based on the approach used in the natural sciences. It was developed by theorists such as Comte (1798-1857), Mill (1806-1873) and Durkheim (1859-1917) (Collis & Hussey 2009, p.55). This approach is concerned to establish the facts or causes of social phenomena, irrespective of individual subjectivity (Collis & Hussey 2003, p.52). Positivism is "a paradigm that originated in the natural sciences. It rests on the assumption that social reality is singular and objective, and is not affected by the act of investigating it" (Collis & Hussey 2009, p.56). One of the major implications of this approach is the need for the researcher to be independent from that which is being researched (Collis & Hussey 2003, p.49).

Positivist researchers "prefer precise quantitative data and often use experiments, surveys, and statistics" (Neuman 1997, p.63), for the collection and analysis of data. Positivists often try to convert the data into a quantitative form or analyse it using quantitative techniques.

The alternative to positivism is the phenomenological or interpretive paradigm. It was developed by Dilthey (1833-1911), Rickert (1863-1936) and Weber (1864-1920) (Collis & Hussey 2009, p.56). Interpretivism is "underpinned by the belief that social reality is not objective but highly subjective because it is shaped by our perceptions" (Collis & Hussey 2009, p.57). It seeks to understand human behaviour in terms of the participants' own experiences, meanings and values (Collis & Hussey 2003, p.53). This paradigm developed as a result of criticisms of the positivistic paradigm (Collis & Hussey 2003, p.53) and it is often called a qualitative method of research (Neuman 1997, p.68). This qualitative approach recognises the subjective aspects of human activity by concentrating on the meanings of social phenomena rather than their measurement (Collis & Hussey 2003, p.53). These two paradigms are summarised in Table 4.1.

Paradigms	Concepts	Methods
Positivism	Social structure	Quantitative
	Social facts	Hypothesis testing
Interpretive social	Social construction	Qualitative
science	Meaning	Hypothesis
		generation

Table 4.1: Two 'schools' of social science

(Source: Silverman 1998, p.5)

Understanding the methodological paradigm debate is important since different methods are appropriate for different situations (Amaratunga *et al.* 2002, p.19). Collis and Hussey (2009, p.62) summarised the main features of positivism and interpretivism as below (see Table 4.2).

Positivism	Interpretivism	
- Has an artificial location	- Has a natural location	
- Focuses on hypothesis testing	- Focuses on generating theories	
- Generates precise, objective and	- Generates subjective and qualitative	
quantitative data	data	
- Uses large samples	- Uses small samples	
- Gives results with high reliability	- Gives results with low reliability but	
but low validity	high validity	
- Allows findings to be generalised	- Allows findings to be generalised	
from the sample to the population	from one setting to another similar one.	

 Table 4.2: Features of the two main paradigms

(Source: Collis & Hussey 2009, p.62)

Furthermore, there are a number of terms used to describe approaches within these two main paradigms, such as quantitative and qualitative, objective and subjective, scientific and humanist, and traditionalist and phenomenological (Collis & Hussey 2009, 58). Although Creswell's 1994 approach, as reported by Collis & Hussey (2003, p.56), is to refer to the positivist paradigm as quantitative and the

phenomenological paradigm as qualitative, it is possible for positivistic research to produce qualitative data and vice versa.

In summary, the choice of research paradigm depends on the research assumptions and the nature of the research problem (Collis & Hussey 2009, p.61) and , according to the researchers, there is no 'right' or 'wrong' paradigm.

#### 4.4 Research design

Research designs "are plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis" (Creswell 2009, p.3). The choice of research design depends on the nature of the research problem, the researchers' personal experiences, and the audiences for the study. Creswell (2003, p.5) identifies three main issues central to the design of research: what knowledge claims are being made; what strategies of enquiry might be used; and what methods of data collection and analysis will be employed.

Sufian (2009, p.10) classifies the purpose of research into three broad types: exploration, description, and explanation. In exploratory research, researcher has little or no knowledge about the problem under investigation, or he/she may be unaware of the specific aspects of a general problem. Such research is undertaken to better understand the nature of the problem, as few studies might have been conducted in that area (Sekaran 2000, p.123). This type enables the researcher to formulate problems for more in-depth investigations, develop hypotheses, and gain familiarity with significant factors to be dealt with subsequently in greater detail in more structural investigations (Sufian 2009, p.10). Its main advantage is that it is flexible and adaptable to change which means that the focus of the study begins broad and becomes progressively narrower at the research progresses (Saunders, Lewis & Thornhill 2009, p.140). This type of research uses methods such as observation, interviews and case studies to understand certain phenomena (Sekaran 2000, pp.123-124).

Descriptive researches focus on describing situations and events such as describing the different characteristics of a population or of a segment of it (Sufian 2009, p.10). It may be an extension of a piece of exploratory or explanatory research (Saunders, Lewis & Thornhill 2009, p.140). Its goal is to offer the researcher a profile of the relevant aspects of the phenomena under investigation (Sekaran 2000, p.125).

Explanatory research used to explain events (Sufian 2009, p.10). It studies a situation in order to explain the relationship between variables (Saunders, Lewis & Thornhill 2009, p.140). It "seeks to identify causes and effects of social phenomena and to predict how one phenomenon will change or vary in response to variation in some other phenomenon" (Schutt 2006, p.15).

#### 4.4.1 Time horizons

Research design can be cross-sectional or longitudinal. Cross-sectional studies are "the study of a particular phenomenon (or phenomena) at a particular time (Saunders, Lewis & Thornhill 2009, p.155). This type of design often uses the survey strategy and is designed to obtain research data in different contexts, but over the same period of time (Collis & Hussey 2009, p.77). This type of research shows whether the correlation between certain variables exists or does not exist; it does not explain why a correlation exists. Cross-sectional studies are conducted when there are time constraints or limited resources.

Longitudinal research is "a diary or a series of snapshots and a representation of events over a given period" (Saunders, Lewis & Thornhill 2009, p.155). The main strength of this design is the ability that it has to study change and development over a period of time. Collis and Hussey (2009, p.78) also define a longitudinal study as "a methodology used to investigate variables or a group of subjects over a long period of time". It is often associated with a positivist methodology, but it can also be used under the interpretive paradigm. Conducting this type of methodology is expensive and very time consuming.

#### 4.5 Research approaches

Data play a critical role in the reliability and validity of the research outcomes. Therefore, researchers need to pay considerable attention to their approaches to data collection. In the literature there are several research approaches available to the researcher. The main factors in the selection are the main aims and objectives of the research, the cost and the availability of resources. Therefore, this section briefly presents the main approaches used in the current study.

#### 4.5.1 Quantitative and qualitative approaches

Quantitative and qualitative approaches encompass different assumptions with regard to the underlying research philosophy. Creswell (2003, p.18) defines a quantitative approach as one in which the researcher primarily uses positivist claims for developing knowledge. Such claims might include cause and effect thinking; reduction to specific variables, hypotheses and questions; use of measurement and observation; and the testing of theories. By contrast, Creswell describes the qualitative approach as one in which researcher makes knowledge claims based primarily on constructivist perspectives which encompass multiple meanings of individual experiences, meanings socially and historically constructed with an intention of developing a theory or pattern.

The qualitative approach "concentrates on words and observations to express reality and attempts to describe people in natural situations", whereas the quantitative approach "places considerable trust in numbers that represent opinions or concepts" (Amaratunga *et al.* 2002, p.19).

Furthermore, Bryman (2004, pp.19-20) stresses that quantitative research emphasises quantification in the collection and analysis of data and involves a deductive approach to the relationship between theory and research, for the purpose of testing theories. In contrast, qualitative research emphasises words in the collection and analysis of data and emphasises an inductive approach to the relationship between theory and research, in which emphasis is placed on the generation of theories.

The advantage of the quantitative approach as it is described by Patton (1984, p.54), is the possibility of measuring the reactions of many subjects to a limited set of questions. This facilitates comparison and statistical aggregation of the data. It also creates "quantifiable, reliable data that are usually generalizable to some larger population" (Weinreich 2006, no page number). However, qualitative methods generate a 'wealth of detailed data' about a small number of people and cases. The extent of depth and detail depends on the nature and purpose of the study.

Qualitative data are useful when the researcher needs to supplement, explain, validate, illuminate, or reinterpret quantitative data gathered from the same study (Amaratunga *et al* 2002, p.22). Because of the different focuses and emphases between these two approaches, there is a strong suggestion within the research community that research, both qualitative and quantitative, is "best thought of as complementary and should therefore be mixed in research of many kinds" (Amaratunga *et al.* 2002, p.23). Das (1983, p.311) states that:

...qualitative and quantitative methodologies are not antithetic or divergent. Rather, they focus on the different dimensions of the same phenomenon. Sometimes, these dimensions may appear to be confluent: but even in these instances, where they apparently diverge, the underlying unity become visible on deeper penetration.

Trochim (2006, no page number) argues that quantitative and qualitative data are closely related to each other. In his view, all quantitative data are "based upon qualitative judgments; and all qualitative data can be described and manipulated numerically". Jick (1983, p.135) also notes that qualitative and quantitative methods should be "viewed as complementary rather than as rival camps".

According to Patton (1984, p.56), there is no logical reason why quantitative and qualitative methods cannot be used together. Since single methodology approaches have strengths and weaknesses, the combination of methodologies can focus on their relevant strengths (Amaratunga *et al.* 2002, p.23). In other words, the researcher should aim to achieve a situation where "blending qualitative and quantitative methods of research can produce a final product which can highlight the significant contributions of both" (Nau 1995, no page number). Often mixed methods research produces a superior product (Johnson & Onwuegbuzie 2004, p.17). It represents the real "gold standard" for studying phenomena (Onwuegbuzie & Leech 2004, p.770). According to Johnson and Christensen (2004, p.409), mixed research is now considered the third major research approach after quantitative and qualitative methods. This approach will be presented and discussed in the following section.

#### 4.5.2 Mixed methods approach

During the last 50 years, writers have used different names for this approach, such as "multitrait/multimethod research", "quantitative and qualitative methods", "methodological triangulation", and "mixed methodology" (Creswell & Plano Clark 2007, p.5). Recently, the most frequently used name is "mixed methods research", defined as follows:

A research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis of data and the mixture of qualitative and quantitative approaches in many phases in the research process. As a method, it focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies (Creswell & Plano Clark 2007, p.5).

Johnson and Onwuegbuzie (2004, p.17) also define mixed methods research as "the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study". It is an attempt to legitimate the use of multiple approaches in answering research questions rather than constraining researchers' choices. The basic premise is that the use of qualitative and quantitative approaches in combination will provide better understanding of research problems than using each approach alone (Creswell & Plano Clark 2007, p.5). Therefore, by using more than one method within a research study, researchers are able to obtain a more complete picture of human experience (Morse 2003, p.189). According to Patton (1990, p.188), using multiple methods for data collection gives "cross-data validity checks". Similarly, Dadayan and Ferro (2005, p.143) wrote that using both approaches "will increase the robustness of results".

Furthermore, Greene, Caracelli and Graham (1989, p.259) noted that there are five purposes for mixed method evaluation designs. These are:

- Triangulation (i.e. seeking the convergence and corroboration of results using different methods)
- Complementarity (i.e. seeking elaboration, illustration, and clarification of the results of one method with results from the other)

- Initiation (i.e. seeking the discovery of contradiction by, recasting the results from one method with the results from another)
- Development (i.e. using the findings from one method to help inform the other)
- Expansion (i.e. seeking to expand the breadth of inquiry by using different methods for different inquiry components).

Johnson and Onwuegbuzie (2004, p.21) listed the strengths and weaknesses of the mixed method. According to the researchers, using mixed methods helps the researcher to generate and test a grounded theory, and to answer a broader range of research questions. However, using mixed methods takes more time and is more expensive. Similarly, Creswell and Plano Clark (2007, p.10) indicated that mixed methods research is not easy to conduct. It takes time and resources to collect and analyse both types of data; it also requires investigators to understand both forms of data (i.e. quantitative and qualitative).

According to Creswell and Plano Clark (2007, pp.80-81), there are three decisions researchers should consider when choosing a mixed methods design. These are:

- Timing decision: the order in which the data are used in a study
- Weighting decision: the emphasis given to each (quantitative and qualitative) approach
- Mixing decision: how the two data sets will be related or mixed (see Figure 4.1) (Creswell & Plano Clark 2007, p.80).





As shown in Figure 4.1, the timing decision divides into two types concurrent or sequential. Concurrent timing "occurs when the researcher implements both quantitative and qualitative methods during a single phase of the research study" (Creswell & Plano Clark 2007, p.81). This means that a researcher collects both quantitative and qualitative data at the same time. Sequential timing "occurs when the researcher implements the methods in two distinct phases, using (and collecting and analysing) one type of data before using another data type" (Creswell & Plano Clark

2007, p.81). A researcher may choose to start by collecting and analysing quantitative data and may then collect qualitative data to obtain further explanation. Alternatively, qualitative data may be collected first, followed by the use of a quantitative method.

With a weighting decision, "a researcher decides whether both methods will have equal priority or one method will have a greater priority than the other" (Creswell & Plano Clark 2007, p.81). In this case, one of the collection methods will have a greater emphasis within the study than the other.

As shown in Figure 4.1, there are three strategies for mixing quantitative and qualitative data (Creswell & Plano Clark 2007, pp.83-84). These are:

- Merging data sets: researchers can merge both quantitative and qualitative data during the interpretation or during the analysis of the data
- Embedding data: a researcher can decide to embed data of one type within the design of the other
- Connecting data: this occurs when the analysis of one type of data leads to the need for another type of data.

The above sub-sections present the most popular approaches that researchers can adopt in their research. Based on the above discussion, this research adopted a mixed methods approach, combining quantitative and qualitative data collection methods. Prior to discussing these methods in detail, it is first important to provide an explanation of the research model adopted in this study. The research model helped in developing hypotheses and also in deciding the most appropriate data collection approaches.

### 4.6 Theoretical model

The literature review in Chapter Three illustrated a number of theoretical models that have been used by researchers to study users' acceptance of technology. These models provide a clear understanding of the problem under investigation and explain the relationships between concepts and variables (Al-Muomen 2009, p.98). Sekaran (2000, p.91) defines a theoretical model as:

How one theorizes or makes logical sense of the relationships among the several factors that have been identified as important to the problem. This theory flows logically from the documentation of previous research in the problem area. Integrating one's logical beliefs with published research, taking into consideration the boundaries and constraints governing the situation, is pivotal in developing a scientific basis for investigating the research problem.

Therefore, to achieve the aim and objectives of this study, a theoretical model was proposed to identify the main factors that influence students' intention to use elearning system. This model serves as guide for developing hypotheses, testing and comparing the results, and assisting in the interpretation phase.

#### 4.6.1 Research model and hypotheses

The research model used as the basis for the current study is shown in Figure 4.2. It is based on the TAM which is the most well known model that has been used to explain individual technology acceptance decisions across a wide range of technologies, user populations and contexts (Hu, Clark & Ma 2003, p.229). A critical review of the TAM revealed a need to include other factors in order to provide a better explanation of IT adoption (Lee, Cheung & Chen 2005, p.1096). Researchers such as Venkatesh, Speier and Morris (2002); and Davis, Bagozzi and Warshaw (1989) redefined the TAM within a motivational framework. Therefore, the research model integrates the motivational perspectives into the original TAM and adds subjective norm from the TRA.

Motivation is "the internal processes that give behaviour its energy and direction" (Reeve 1996, cited in Lee, Cheung & Chen 2005, p.1096). Similarly, Dillemans *et al.* (1998, p.30) define motivation as the "willingness of students to invest mental effort in order to execute learning tasks". The motivational model adopted by Davis, Bagozzi and Warshaw (1992) has two main constructs: extrinsic motivation and intrinsic motivation (Venkatesh, Speier & Morris 2002, p.299). Extrinsic motivation "pertains to behaviors that are engaged in response to something apart from its own sake, such as reward or recognition or the dictates of other people" (Lee, Cheung & Chen 2005, p.1097). Intrinsic motivation "refers to the fact of doing an activity for its own sake: the activity itself is interesting, engaging, or in some way satisfying" (Lee,

Cheung & Chen 2005, p.1097). In addition, Panitz (1999, p.11) points out that intrinsic motivation "comes from within students". For example, students want to learn for the joy of learning, because the topic is interesting, or to improve themselves. On the other hand, extrinsic motivation means that motivation "comes from outside the students" (Panitz 1999, p.11). For example, students learn to receive grades or other rewards from teachers, parents, and others. Vasupongayya and Hannok (2009, p.334) found in their study that students will be more likely to attend a virtual class if they are rewarded (such as receiving extra marks). Therefore, users accept new technology because it is both fun and beneficial (Igbaria, Iivari & Maragahh 1995, p.229).

A number of researchers have argued that the adoption of new technology is mainly determined by both intrinsic and extrinsic motivators and, according to Lee, Cheung and Chen (2005, p.1096), incorporating both motivators into the TAM may provide better explanation and prediction of student acceptance and usage behaviour. Only recently have researchers begun to examine the role of intrinsic motivation in their studies to provide a broader view and a better explanation of IT adoption (Saadé, Tan & Nebebe 2008, p.139) while a number of researchers have used enjoyment to represent the intrinsic motivation factor in examining the influence of intrinsic motivators on users' IT acceptance behaviour (Sheng, Jue, Weiwei 2008, p.313). In the TAM, perceived usefulness is a form of extrinsic motivation and perceived enjoyment is a form of intrinsic motivation. In addition, Lee, Cheung and Chen (2005, p.1097) point out that it is only recently that researchers have started to address the role of intrinsic motivation in the study of IT adoption.

Hence the proposed model combines the TAM's constructs of perceived usefulness, perceived ease of use, attitude, behavioural intention, perceived enjoyment and subjective norms (see Figure 4.2). It integrates subjective norm and perceived enjoyment factors and proposes a new TAM model to study students' intentions to use an e-learning system. A detailed discussion of the variables used in the research model and the related research hypotheses is presented in the subsequent sections.



**Figure 4.2 Research Model** 

#### **Perceived usefulness**

In an e-learning context, perceived usefulness "refers to the extent that an individual believes that use of the technology in learning will improve performance" (Abbad, Morris & Al-Ayyoub 2008, p.4). It captures the same concept as the relative advantage construct in the DoI model (Moore & Benbasat 1991) or performance expectancy in UTAUT (Venkatesh *et al.* 2003); this suggests a substantial similarity among the construct definitions, measurement scales and relationships (Al-Gahtani 2008, p.9).

Previous studies concerning the TAM have shown that perceived usefulness is a major determinant of attitude and intention to use (Davis, Bagozzi & Warshaw 1989; Mathieson 1991; Taylor & Todd 1995a; Venkatesh & Davis 2000; Lee 2006; Chang & Tung 2008). In their study, Davis, Bagozzi and Warshaw (1989, p.1000) found usefulness to be more important than ease of use and asserted that it should not be over-looked. In other words, users might be willing to tackle a difficult interface in order to gain access to a needed function but no matter how easy an interface was to use, this did not compensate for a system that did not perform a useful task. Therefore, this study hypothesised that:

- H<sub>1:</sub> There is a significant positive relationship between perceived usefulness and behavioural intention to use the Edunet.
- H<sub>2:</sub> There is a significant positive relationship between perceived usefulness and attitudes to using the Edunet.

#### Perceived ease of use

In an e-learning context, perceived ease of use can be defined as "the degree to which an individual believes that learning to use a technology will require little effort" (Abbad, Morris & Al-Ayyoub 2008, p.4). It captures the same concept as the complexity construct in the DoI model (Moore & Benbasat 1991) or effort expectancy in UTAUT (Venkatesh *et al.* 2003), which suggests a substantial similarity among the construct definitions and measurement scales (Venkatesh *et al.* 2003, p.450).

Previous studies have shown that users are more likely to use a new system if they perceive that it is easy to use and a number of researchers have found that perceived ease of use has a significant effect on behavioural intention to use a system through its effect on perceived usefulness (Davis, Bagozzi & Warshaw 1989; Szajna 1996; Ong, Lai & Wang 2004). In addition, perceived ease of use influences attitude indirectly through perceived usefulness (Teo, Luan & Sing 2008, p.268). Similarly, Taylor and Todd (1995a, p.148) found perceived ease of use has a direct effect on perceived usefulness. According to Lee, Cheung and Chen (2005, p.1099), perceived ease of use also influences intrinsic motivation (perceived enjoyment). In other words, students who perceive technology as easy to use are more likely to have an enjoyable feeling towards using it. Thus, the effect of perceived ease of use on perceived enjoyment was expected to be positive. Therefore, this study hypothesised that:

- H<sub>3:</sub> There is a significant positive relationship between perceived ease of use and attitudes to using the Edunet.
- H<sub>4:</sub> There is a significant positive relationship between perceived ease of use and perceived usefulness.
- H<sub>5:</sub> There is a significant positive relationship between perceived ease of use and perceived enjoyment of using the Edunet.

#### **Perceived enjoyment**

This is a form of intrinsic motivation and it refers to "the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" (Davis, Bagozzi & Warshaw 1992, p.1113). Similarly, van der Heijden (2004, p.697) defined perceived enjoyment as "the extent to which fun can be derived from using the system". Hence, it focuses on intrinsic motivation.

Learning that is fun appears to be more effective (Lepper & Cordova 1992, cited in Amory *et al.* 1999, p.312). Green and McNeese (2007, p.6) noted that "when adults and children are having fun, they are more willing to pay attention, participate enthusiastically, and since their stress level is lower, they are more receptive to learning".

Although intrinsic motivation factors were not included in the TAM, a number of researchers (such as Davis, Bagozzi & Warshaw (1992) and Igbaria, Schiffman and Wieckowski (1994)) added this kind of motivation as a belief variable in their research model. Venkatesh, Speier and Morris (2002, pp.299-301) added that perceived ease of use which was widely employed within the user acceptance literature, was not been incorporated into the motivational model as an intrinsic motivation construct. In line with Al-Gahtani and King (1999, p.278), enjoyment was introduced and placed parallel to the perceived usefulness and perceived ease of use constructs of the TAM as a cognitive response. The effect of perceived enjoyment on students' attitude and intention to use e-learning was expected to be positive. Therefore, the present study proposed the following two hypotheses:

- H<sub>6:</sub> There is a significant positive relationship between perceived enjoyment and behavioural intention to use the Edunet.
- H<sub>7:</sub> There is a significant positive relationship between perceived enjoyment and attitudes to using the Edunet.

#### Subjective norm

Subjective norm, one of the social influence variables (Park 2009, p.152) has been defined as a "person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Fishbein & Ajzen 1975, p.302). In educational contexts, where technology is a potential influence on teacher/student relationships, it does not seem reasonable to assume that the decision to use technology is made without reference to others' approval or disapproval of its use (Wolski & Jackson 1999, p.1720). Parents and teachers, both as role models and as "important socialisers, play an important role in socialising boys and girls to have different expectations and values regarding various school subjects" (Shashaani 1997, p.39). Peer influence "refers to friends as the referent groups" (Lin, Chan & Jin 2004,

p.184). This is critical in a teenager's life (Focus Adolescent Services, 1999) as the opinions of peers carry more weight with teenagers than their parents' opinions. Similarly, Martins and Kellermanns (2004, p.21) found students' peers play an important role in encouraging students to accept new systems. Lee (2010, p.508) pointed out that students choose to use an e-learning system because their friends are the users of the system and they recommend it to them.

However, the TAM does not include subjective norm (SN) as a determinant of behavioural intention due to theoretical and measurement problems (Venkatesh & Morris 2000, p.116). Therefore, empirical evidence supporting the role of the subjective norm has been somewhat mixed (Venkatesh & Morris 2000, p.116). Some investigations have omitted the construct completely (e.g. Adams, Nelson & Todd 1992; Szajna 1996). Others have found the construct to be non-significant (see, for example, Mathieson 1991; Davis, Bagozzi & Warshaw 1989). However, other researchers have found subjective norm to influence significantly intention to use, directly or indirectly, through perceived usefulness (see, for example, Taylor & Todd 1995a; Hartwick & Barki 1994; Venkatesh and Davis 2000; Lee 2006). Hartwick and Barki (1994, p.458) add that subjective norm has been found to be more important and to have a greater influence on intention in the early stages of a system's implementation when users have limited knowledge. Lee (2006, p.517), however, found that the effects of subjective norm significantly influence perceived usefulness. Therefore, this research tested the influence of subjective norm on intention to use the e-learning systems, and the following two hypotheses were developed accordingly.

# H<sub>8:</sub> There is a significant positive relationship between subjective norm and behavioural intention to use the Edunet.

# H<sub>9:</sub> There is a significant positive relationship between subjective norm and perceived usefulness.

#### Attitude

There are several definitions of attitude. Fishbein and Ajzen (1975, p.6) defined attitude as "a learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object".

Other definitions and descriptions of attitude are as follows:

"a person's disposition (either favorable or unfavorable) toward an object or event" (Klobas & Clyde 2000, p.6).

"attitudes arise from evaluated beliefs and perceptions" (Klobas & Clyde 2000, p.17).

Furthermore, attitudes towards use in the TAM model are described as "the mediating affective response between usefulness and ease of use, beliefs and intentions to use a target system" (Lu *et al.* 2003, p.208). Wilder and his associates state that users' attitudes are often shaped at an early stage in their education (Torkzadeh, Pelughoeft & Hall 1999, p.301).

In fact, the measurement of user attitudes has been an important research issue in Management and Information Science (MIS) since the 1970s (Swanson 1982, p.158) and, according to Zimbardo and his associates, changing the behaviour of individuals is possible if their attitudes have been identified and understood (Albirini 2006, p.4).

Considering user attitudes is a vital part of computer use in education as attitudes influence students' initial acceptance of technology as well as their future behaviour regarding computers (Selwyn 1997, p.35). Therefore, providing access to hardware and software does not guarantee the effective integration of IT into an educational setting; the learners' preference to use the technology must also be understood.

Attitudes have been recognised as important predictors when considering individual differences in educational application, learning and achievement (Evans 1965, cited in Francis & Greer 1999, p.219). It is therefore clear that those students who are anxious about computers are more likely to develop negative attitudes towards them and be resistant to using them (Smalley, Graff & Saunders 2001, p.48). Thus, there is still a positive need to monitor attitudes toward computers in school children in order for educators to be able to predict accurately the potential success of computer-based learning in schools.

In the final version of the TAM, attitude was omitted, because it did not fully mediate the effect of perceived usefulness on intention (Davis & Venkatesh 1996, p.21). However, a review of the research on the use of the TAM showed that many studies had retained the concept of attitude and found that it affected behavioural intention. Such researchers include Davis, Bagozzi and Warshaw (1989); Taylor and Todd (1995a); Mathieson (1991); Thompson (1998); and Morris and Dillon (1997) as listed by Lederer *et al.* (2000, pp.272-273). Similarly, there are other studies which have confirmed the significant relationship between attitude and behavioural intention to use (e.g. Wu & Chen 2005; Chang & Wang 2008; Liu, Liao & Pratt 2009).

Attitude is determined by two specific beliefs: perceived usefulness and perceived ease of use. In other words, the easier a technology is to use, and the more useful it is perceived to be, the more positive an individual's attitude and intention will be towards using any particular technology (Taylor & Todd 1995a, p.148). Therefore, the intention to use is a weighted function of attitude towards usage and perceived usefulness (Taylor & Todd 1995a, pp.147-148; Al-Gahtani & King 1999, p.278). As a result, the present study proposed the following hypothesis:

# H<sub>10:</sub> There is a significant positive relationship between attitudes and intention to use the Edunet.

#### **Behavioural intention**

In technology acceptance models, usage behaviour is modelled as a direct function of behavioural intention (Taylor & Todd 1995a, p.147). Similarly, Davis and Venkatesh (1996, p.20) asserted that intention to use is the "single predictor of actual system usage". Thus, intention is "the extent to which the user would like to reuse the website in the future" (Lin & Lu 2000, p.199). Fishbein and Ajzen (1975, p.288) defined behavioural intention as "a person's subjective probability that he will perform some behavior". In addition, Jan and Contreras (2011, p.847) described behavioural intention as "a measure of innovation acceptance and a strong predictor of future real use". This is theoretically justifiable and empirically supported (Hu, Clark & Ma 2003, p..231). In their study, Taylor and Todd (1995a) found that behaviour is mostly determined by behavioural intention, as this explains about 30% of the variance in behaviour. The researchers also pointed out that the variance
explained the decreases observed when behavioural intention was deleted from the model (p.166). In the context of technology acceptance, Chau and Hu (2002, pp.298-299) highlighted the importance of using behavioural intention instead of actual usage to examine adoption at an early stage. Therefore, the present study hypothesised that:

# H<sub>11:</sub> There is a significant positive relationship between behavioural intention to use the Edunet and its actual use.

The research aims and objectives and the development of the theoretical model played a central role in identifying the research design to be adopted in this study. The next section presents and discusses the choices of methodology that were used to fulfil the research aims and objectives.

# 4.7 Choice of methodology

Patton (2002, p.12) indicates that "there is no recipe or formula in making methods decisions...Research, like diplomacy, is the art of the possible". There are no rules that tell researchers what data mix is best (Patton 1984, pp.56-57). The breadth versus depth trade-off is applicable in comparing quantitative and qualitative methods as well as within either quantitative or qualitative methods. Therefore, the extent to which a research question is broad or narrow depends on the availability of resources, time, and the needs of decision makers. Similarly, Creswell (2003, p.21) identifies three criteria for selecting an approach. These are: the research problem, researchers' personal experience, and the audience (s) for whom the report will be written. Remeny *et al.* (1998, p.38) stress that the choice of any approach depends on the researcher's background.

The current study was designed to investigate and measure students' acceptance of e-learning system as the main tool in the learning process in Bahrain's secondary schools, using a mixed method approach. Both quantitative (questionnaire) and qualitative (interview and focus group) techniques are combined in one study (see Figure 4.3). Using this approach was considered to be the best way of reaching a thorough understanding of the research problem (Creswell & Plano Clark 2007, p.5) and of avoiding any bias associated with the adoption of one method (Sekaran 2003,

p.256). The use of the mixed method therefore allows for greater confidence in the value of the collected data.



Figure 4.3: Research approach

A concurrent mixed research approach was used in the current study to confirm, cross-validate, and corroborate findings within a single study (Creswell 2003, p.217). The other main justification for this use was that the data collection time period was shorter compared to a sequential approach and it was important in this research, because it was conducted in the Kingdom of Bahrain, to use the project time effectively. After collecting the two data sets, the researcher analyzed them separately and then merged the two sets of results during the discussion phase.

Furthermore, the questionnaire survey was considered the most appropriate quantitative method to fulfil objectives 1 and 5 (stated in Chapter One) whereas interviews and focus groups were considered the most suitable qualitative methods to achieve objectives 2, 3, 4, 5 and 6. These techniques are discussed in the following sections.

## 4.7.1 Questionnaire

Within two fieldwork visits, a questionnaire was used in the current study to survey a large number of secondary school students to investigate their attitudes towards elearning and to identify the main factors that influenced their adoption of an elearning system. In other words, using a questionnaire helped the researcher to identify the main variables that predicted students' intention to use an e-learning system, together with their actual usage. As was pointed out in Chapter One, this study uses the TAM as the research model. Therefore, the questionnaire was used to obtain data concerning issues to be covered in the research model and to test the relationships between the model's variables.

Abbad, Morris and Al-Ayyoub (2008, p.13) point out that the majority of studies that have applied the TAM have relied on survey methodology. In a positivist study, a survey methodology is "designed to collect primary or secondary data from a sample, with a view to analysing them statistically and generalizing the results to a population" (Collis & Hussey 2009, p.76). A survey strategy allows researchers to collect quantitative data and to analyse them using descriptive and inferential statistics (Saunders, Lewis & Thornhill 2009, pp.144-145). Structured observation, structured interviews and questionnaire are data collection techniques that belong to the survey strategy.

The literature review in Chapter Three shows that most studies investigating the acceptance of educational technology have employed the questionnaire survey. For example, Szajna, (1996), Atkinson and Kydd (1997), Fenech (1998), Teo, Lim and Lai (1999), Ong, Lai and Wang (2004), Gabbard (2004), Saadé and Bahli (2005), Lee (2006), Pituch and Lee (2006), Roca, Chiu and Martinez (2006), Srite (2006), Abdalla (2007), Ngai, Poon, and Chan(2007), Abbad, Morris and Al-Ayyoub (2008), Al-

Ammari and Hamad (2008), Chang and Tung (2008), van Raaij and Schepers (2008), Abbad, Morris and de Nahlik (2009), Liu, Liao and Pratt (2009), Park *et al.* (2009), Liu *et al.* (2010), Sanchez-Franco (2010).

Questionnaires gather information directly by asking people questions; they can be used as data for analysis (Wisker 2001, p.147). They are often used to gather information about behaviours, activities, attitudes, and responses to events. Similarly, Johnson and Turner (2003, p.306) noted that the questionnaire is an appropriate method for measuring participants' attitudes and eliciting other content.

Questionnaires can be used for descriptive or explanatory research (Saunders, Lewis & Thornhill 2009, p.362). However, questionnaires are usually not good for research that requires a large number of open-ended questions (Saunders, Lewis & Thornhill 2009, p.362). Robson (2002, p.234) indicates that questionnaires work best with standardized questions because the researcher will be confident that questions mean the same thing to different respondents. Youngman (1984, p.156) argues that questionnaires are inexpensive, they can be sent to a large number of subjects, and if well designed, they allow easy analysis.

The choice of the questionnaire was influenced by a number of factors. These are

- The nature of the research
- The method followed in the research
- The difficulty of using another means
- The research sample (a questionnaire is considered to be a suitable instrument for collecting data from a large sample)
- The funding and time available to the researcher (Al-Assaf 1995, cited in Al-Rashed 2002, p.5).

The main disadvantages of questionnaires are that they: must be short, low response rate for mail questionnaires, and they may have missing data (Johnson &Turner 2003, p.306).

#### 4.7.2 Interviews

Interviews are a "method for collecting data in which selected participants (the interviewees) are asked questions to find out what they do, think or feel" (Collis and Hussey 2009, p.144). It was decided to conduct a number of interviews with schoolteachers in two fieldwork visits. Face-to-face interviews with secondary schoolteachers on a one-to-one basis were chosen in the current study. Such qualitative data are needed to elaborate, enhance and clarify quantitative data results. Interviewing schoolteachers helped the researcher to obtain in-depth details about King Hamad's School of the Future Project, schoolteachers' perceptions regarding the e-learning system, and also to highlight the main obstacles faced by teachers and students.

Interviews involve "the gathering of data through direct verbal interaction between individuals" (Cohen, Manion & Morrison 2000, p.269). Robson (2002, pp.272-273) writes that "face to face interviews offer the possibility of modifying one's line of enquiry, following up interesting responses and investigating underlying motives in a way that postal and other self-administered questionnaires cannot". The goals of any interview are to see the research topic from the perspective of the interviewee, and to understand how and why they come to have this perspective (Amaratunga *et al.* 2002, p.25).

The interview has a number of advantages. According to Oppenheim (1992, p.81), interviews have a higher response rate than questionnaires and they are better than questionnaires for handling open-ended questions or open-ended probes. In spite of the advantages of interviews, there are some disadvantages, such as their high cost and interviewer bias. Similarly, Johnson and Turner (2003, p.308) identified a number of strengths and weaknesses of interviews. According to Johnson and Turner, an interview is useful for confirmation and exploration, and for providing in-depth information; however, it is expensive and time consuming.

It was thought that semi-structured interviews with schoolteachers would be the most fitting approach for this research because they offered the interviewer the flexibility of omitting some questions or adding additional ones in order to obtain more detailed information about a particular answer or to explore new issues that might arise from a particular answer (Collis & Hussey 2009, p.195). The order of questions may also vary, depending on the flow of the conversation (Saunders, Lewis & Thornhill 2009, p.320).

## 4.7.3 Focus Group

Focus groups are "small groups brought together specifically to focus on certain issues" (Wisker 2001, p.141). The focus group technique "...has been used extensively to ascertain the perceptions and feelings of participants around a particular area of inquiry" (Chase & Alvarez 2000, p.358).

The goal of a focus group is to obtain the perceptions, attitudes, feelings, and ideas of participants about a selected topic (Vaughn, Schumm & Sinagub 1996, p.5). One of the main reasons for adopting the focus group method in this research was to allow the participants (in this case, students) to interact with each other to explore the issues that contributed towards accepting e-learning in their classes.

... Participants interact with each other rather than with the interviewer, such that the views of the participants can emerge – the participants' rather than the researcher's agenda can predominate (Cohen, Manion & Morrison 2000, p.288).

Furthermore, focus groups have been used in three main ways (Wilkinson 1998, p.184). These are: as part of a multi-method research design, as a primary research method, and as participatory action research. In other words, focus groups are often used alongside additional methods of data collection, but can also be used as a standalone method (Johnson & Turner 2003, p.309).

In deciding whether to use focus groups in any research, there are three key considerations:

#### • Purpose of research

The use of focus groups should be considered in relation to the type of research question. In other words, focus groups are a good choice of method when the purpose of the research is "to elicit people's understandings, opinions and views, or to explore how these are advanced, elaborated and negotiated in a social context" (Wilkinson 1998, p.187).

# • Type of output desired

The data generated by focus groups are qualitative and therefore best suited to qualitative analysis. Focus group data are "best reported with extensive illustrative extracts, which are often vivid and compelling to readers and reports may consequently be lengthy" (Wilkinson 1998, p.187).

# • Practical aspects

As with any qualitative method, the focus group researcher must pilot the question guide and test the procedure; spend time recruiting, briefing and debriefing participants; check and recheck the recording equipment; and spend many hours in transcription and analysis. However, there are practical considerations specific to the focus group methodology. These are: recruitment, which means it may be difficult to get a group together; moderating a focus group requires different skills from one-to-one interviews; the coordination of activities 'on the day' is a challenge (Wilkinson 1998, pp.187-188).

Wilkinson (1998, p.188) adds that the focus group methodology is flexible, user friendly, and fun to work with; however, it is demanding. It is an appropriate method for exploring ideas and obtaining in-depth information about how participants think about an issue (Johnson & Turner 2003, p.310). On the other hand, according to the authors, focus groups have some weaknesses: they are sometimes expensive; analysing the data is often time-consuming; participants may possibly be biased by the focus group moderator; and they may be dominated by one or two participants.

Focus groups are often used for exploratory purposes as stated by Johnson and Turner (2003, p.309). Therefore, since this research is considered to be exploratory in nature, the use of focus groups was beneficial to explain some issues in more detail that could not be investigated by using the quantitative method. Bernard (2000, pp.207-208)

indicates that focus groups complement surveys but do not replace them; they help interpret the results of surveys. Similarly, Weinreich (2006) indicates that using focus groups for exploration purposes provides valuable qualitative data regarding the target audience, they offer insights into their language, and they identify obstacles, and meanings attributed to beliefs and behaviours. The author adds that, if enough focus groups are conducted with representatives of the target audience, a questionnaire may be administered either before or after the focus group to collect numerical data as well.

In this research, it was planned at an early stage of the data collection to have no more than eight participants in each group. Restricting groups to this size enabled the researcher to manage and control the groups more effectively. In addition, Morgan (1997, p.43) indicates that three to five groups will be adequate for saturation, but the ideal number still depends on many factors. The most important determinant of the number of groups is the variability of the participants both within and across groups. Eight focus groups were chosen for this study during two-field-work visits; these comprised, four female and four male groups, with the presence of an Information Technology specialist, nominated by the school management, as observer. This research adopted focus groups with students to provide the qualitative data needed to enhance and clarify the quantitative data results. This technique was considered to be appropriate for providing more information and explanation on issues relating to the adoption of an e-learning system in Bahrain secondary schools.

# 4.8 Fieldwork survey strategy

One of the main objectives of this research was to investigate student acceptance of the technology before and after one year of experiencing e-learning. Lee (2010, p.506) argues that "although initial acceptance of e-learning is an important first step toward achieving e-learning success, actual success still needs continued usage". Therefore, to examine changes in students' attitudes and the perceptions of teachers towards e-learning at more than one time, a longitudinal design was chosen. The research data collection was divided into two stages of field work. The first stage was carried out with students in the first year of experiencing the e-learning portal

(Edunet). The second stage was carried out in October-December 2007, after one year of using the Edunet (see Figure 4.4).

# 4.8.1 Stage 1: Fieldwork survey-before experiencing e-learning

This stage was carried out between October 2006 and December 2006. The main aims of this stage were:

- 1. To identify the research samples.
- 2. To clear all the ethical issues related to the fieldwork processes. This included arranging all the administration necessary to carry out the survey.
- 3. To carry out the pilot study.
- 4. To distribute and collect the questionnaire.
- 5. To carry out focus groups.
- 6. To arrange and plan for the second stage field work.
- 7. To interview school teachers.

# 4.8.2 Stage 2: Fieldwork survey-after one year of experiencing e-learning

This stage was carried out between October 2007 and December 2007. The main aims of this stage were:

- 1. To distribute questionnaires to the same samples as in the first stage, after one year of experiencing e-learning.
- 2. To find out students' use of the system.
- 3. To identify the main factors that influenced the students' use.
- 4. To carry out focus group sessions.
- 5. To interview school teachers.



Figure 4.4: Fieldwork stages

# 4.9 Scope of the study

The State of Bahrain is in the process of developing its sectors, particularly school education, to cope with the dramatic changes in learning processes and the availability of e-learning at a school level. This section outlines the main elements of the research's scope, including location, schools and the subjects taught (see Figure 4.5).

#### **4.9.1** Location (geographically)

Bahrain, geographically, is divided into five provinces. Four of the provinces have introduced e-learning as part of the learning process. Two schools from each province with e-learning were selected in this research to avoid any location bias and to increase the reliability of the collected data.

#### 4.9.2 Schools

The main aims of the research involve secondary schools in Bahrain. Therefore, only secondary schools adopting an e-learning strategy were selected for the study.

#### 4.9.3 Subjects

Secondary schools are encouraged and supported, by government and parents, to develop and implement e-learning in their teaching process. The strategy is to introduce e-learning in stages due to the need for sufficient facilities before establishing full school e-learning in all subjects. The first three subjects targeted by the schools were Science, Mathematics and the English language. As a result, the research concentrated on these three subjects only.

# 4.9.4 Schoolteachers

Schools adopting the e-learning strategy have already trained the vast majority of their teachers in appropriate training programmes. Science, Mathematics and English teachers only were selected for interviews for two main reasons: they were involved in the e-learning process in this stage of e-learning implementation, and they were trained in the e-learning system.

Second year students were selected in this research for two main reasons. The first reason for this selection was that the second year students used e-learning in their learning process. The second reason was the availability of the students to carry out the second stage fieldwork in the following year.

# 4.10 Research sample

The first step in the sampling process is to cover a large number of students in order to build confidence about the applicability of the obtained data and the main findings, as "the bigger the sample, the more likely the results are to be representative of the whole population" (Moore 2006, p.116).

#### 4.10.1 Location sampling

The sample covered students in Bahrain's provinces (four out of five) that had adopted an e-learning strategy in order to ensure that the data reflected opinions and attitudes in various parts of Bahrain, and also to avoid any locational bias. This choice was based on the fact that these provinces are close to each other and they are not large in size and population. The selected Bahraini provinces were:

- 1. Capital
- 2. Muharraq
- 3. Northern
- 4. Central (see Figure 4.5)

# 4.10.2 School sampling: schools' selections

As explained earlier, e-learning at secondary school is still at the implementation phase and therefore, not all schools in Bahrain have e-learning as part of their teaching activities. A total of 11 schools are currently using e-learning as part of their teaching: 5 boys' schools and 6 girls' schools. A stratified random sampling technique was used to select the schools. Stratified sampling was based on dividing the eleven schools according to their province and sex, boys and girls strata. One boys' and one girls' school was selected from each province. Simple random selection was used for provinces with more than one school for one or other of the genders (see Table 4.3).



Figure 4.5: Scope of the study

Province	No of schoo an e-lea	ols implementing arning system		Selected Schools
1. Capital	Boys	Girls	Boys	Girls
	1	1	1	1
2. Muharraq	Boys	Girls	Boys	Girls
	2	1	1	1
3. Northern	Boys	Girls	Boys	Girls
	1	1	1	1
4. Central	Boys	Girls	Boys	Girls
	1	3	1	1
	5	6	4	4
Total		11		8

# Table 4.3: Schools' sampling

# 4.10.3 Interview sampling: schoolteachers

Not all schoolteachers were involved in e-learning at the stage when the researcher began this research. Therefore, the researcher established a set of selection criteria, as follows:

- 1. Teacher participants should currently use e-learning in their teaching.
- 2. Teacher participants should have passed the e-learning training programme set by the school.
- 3. Teacher participants should be full- time members of staff.
- 4. Teacher participants should teach second -year students.

A stratified random sample was used for the interviews with teachers'. This involved dividing the school teachers according into three strata according to their teaching discipline; namely Science, Mathematics and English language. A list of teachers was obtained for each stratum in each school. A simple random selection was made from each list to select participants for the interviews. The total number of schoolteachers interviewed in the current study was 24 in the first fieldwork visit and 24 in the second (see Table 4.4).

Subject	Number of male participants	Number of female participants	Total
English	4	4	8
Mathematics	4	4	8
Science	4	4	8
Total	12	12	24

Table 4.4: Schoolteachers by subject and gender

#### 4.10.4 Questionnaire sampling: students

The researcher established a set of selection criteria for the selection of student s:

- 1. The student must be in the second year at secondary school
- 2. The student must not be repeating a year
- 3. The student must be studying e-learning subjects.

Table 4.5 shows the number of students in each school and the selected samples. The number of the sample was 1,140 from a total of 3,351 students (34% of the population). The selected number was appropriate for this research due to time constraints and the reliability of the data required. The sample figure was checked for its reliability and confidence using two approaches. The first approach used the following formula<sup>1</sup>.

Sample Size = 
$$\frac{1}{(Accuracy Required)^2}$$
  
Accuracy Required =  $\frac{1}{\sqrt{Sample Size}}$ 

Accuracy Required = 
$$\frac{1}{\sqrt{1140}}$$
  
Accuracy Required = 0.0296

<sup>&</sup>lt;sup>1</sup> Gadsden, R., 2006. Questionnaire design [lecture handout for PGR training program, 9Feb., slide 8].

This accuracy was checked again using Al-Dhuhayan and Hassan's (2002, p.250) table which calculates the sample size according to a 95% level of confidence and to different percentages of margin of error. The table shows the appropriate sample selections for population sizes. According to the table, the sample sizes for a population of 3000 (the nearest number to 3351) are 341 at .05 margin of error; 500 at .04 margin of error; 787 at .03 margin of error; 1,334 at .02 margin of error and 2,286 at .01 margin of error. Therefore, the selected sample of 1,140 lies between margins of error of 0.02 and 0.03. This is very close to the accuracy predicted by the previously mentioned formula.

Methodology	Target	Schools	Total No. of students	Selected sample
		Al Hidaiya Al	397	135
		Khalifia		
		(Boys)		
		Ahmed Al Omran	617	210
		(Boys)		
		Hamad Town	368	125
Questionnaire	Students	Intermediate		
		Secondary (Boys)		
		East Rifa Secondary	397	135
		School (Boys)		
		Al Istiqlal	485	165
		Commercial (Girls)		
		Al Hoora	338	115
		Commercial (Girls)		
		Sitra (Girls)	367	125
		Saar Secondary	382	130
		School (Girls)		
	1	8 Schools	3,351	1,140
Total	l	(4 Boys' and 4		
		Girls')		

 Table 4.5: Student samples for the questionnaire survey

#### 4.10.5 Focus group sampling: students

A list of students who agreed to participate in a focus group was obtained from the Information Technology specialist at each school. An optimal group size, as suggested by Carey (1994, p.229), is between five and 12 per session. Factors to consider include the sensitivity of the topic, and the abilities, expectations, and needs of the participants. In this study, it was planned at an early stage of the data collection to have no more than eight participants in each group. Restricting the groups to this size enabled the researcher to manage and control the groups more effectively. Therefore, eight students were selected randomly from the list of each school. They were grouped into single gender groups, because the schools are arranged that way. Moreover, it is preferable to use single sex groups in the case of young people (Large & Beheshti 2005, p.322).

Eight focus groups in each fieldwork visits were conducted with students in their classrooms, in the presence of the Information Technology specialist and, at a time suitable for both students and staff. Each group had between five and eight participants (see Table 4.6). Fifty students participated in the focus group sessions in the first stage and 53 in the second.

Focus group (male	No. of	No. of	
students)	participants	participants	
	(First stage)	(Second stage)	
m 1	6	8	
m 2	5	5	
m 3	6	7	
m 4	5	6	
Sub-Total	22	26	
Focus group (female	No. of	No. of	
students)	participants	participants	
	(First stage)	(Second stage)	
f 1	5	8	
f 2	8	8	
f 3	7	5	
f 4	8	6	
Sub-Total	28	27	
Total	50	53	

# **Table 4.6: Focus group participants**

# **4.11 Data collection techniques**

As discussed earlier in this chapter a mixed method approach was used in the current study, involving the use of both quantitative and qualitative methods. A questionnaire was used to collect mainly quantitative data, and interviews and focus groups used to collect qualitative data. The next sections present the design of these techniques.

# 4.11.1 Questionnaire

# 4.11.1.1 Questionnaire design and structure

The design and structure of the questionnaire are explained in detail below:

#### **Questionnaire cover sheet**

A cover sheet was included on the questionnaire. The main purpose of the cover sheet was to indicate the main aim and importance of the research, the confidentiality of the responses, and the researcher's identity and contact information (see Appendix 2). The questionnaire contained the following sections:

## Section 1: General Information

This section aimed to identify students' gender, age and name of school. These data were needed to enable the research variables to be related to these demographic data during analysis.

#### **Section 2: Computer experience**

This section aimed to identify students' prior computer experience, ownership of a computer, whether they had Internet access at home, and the purpose for which they used a computer at home. Further, respondents were asked to identify anyone who encouraged them to use a computer.

#### Section 3: Technology Acceptance Model (TAM)

This section explored respondents' perceptions regarding the TAM variables, which included perceived usefulness, perceived ease of use, perceived enjoyment, subjective norm, attitude and behavioural intention to use the e-learning system. Students were asked to indicate their agreement or disagreement with several statements using a five-point Likert-type scale ranging from (1) "strongly disagree" through to (5) "strongly agree". Consistent with other research, it was decided that it was appropriate to keep the TAM groups of statements together (Spacey 2003, p.74). Davis and Venkatesh (1996, p.19) found that item grouping versus item intermixing had no significant effect either on the high levels of validity and reliability of the TAM scales, or on the path coefficients linking them together. Davis and Venkatesh suggested other researchers should continue using the grouped format when using the TAM to best predict and explain user acceptance of IT.

The TAM variables were measured using statements adapted from a number of studies with some modification to conform to the research context. Original statements related to each variable are listed in Tables 4.7, 4.8, 4.9, 4.10, and 4.11.

Statements	Source
- Using electronic mail saves me time	Davis (1989)
- Using the Web-based learning system will	Pituch and Lee
make it	(2006)
easier to learn course content	
-I would find CHART-MASTER useful in my	Davis (1989)
job	

# **Table 4.7: Perceived usefulness statements**

# Table 4.8: Perceived ease of use statements

Statements	Source
- Learning to use the Internet would be easy for me	Teo, Lim and Lai (1999)
- It is easy for me to become skilful at using	Wolski and Jackson
web based	(1999)
instruction	Davis (1989)
- I would find CHART-MASTER to be	
flexible to	Davis (1993)
interact with	
- Overall, I find the Internet easy to use	

Statements	Source	
- I find using WriteOne to be enjoyable		
- The actual process of using WriteOne is	Davis, Bagozzi and	
(unpleasant/pleasant)	Warshaw (1992)	
- I have fun using WriteOne		

Statements	Source	
- My teachers/instructors think that I should	Ma, Andersson and	
use	Streith (2005)	
computers in my future teaching	Ma, Andersson and	
- People who are important to me think that I	Streith (2005)	
should use	Ma, Andersson and	
computers in my future teaching	Streith (2005)	
- My friends think that I should use computers	Ma, Andersson and	
in my	Streith (2005)	
future teaching		
- People who influence my behaviour think		
that I should		
use computers		

# Table 4.10: Subjective norm statements

 Table 4.11: Behavioural intention statements

Statements	Source
- I intend to use ILM regularly next semester	Cheung, Lee and Chen (2002)
- I intend to increase my use of web based	
instruction	Wolski and Jackson
in the future.	(1999)
- I strongly recommend others to use WWW	Moon and Kim
	(2001)
- I will frequently use WWW in the future	
	Moon and Kim
	(2001)

Moreover, other statements related to the research constructs were constructed and added by the researcher to give a clearer picture of the research context. Such statements are listed in Table 4.12, 4.13, 4.14, and 4.15.

Table 4.12: New	perceived	usefulness	statements
	percertea		Sectoritones

Statements
· Using Edunet helps me to get information at any time and at any
place
Using Edunet enables me to access many resources

 Table 4.13: New perceived ease of use statements

Statements
<ul><li> I find it easy to learn how to use Edunet</li><li> It is difficult for me to learn through the Edunet portal</li></ul>

# Table 4.14: New perceived enjoyment statements

Statements
- The interaction with sounds, colours and pictures using Edunet is
pleasant
- Lessons in which Edunet is used are not pleasant

# Table 4.15: New subjective norm statements

Statements	
- I would use Edunet even if no one I know was using it	
<ul> <li>I would use Edunet if my friends used it</li> </ul>	

Furthermore, the five attitudinal statements included in the questionnaire are listed in Table 4.16. The score used in this section is based on a semantic differential scale, which is a "generalized attitude scale" (Osgood, Suci & Tannenbaum 1957, p.195). It can be used to measure a broad range of issues such as personality, attitude and perception regarding any object (Sufian 2009, p.29). It provides "the respondent with one or more concepts to differentiate and a set of bipolar adjectives against which to do so. The respondent's task is to rate each concept on each scale" (Fishbein & Ajzen 1975, p.74).

Students were asked to rate the five items according to how they felt about using Edunet by making a check mark in the place that best described their opinion.

Attitudes	Source
Bad/Good	Al-Gahtani and King (1999);
	Wolski and Jackson (1999); Moon
	and Kim (2001)
Foolish/Wise	Al-Gahtani and King (1999); Moon
	and Kim (2001)
Unenjoyable/Enjoyable	Igbaria (1993); Wolski and Jackson
	(1999)
Unnecessary/Necessary	Wolski and Jackson (1999)
Harmful/Beneficial	Al-Gahtani and King (1999)

**Table 4.16: Attitudinal items** 

#### Section 4: Usage (U)

Two indicators of usage derived from previous research (Al-Gahtani (1995) and Teo, Lim and Lai (1999)) were used as indicators of Edunet usage. These are:

- Frequency of Edunet use
- Time spent per day using Edunet

Frequency "represents the number of times a user said he or she has used a system over a period, whereas volume gave time that the user used a system over the same period" (Burton-Jones & Hubona 2006, p.710).

Frequency of use was measured on a six-point scale ranging from (1) "less than once a month" to (6) "a few times a day". Respondents were also asked to indicate the

amount of time spent using Edunet, using a six-point scale ranging from (1) "almost never" to (6) "more than 3 hours per day".

At the end of the questionnaire, respondents were asked to add any comments they had regarding any issues related to e-learning in Bahrain secondary schools.

# 4.11.1.2 Translation

To translate the questionnaire into Arabic, the language spoken in the Kingdom of Bahrain, the translation went through a number of stages. Firstly, it was translated by the researcher; secondly, it was checked by two professionals who speak both Arabic and English; finally, it was checked by a school teacher who specialises in the Arabic language. This was done to check the clarity of the words for students at the age of the potential participants (see Appendix 2).

# 4.11.1.3 Pre-testing and pilot study

Before any questionnaire can be considered to be effective as a tool for gathering data, it must be tested. Oppenheim (1992, p.47) states that "…every aspect of a survey has to be tried out beforehand to make sure that it works as intended". He adds that carrying out a pilot helps with how the questions of the survey are worded and also procedural matters, such as the design of an introduction letter, how the questions are ordered, and how to reduce non-response rates. Saunders, Lewis and Thornhill (2009, p.394) add that the purpose of pilot test is to refine the questionnaire so that the respondents will have no problems in answering the questions and in recording the data.

Pilot testing allows authors the "time and opportunity to redesign problematic parts of the survey before it is actually used" (Litwin 1995, p.60). It also predicts difficulties that might occur during the subsequent data collection. Reliability can also be improved by using a pre-test or pilot test first (Neuman 2006, p.191).

The first aim of the pilot test is to ensure that the wording of the questions is both clear and simple, as this has an impact on the respondents and their willingness to complete the survey to the end, as stated by Litwin (1995, p.62):

If respondents have trouble reading the words on the page, they will not have much energy left to think about the meaning of the questions.

Dillman (1978, pp.156-157) and Collis and Hussey (2003, p.175) suggest that questionnaires should be pre-tested by different groups, including colleagues and potential respondents, to eliminate any problems. In this research, the pre-testing was carried out first, followed by a pilot study. The first stage was carried out with six GCC (Gulf Cooperative Council) research students who were colleagues at Loughborough University. The main reasons for this selection were (1) familiarity of the students with the education system and culture of Bahrain, (2) convenience and manageability, and (3) cost was not an issue. Colleagues provided useful comments relating to the scale and wording of some of the questions.

The pilot study in this research was carried out with the research population. Bell (2005, p.147) and Collis and Hussey (2003, p.175) note that it is better to try out the survey on a group similar to the one that forms the population of the study and so the pilot study was carried out in Bahrain in two phases. First, the questionnaire was sent to three academic staff, one in an IT College, and the other two in the College of Education at the University of Bahrain. The selected academic staff had considerable experience in the design of questionnaires, so they provided some comments regarding the clarity of the instructions and the wording of some of the questions. All the suggested changes were made to ensure that the questionnaire was clear.

Second, the pilot test was conducted with 21 students (11 female and 10 male), using the Arabic version of the questionnaire. It asked participants to describe any problems they encountered when completing the questionnaire and add any comments. Comments received from students were about wording and the layout of the questions. After taking into account the students' comments, changes were made to the final version of the questionnaire.

After these changes were carried out, the questionnaire was ready for the main study. This was undertaken between October and December 2006.

#### 4.11.1.4 Questionnaire distribution

Before distributing the questionnaire, introductory interviews with the head teacher and an Information Technology specialist at each school were held in order to explain the importance of the survey and the method of distributing questionnaires to the students. The questionnaires were delivered and collected by the researcher personally. The following strategies were also used to ensure a satisfactory number of responses were received:

- An official letter from the Minister of Education was sent to each school asking them to help the researcher during the fieldwork.
- The questionnaire was designed in English and then translated into Arabic to suit the needs and understanding of participants.
- A covering letter was attached to the questionnaire to explain its aim and the importance of the study for the development of e-learning in Bahrain.
- The questionnaires were distributed and collected via the Information Technology specialists and teachers at each school.
- Questionnaires were distributed after class and students had the choice to answer the questionnaire immediately or at a time convenient to them.

# 4.11.1.5 Reliability and Validity

# Reliability

Carmines and Zeller (1979, p.11) defined reliability as the "extent to which an experiment, test, or any measuring procedure yields the same results on repeated trials". To measure the reliability of the amended TAM scale in the current study, the internal consistency measure was used. This method is appropriate for scales with Likert-type answers (Spacey 2003, p.93). Internal consistency is "an indicator of how well the different items measure the same issue" (Litwin 1995, p.21). SPSS was used to measure internal consistency by calculating Cronbach's alpha where "high correlations between alternative measures or large Cronbach alphas are usually signs that the measures are reliable" (Straub 1989, p.151).

# Validity

Validity is "the degree that a particular indicator measures what it is supposed to measure rather than reflecting some other phenomenon" (Carmines & Zeller 1979, p.16). Sánchez and Hueros (2010, p.1636) also defined validity as "the degree to which a variable differs from the other set variables". Validity is needed to ensure that the measured data reflect what they set out to measure.

In the current study, amendments were made to the TAM statements to reflect the research context. Straub (1989, p.153) argues that "the more the format, order, wording, and procedural setting of the original instrument is changed, the greater the likelihood that the derived instrument will lack validated qualities of the original instrument". Cronbach and Meehl, as quoted in Carmines and Zeller (1979, pp.22-23), add that "Construct validity must be investigated whenever no criterion or universe of content is accepted as entirely adequate to define the quality to measured". Construct validation focuses on "the extent to which a measure performs in accordance with theoretical expectations" (Carmines & Zeller 1979, p.27). It can be assessed through Principal Component Analysis (PCA) (Ngai, Poon & Chan (2007, p.258); Masrom (2007, p.5)). Similarly, Straub (1989, p.151), citing the work of Long (1983) and Nunnally (1967), suggests measuring the construct validity by using techniques such as confirmatory or principal components analysis. In this study, principal component analysis was used to assess the scales' construct validity.

#### 4.11.2 Interviews

#### 4.11.2.1 Interview design

As indicated in previous sections, interviews offer the "possibility of modifying one's line of enquiry, following up interesting responses and investigating underlying motives in a way that postal and other self-administered questionnaire cannot" (Robson 2002, pp.272-273). To gain a comprehensive picture of the current situation, interviews with schoolteachers were used to complement and support the questionnaire results. They clarified issues that could not be explained by numerical data. Hakim (2000, p.41) states that:

...the qualitative study may be carried out after the main survey, which can then provide a rich sampling frame for selecting particular types of respondent for depth interviews. This link strengthens interpretation of the survey results, and it may be possible to set the qualitative results in a statistical context by directly linking the two sets of data.

The interviews with schoolteachers were semi-structured to give participants the opportunity to express their perceptions freely. The interview questions were used to explore the secondary school teachers' opinions and views regarding the e-learning system and its use in class activities (see Appendix 3). They also helped to identify

factors that influence students' acceptance of e-learning as part of their learning process, as well as the main barriers and obstacles that hinder the use and acceptance of the e-learning system.

All interviews with schoolteachers were carried out at their school at a time and place convenient for them. Each interview lasted approximately 30-45 minutes.

# 4.11.3 Focus Group

#### 4.11.3.1 Focus group design

Two different questioning strategies are currently in use in focus groups. These are the topic guide and the questioning route. The topic guide is a "list of topics or issues to be pursued in the focus group". However, the questioning route is a "sequence of questions in complete, conversational sentences" (Krueger 1998, p.9).

A topic guide was used in this study to reflect the aim and objectives of the study. Topics or issues discussed in the focus group included use of e-learning in class activities, social impact, barriers and obstacles, motivating factors and other issues related to an e-learning environment (see Appendix 4). All these topics were translated into Arabic by the researcher first and then checked by the translator to ascertain the accuracy of the translation.

Each session followed the same structure and discussed the same topics. At the beginning of each session, participants were encouraged to introduce themselves to the group. The researcher acted as facilitator to guide the discussion between students from one topic to another and to encourage students' participation. The researcher also ensured that all students contributed their views.

A number of factors affected the time spent in each session. Students' free time and the availability of classrooms were the most important factors that had to be considered by the researcher when conducting these sessions. Taking these into account, the interviews lasted from 30-45 minutes.

# 4.12 Data analysis

Both quantitative and qualitative data were generated from this research. Each set of data was analysed separately (Chapters Five and Six) and were then integrated together in Chapter Seven, the discussion.

#### 4.12.1. Data input and recording

The quantitative data from the questionnaire were coded and entered into the SPSS. Comments made by the students on the questionnaire were treated as qualitative data and recorded separately using the same identification number used on the questionnaire. Interviews with schoolteachers and focus groups with students were transcribed first in Arabic and then translated into English.

#### 4.12.2 Screening and cleaning the data

It is important to check any data for errors before starting analysis and the screening process involves a number of steps as follows (Pallant 2005, p.40):

- Checking for errors. Each variable has to be checked for scores that are out of range.
- Finding the error in the data file. This means finding precisely where in the data file the error occurred.
- Correcting errors in the data file by referring to the original questionnaire.

There are a number of different ways to check for errors using SPSS (Pallant 2005, p.41). One way is to use either the frequencies or descriptive statistics options in SPSS. All these steps were checked before analysis began.

## 4.12.3 Quantitative data analysis method

Data analysis in this study began with the production of descriptive statistics that described the characteristics of the respondents. This was attained by calculating frequencies and percentages and presenting them in tables and graphs. Descriptive statistics can also include the calculation of median, mode and mean. The mode is "the most frequently occurring score in a set of data" (Field 2005, p.738) and this was appropriate for categorical variables such as gender. The median is "the middle score of a set of ordered observations" and the mean is "the centre of a distribution of scores" (Field 2005, p.738).

To explore relationships among variables, chi-square, correlation, principal component analysis, and multiple regression were used (see Figure 4.6). For relationships that included nominal variables, such as gender and ownership of a computer, the chi square statistic was an appropriate test of association. The chi-square test (denoted as " $\chi^{2}$ ") is "an inferential statistical test that is used to examine relationships between two variables with nominal or ordinal data" (Vaughan 2001, p.75).

Principal Component Analysis (PCA) is a "multivariate technique for identifying the linear components of a set of variables (Field 2005, p.742). To assess the factorability of the data, two statistical measures are generated by SPSS: Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) (Pallant 2005, p.174). Bartlett's test of sphericity is "a notoriously sensitive test of the hypothesis that the correlations in a correlation matrix are zero" (Tabachinick & Fidell 2001, p.589). It should be significant (p<.05) for the analysis to be considered appropriate. The KMO ranges from 0 to 1, with 0.6 suggested as the minimum value for the PCA to be appropriate (Tabachnick & Fidell 2001, cited in Pallant 2005, p.174).

The rule of the Kaiser criterion which is usually referenced in relation to Kaiser's 1960 work, is to drop all components with eigenvalues under 1.0 (Garson 2006, no page number). By using Kaiser's criterion or the eigenvalue rule, only factors with an eigenvalue of 1.0 or more are retained for further investigation (Pallant 2005, p.175).

A varimax rotation was used in the current study. It was selected for ease of interpretation. Varimax rotation is a method of orthogonal rotation and "loads a smaller number of variables highly onto each factor resulting in more interpretable cluster of factors" (Field 2005, p.749).

Furthermore, correlations between the six TAM variables were calculated by using Pearson's Product-Moment Correlation Coefficient which is suitable for use with continuous variables. The Pearson Correlation Coefficient is a "standardized measure of the strength of relationship between two variables" (Field 2005, pp.740-741). It ranges from -1 to +1 (Pallant 2005, p.121). The sign indicates the direction of the relationship between two variables whilst the size of absolute value indicates the

strength of the relationship. Therefore, by calculating total scale scores for each variable, the data become continuous, despite being derived from ordinal data.

Multiple regression was used in the current research to identify the main factors influencing students' acceptance of the e-learning system and to test for the model's relationships in line with Ndubisi (2006, p.577), Burdwell (2006, p.64), Al-Khateeb (2007, p.145) and Sun *et al.* (2008, p.1196). Pallant (2005, p.140) defines multiple regression as a "family of techniques that can be used to explore the relationship between one continuous dependent variable and a number of independent variables or predictors". This uses the regression equation:

$$Outcome_i = (Model_i) + error_i$$

This means that the outcome can be predicted by whatever model fits the data, plus some kind of error (Field 2005, p.144). The model in regression is a linear model, which is based on a straight line. Any straight line can be defined by two things: the slope or gradient and the intercept of the line (Field 2005, p.144). The slope refers to the degree of steepness of the regression line whereas the intercept is the point where the line crosses the Y axis (Vaughan 2001, p.103). Therefore, the equation becomes:

$$Y_i = (b_0 + b_1 x_1) + \varepsilon_i$$

 $Y_i$  is the outcome (dependent variable) and  $x_1$  is the independent variable that explains the variance in  $Y_i$  b<sub>1</sub> is the slope of the straight line and b<sub>0</sub> is the intercept of that line (Field 2005, p.145). These two parameters are known as the regression coefficients. The residual term ( $\varepsilon_i$ ) represents "the difference between the score predicted by the line for participant *i* and the score that participant *i* actually obtained" (Field 2005, p.145).

The same equation can be used in multiple regression but with extra predictors, and each predictor has its own coefficient. Thus, the equation is:

$$Y_{i} = (b_{0} + b_{1}x_{1} + b_{2}x_{2} + .. + b_{n}x_{n}) + \varepsilon_{i}$$

Therefore, the outcome  $(Y_i)$  is "predicted from a combination of all the variables multiplied by their respective coefficients plus a residual term" (Field 2005, p.157).

Statistical techniques to compare groups, such as the one-way analysis of variance (ANOVA) and the independent-sample-t-test, were used in the current study (see Figure 4.6). The decision to use parametric tests or non-parametric tests depends on the nature of the data and their distribution. In other words, parametric tests are more powerful and are usually used for ratio or interval data, whereas nonparametric tests are usually used for nominal or ordinal data (Vaughan 2001, p.6). Further, to use parametric tests such as the t-test, data need to be normally distributed. However, Hinton (2004, p.55) writes that "even though the distribution of scores is not normally distributed, the distribution of sample means will end up as a normal distribution as long as the samples are large enough"; this is called the 'central limit theorem'.

Independent-sample-t-tests were used in the current study to compare the mean scores of two different groups of subjects (Pallant 2005, p.205). It is a parametric statistical test. A number of assumptions were checked by the researcher before using this test, such as the homogeneity of variance, the level of measurement and whether the distribution was normal.

One-way between-groups analysis of variance is used when there is one independent variable with three or more levels or groups (e.g. age), and one dependent continuous variable (Pallant 2005, p.215). A post hoc test, such as Tukey's HSD test, which is a "set of comparisons between group means that were not thought of before data were collected" (Field 2005, p.741), was used to identify which combination of groups were significantly different (Spacey 2003, p.91).

To assess the importance of findings, the 'effect size' was calculated. This is a "set of statistics which indicates the relative magnitude of the differences between means" (Pallant 2005, p.201). There are a number of different effect size statistics and eta squared ( $p^2$ ) is the most commonly used. Eta squared "represents the proportion of variance of the dependent variable that is explained by the independent variable" and its values range from 0 to 1 (Pallant 2005, p.201). The strength of eta squared values are classified as: 0.01= a small effect, 0.06= a moderate effect, 0.14= a large effect (Cohen 1988, cited in Pallant 2005, p.201).



#### 4.12.4 Qualitative data analysis method

The qualitative data collected in the current study were transcribed first in Arabic and then translated into English. There are more than 20 different software packages available nowadays that can assist qualitative researchers in their work with textual data (Kelle 2004, p.473). Some of these programs, which are widely applied, are NVivo, ATLAS/ti and MAXQda.

In the current study, Atlas/ti was selected as the analysis tool for the qualitative data obtained from the interviews, focus groups and open-ended questions from the questionnaires. Atlas/ti stands for "archive for technology, and the life-world and everyday language; 'ti' stands for text interpretation" (Hardy 2005, p.177).

Atlas/ti provides flexible tools that help researchers to define all possible forms of linkages between the 'object' of their qualitative database, such as the use of text segment categories and subcategories, and memos (Kelle 2004, p.483).

In addition, Barry (1998, no page number) lists the strengths of Atlas/ti as: a well designed interface; all features on screen at once; visually attractive; no limit on units of coding; hypertext links between data/codes/documents; inclusion of text segments and memos in network displays; conceptual network displays can be manipulated; and assisting creative and visualized theoretical thinking. However, the software has some weaknesses. These include loose structure and uncertainty; limited searching capacity; limited case and project management tools; and files cannot be altered.

# 4.13 Ethical issues

Research ethics can be defined as "the appropriateness of your behaviour in relation to the rights of those who become the subject of your work, or are affected by it" (Saunders, Lewis & Thornhill 2009, pp.183-184). According to Trochim (2006, no page number), there is no set of standards that can anticipate every ethical circumstance. Therefore, various ethical issues in the UK and Bahrain were considered whilst formulating the research plan. In the UK, the researcher filled in the Loughborough University ethical clearance checklist and checked the published guidelines to assure compliance. A number of guidelines of the British Educational Research Association were also checked by the researcher, especially those relating to the researcher's responsibility towards the participants. These are:

- Participants in a research study have the right to be informed about the aims and purposes of the study and the publication of findings, and to give informed consent before participating in research.
- Participants have the right to withdraw from a study at any time.
- Permission should be obtained from the school when interviewing students up to school leaving age.
- Honesty and openness should characterize the relationship between researchers, participants and institutional representatives.
- It is the researcher's responsibility to be mindful of religious, cultural, gendered, and other significant differences within the research population in planning, conducting, and reporting their research (British Educational Research Association 1992, p.2).

In Bahrain, ethical clearance is necessary for administrative and social reasons. The clearance process includes filling in ethical clearance documents and signing consent forms. The researcher obtained clearance to carry out the research from the Minister of Education, the Director of the Educational Research and Development Centre, and the Director of Secondary Education and Schools' Management.

The survey was conducted with students as a group inside a classroom, in the presence of an Information Technology specialist, nominated by the school management as an observer, and with no video or voice recording taking place. The researcher explained to the students the aims and objectives of the research to ensure that the participants understood the general thrust of the research. Participation was voluntary and students were free to withdraw at any stage of the study without giving reasons.
# 4.14 Conclusion

This chapter explained the theoretical framework and described the research design and approaches used in the study. It identified the mixed method approach as the most appropriate approach for this research to investigate secondary school students' acceptance of an e-learning system. This approach was considered to be the best way of achieving the aims and objectives of the study set out in Chapter One. Combining quantitative and qualitative approaches in one study provided a better understanding of the research problems and allowed for greater confidence in the research findings.

Therefore, it was decided to use a questionnaire survey, focus groups and semistructured interviews in this study. The use of a questionnaire was appropriate to identify the characteristics of the respondents and to provide the quantitative data needed to test the research hypotheses, by measuring variables. A qualitative approach was used to provide data to enhance the quantitative data and help the researcher to gain a greater insight into the research's main concerns. Interviewing schoolteachers and students gave them an opportunity to discuss their ideas and clarify some important issues.

The sampling procedure used was explained and the pilot study and pre-testing of the questionnaire undertaken before the actual distribution were described. The chapter also provided an overview of the quantitative and qualitative data analysis methods. The next chapter discusses the analysis of the questionnaire survey data.

# CHAPTER FIVE QUESTIONNAIRE ANALYSIS

# **5.1 Introduction**

This chapter presents the findings derived from the quantitative data collected during the survey entitled "Students' acceptance of e-learning in Bahrain Secondary Schools" (see Appendix 2). Section 5.2 provides an overview of the characteristics of the survey respondents such as gender, age and name of school. This is followed by Sections 5.3-5.7, which include details of respondents' computer proficiency, their ownership of a computer, having access to the Internet, and the purposes for which they use a computer at home.

Section 5.8 describes the respondents' choices in relation to the amended version of the TAM statements while, in Section 5.9, the reliability of the scales used in the TAM is shown and the factor analysis process is also described. The results of statistical tests to explore relationships and differences between the six TAM variables are considered in the remaining sections.

# **5.2 Overview of respondents**

The survey was completed by 926 respondents from a sample of 1,140 students resulting in a response rate of 81.2% (see Appendix 5).

#### 5.2.1 Gender and age

Survey respondents included 478 males (51.6%) and 448 females (48.4%). Over half (59.9%) of respondents were aged 15 years, whilst one third (33.6%) were aged 16 years. Table 5.1 shows that only 6.5% of respondents were 17 years of age.

AGE	Male		Female		Total	
	Number	%	Number	%	Number	%
15 year	225	47.1	330	73.7	555	59.9
16 year	229	47.9	82	18.3	311	33.6
17 year	24	5.0	36	8.0	60	6.5
Total	478	100	448	100	926	100

Table 5.1: Respondents broken down by age and gender

Table 5.1 shows that about three quarters (73.7%) of the female respondents were aged 15, whilst about half (47.9%) of the male respondents were aged 16. 8.0% of female respondents were aged 17, compared to 5.0% of male respondents.

# **5.3 Computer Experience**

Respondents were asked to specify the length of time they had been using computers. As shown in Figure 5.1, the majority (70.6%) of the respondents had used a computer for more than 3 years (the longest length of time stipulated in the questionnaire), whilst 4.4% had used it for less than one year, the shortest period suggested. A quarter (24.9%) of the respondents had used the computer for more than one but fewer than three years.



Figure 5.1 Respondents' computer experience

# **5.4 Computer Ownership**

Respondents were asked to indicate whether they owned a computer at home. Table 5.2 shows that the majority (95.9%) of respondents owned computers while 4.1% did not. With regard to gender, 95.3% of female respondents owned a computer at home compared to 96.4% of the male respondents.

Answer	Male		Female		Total	
	Number	%	Number	%	Number	%
No	17	3.6	21	4.7	38	4.1
Yes	461	96.4	427	95.3	888	95.9
Total	478	100	448	100	926	100

 Table 5.2: Computer ownership at home

The  $\chi^2$  statistic (.492, df = 1, P > 0.05) shows that the proportion of males who owned a computer at home was not significantly different from the proportion of females who possessed a home computer.

# 5.5 Access to the Internet

Respondents were also asked whether they had access to the Internet at home. As shown in Table 5.3, the majority (86.5%) of respondents had their own access to the Internet at home compared to 13.5% who did not have access at home. The majority (87.3%) of female respondents had access to the Internet at home compared to 85.8% of male respondents.

Answer	Male		Female		Total	
	Number	%	Number	%	Number	%
No	68	14.2	57	12.7	125	13.5
Yes	410	85.8	391	87.3	801	86.5
Total	478	100	448	100	926	100

 Table 5.3: Sample broken down by having their own access to

 the Internet at home

The  $\chi^2$  statistic (.328, df = 1, P > 0.05) shows that the percentage of males that had access to the Internet was not significantly different from the percentage of females that had Internet access.

# 5.6 Reasons for using a computer

Respondents were asked to indicate the purposes for which they used their home computer. As shown in Table 5.4, 80.2% of respondents used the computer at home for accessing the Internet, less than two thirds (62.1%) also used it for schoolwork, whereas more than half (57.2%) used it for e-mail. About one third (33.7%) of respondents used the computer for games and a quarter (24.3%) used it for other purposes, such as programming, building a website, and writing reports.

Answer	Male		Female		Total	
	Number	%	Number	%	Number	%
Internet	381	79.7	362	80.8	743	80.2
School work	276	57.7	299	66.7	575	62.1
E-mail	261	54.6	269	60.0	530	57.2
Games	164	34.3	148	33.0	312	33.7
Other	145	30.3	80	17.9	225	24.3

Table 5.4: Purposes for using a computer\*

\*Totals do not equal 100% as participants could choose more than one answer.

Table 5.4 shows that the majority (79.7%) of male respondents used their home computer to access the Internet. More than half (57.7%) used it for schoolwork and likewise for e-mail, whereas over one third (34.3%) used it for games. However, the majority (80.8%) of female respondents used their computer to gain access to the Internet, while two thirds (66.7%) used it for schoolwork, and one third (33.0%) used it for games. Over half (60.0%) of the respondents used it for e-mail.

# **5.7 Encouragement**

Respondents were asked to indicate who encouraged them to use the computer (they were able to choose more than one option). The study revealed that a friend (55.9%) was the person most likely to encourage respondents' use of computers, compared to 40.9% who specified their father (see Table 5.5). Mothers accounted for 29.9%, while teachers accounted for 19.9%. Over a quarter (26.2%) of respondents indicated that other people encouraged them to use the computer, such as brother, aunt, cousin or themselves.

Person	Male		Female		Total	
	Number	%	Number	%	Number	%
Friends	286	59.8	232	51.8	518	55.9
Father	225	47.1	154	34.4	379	40.9
Mother	152	31.8	125	27.9	277	29.9
Others	111	23.2	132	29.5	243	26.2
Teacher	89	18.6	95	21.2	184	19.9

 Table 5.5: Respondents broken down by the people who encouraged them to use a computer\*

\* Totals do not equal 100% as participants could choose more than one answer.

Furthermore, friends encouraged 59.8% of male respondents compared to 51.8% of female respondents. About half (47.1%) of male respondents indicated that their fathers encouraged them to use a computer compared to 34.4% of female respondents. On the other hand, less than one third (31.8%) of male respondents indicated that their mothers encouraged them to use a computer compared to 27.9% of female respondents. Only 18.6% of male respondents indicated that teachers encouraged them to use the computer compared to 21.2% of female respondents. Table 5.5 shows that a friend was the person most likely to encourage both males and females to use computers. However, more males than females reported that their parents encouraged them to use computers.

# 5.8 The Technology Acceptance Model

This section describes the respondents' responses to perceived usefulness, perceived ease of use, behavioural intention, subjective norm, attitudes, and perceived enjoyment statements using a Likert scale. The Likert scale is "a type of psychometric response scale often used in questionnaires, and is the most widely used scale in survey research" (Wikipedia 2007). Thus, respondents specify their level of agreement to a statement when responding to a Likert questionnaire item.

In order to prevent participants from merely scanning the list of statements and choosing the same answer for all, some negative statements were included in this study (Spacey 2003, p.111). These negative statements are: statement c in perceived

usefulness, statement c in perceived ease of use, and statement b in perceived enjoyment.

To compare respondents' views, Likert scale scores were calculated by multiplying the number of respondents for each preference with the score for each statement. For example, question 9, statement (a) generated the following output:

$$\frac{(63\times1) + (51\times2) + (190\times3) + (350\times4) + (172\times5)}{926} = 3.7$$

A five-point Likert-type scale was used in the current study where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree.

#### **Perceived usefulness**

For the statements in the section on perceived usefulness, respondents were asked their opinion of the usefulness of Edunet. As shown in Figure 5.2, the majority (67.2%) of respondents ranked their scores either 'Agree' or 'Strongly Agree' that using Edunet would help them to get information at any time and at any place, while only 20.5% expressed their neutrality toward the statement. The Likert score was 3.77, suggesting respondents' agreement with the capacity of Edunet to provide information at any time and at any place.



Figure 5.2: Edunet helps to get information at any time and at any place

Respondents were asked to indicate their view on the statement "Learning through Edunet saves me time and effort". Figure 5.3 shows that more than half (55.5%) of respondents were in agreement with this statement, while 28.4% of respondents had a neutral view. The Likert score was 3.53, suggesting respondents' agreement that learning through Edunet saves them time and effort.



Figure 5.3: Using Edunet saves time and effort

Responses to the statement "Using Edunet makes it difficult for me to learn subject content", indicated, as shown in Figure 5.4, that over half (59.1%) of respondents disagreed or strongly disagreed with the statement, while 30.5% of respondents were neutral toward it. A Likert score of 2.29 suggests that it is easy to learn subject content when using Edunet.



Figure 5.4: Difficult to learn subject content using Edunet

As shown in Figure 5.5, about two thirds of respondents (65.2%) ranked their scores either 'Agree' or 'Strongly Agree' to the statement "Using Edunet enables me to access many resources", while 23.3% showed they were neutral. The Likert score of 3.79 suggests that Edunet enables students to access many resources.



Figure 5.5: Using Edunet helps me to access many resources

It is apparent from Figure 5.6 that the majority (73.1%) of respondents ranked their scores either 'Agree' or 'Strongly Agree' to the statement "Overall, I find Edunet useful in my learning", while 17.6% of respondents were neutral to it, giving a Likert

score of 3.91. This result suggests that, overall; respondents agree that Edunet is useful in learning.



Figure 5.6: Edunet useful in learning

# Perceived ease of use

For the statements in the section on perceived ease of use, respondents were asked about their opinion regarding Edunet's ease of use. They were asked to indicate if they found it "easy to learn how to use Edunet". Figure 5.7 shows that 61.6% of respondents agreed with the above statement, while 26.9% of respondents were neutral about it. The Likert score of 3.72 shows that respondents found it easy to learn how to use Edunet.



Figure 5.7: Easy to learn how to use Edunet

As shown in Figure 5.8, nearly two thirds (62.4%) of the respondents ranked their scores either 'Agree' or 'Strongly Agree' to the statement "It is easy for me to become skilful in using Edunet" while 27.3% gave neutral responses. The Likert score was 3.73, suggesting respondents' agreement that it is easy to become skilful in using Edunet.



Figure 5.8: Easy to become skilful in using Edunet

Respondents were asked to specify whether they found it "difficult to learn through the Edunet portal". Figure 5.9 shows that about half (43.9%) of the respondents disagreed or strongly disagreed with the above statement, while 41.0% gave a neutral responses. A Likert score of 2.57 suggests that respondents were uncertain about whether it was easy or difficult to learn through the Edunet portal.



Figure 5.9 Difficulty of learning through Edunet portal

It can be seen from Figure 5.10 that 55.2% of respondents ranked their scores either 'Agree' or 'Strongly Agree' in response to the statement "I find Edunet flexible to interact with", while 34.5% of respondents were uncertain about the statement. A Likert score of 3.56 suggests that respondents found Edunet flexible to interact with.



Figure 5.10: Flexibility of interacting with Edunet

Respondents were asked to indicate their view regarding "Overall, I find Edunet easy to use". As shown in Figure 5.11, 67.1% of respondents answered either 'Agree or 'Strongly Agree' to the above statement, while 22.9% gave neutral responses. Overall ease of use received the highest average score of 3.76; this suggests that students agreed on the whole that Edunet is easy to use.



Figure 5.11: Overall, Edunet is easy to use

#### Subjective norm

In relation to the subjective norm, this section included four statements that investigated the influence of peers and other people on students' decisions to adopt technology. Respondents were asked to indicate their views regarding the statement, "I would use Edunet even if no one I know was using it". Figure 5.12 shows that 54% of respondents responded either 'Agree' or 'Strongly Agree' to the above statement, while 31.7% gave a neutral answer. A Likert score of 3.57 suggests that respondents felt confident in deciding to use Edunet.



Figure 5.12: Using Edunet even if no one I know was using it

In Figure 5.13, about half (47.7%) of respondents responded either 'Agree' or 'Strongly Agree' to the statement, "My teachers think that I should use Edunet in my future learning", while only 29.5% of respondents were uncertain about the statement. The Likert score of 3.30 suggests that students were uncertain about their teachers' views and whether they thought that students should use Edunet in their future learning.



Figure 5.13: Teachers think that I should use Edunet

With regard to the statement, "I would use Edunet if my friends used it", about half (42.1%) of the respondents disagreed or strongly disagreed with this statement, while 28.0% gave a neutral answer (see Figure 5.14). A Likert score of 2.84 was obtained suggesting that respondents were uncertain whether they would use Edunet only if friends used it.



Figure 5.14: Using Edunet if friends used it

Regarding respondents' views concerning the statement "My parents think that I should use Edunet in my future learning", Figure 5.15 shows that 46.5% of respondents agreed with this statement, while over a quarter (30.1%) were neutral in their answers, giving a Likert score of 3.32. The results suggest that students were uncertain about their parents and their thoughts regarding the use of Edunet.



Figure 5.15: My parents think that I should use Edunet

In summary, the highest average score was recorded for the statement, "I would use Edunet even if no one I know was using it" which was 3.57 (see Figure 5.12). This suggests that students felt confident enough to use Edunet if they needed or wanted to; they did not require the influence of others.

# **Perceived enjoyment**

For the statements in the section on perceived enjoyment, respondents were asked about their opinion of the enjoyment they experienced when using Edunet. It can be seen from Figure 5.16 that over half of the respondents (58.2%) answered either 'Agree' or 'Strongly Agree' in response to the statement "The interaction with sounds, colours and pictures using Edunet is pleasant", while 24.5% gave a neutral answer. A Likert score of 3.55 suggests that respondents agreed about this aspect of Edunet.



Figure 5.16: Interaction with sounds, colours and pictures is pleasant

With regard to the statement "Lessons in which Edunet is used are not pleasant", around half (52.4%) of respondents disagreed or strongly disagreed with this statement, while just over one third (35.2%) gave a neutral answer (see Figure 5.17). A Likert score of 2.48 was obtained, suggesting that lessons are pleasant when Edunet is used.



Figure 5.17: Lessons are not pleasant when using Edunet

As seen in Figure 5.18, 53.1% of the respondents were in agreement with the statement "I have fun using Edunet", while 29.3% gave neutral responses. A Likert

score of 3.42 suggests that respondents were uncertain about whether they had fun when using Edunet.



Figure 5.18: Have fun using Edunet

Responses to the statement "Using Edunet is enjoyable" indicate, as shown in Figure 5.19, that over half (56.6%) of respondents answered either 'Agree' or 'Strongly Agree' to this statement, while over a quarter (26.1%) were neutral. The Likert score was 3.49, suggesting respondents agreed that using Edunet is enjoyable.



Figure 5.19: Using Edunet is enjoyable

In general, respondents' Likert scores ranged from 2.48 to 3.55 on perceived enjoyment. The results revealed that overall using Edunet was enjoyable, with the statement that mentioned the interaction with sounds, colours and pictures receiving the highest average scores. This suggests that these aspects are most important for students.

#### **Behavioural intention**

This section, containing four statements, asked respondents how often they expected or hoped to use Edunet in the future, and how far they were likely to recommend others to use it. Respondents were asked to indicate whether they intended to use Edunet regularly in the current semester. Figure 5.20 shows that less than half (40%) of respondents agreed (that is, they responded 'Agree' or 'Strongly Agree' with this statement, while over one third (36.9%) were neutral, giving a Likert score of 3.20. The results revealed that respondents were uncertain whether they would use Edunet regularly in the current semester.



Figure 5.20: Intend to use Edunet regularly this semester

When asked about their intention to increase their use of Edunet in the future, Figure 5.21 shows that 58.1% of respondents agreed to the statement, while 27.9% gave neutral responses. The Likert score of 3.63 shows that respondents were intending to increase their use in the future.



Figure 5.21: Intend to increase use in the future

In Figure 5.22, it can be seen that 58.8% of respondents agreed overall with the statement "I strongly recommend other students to use Edunet", while 26.8% gave neutral responses. The Likert score of 3.59 suggests that students strongly wished to recommend the use of Edunet to other students.



Figure 5.22: Recommending other students to use Edunet

When respondents were asked whether they intended to use Edunet frequently in the future, Figure 5.23 shows that 55.9% of respondents agreed with the statement, while

30.2% were neutral. The Likert score was 3.61, suggesting that respondents were intending to use Edunet frequently in the future.



Figure 5.23: Intention to use Edunet frequently in the future

In general, the Likert scores for the four statements ranged from 3.20 to 3.63. The results suggest that, overall, students intended to increase their use of Edunet in the future. The statement that indicated respondents' intention to increase their use in the future received the highest average scores. This revealed that students were happy to accept that their use of Edunet would increase and they were willing to use it more frequently in the future.

#### Attitude

This section included five statements concerned with students' feelings and perceptions about Edunet and its use. Scoring in this section was based on a semantic differential scale which measures "people's reactions to stimulus words and concepts in terms of ratings on bipolar scales defined with contrasting adjectives at each end" (Heise 1970, p.235). In addition, the semantic differential scale is an interval scale and is used to assess participants' attitudes toward a particular brand, object or individual (Sekaran 2000, p.199).

A consideration of students' opinions revealed that 45.4% of respondents thought that the idea of using Edunet was "extremely good" while only 3.0% thought it was "extremely bad" (see Figure 5.24). The Likert score was 4.17, suggesting respondents' agreement with the idea that using Edunet is "Quite good".



Figure 5.24: Bad or good idea to use Edunet

Figure 5.25 shows that the majority (73.0%) of respondents thought that the idea of using Edunet was wise compared to 10.3% who thought it was foolish, giving a Likert score of 3.88. This suggests that the idea of using Edunet is "Quite wise".



Figure 5.25: Foolish or wise idea to use Edunet

Regarding respondents' views about the use of Edunet, 60% of respondents considered the use of Edunet as enjoyable, while around a quarter (24.8%) gave a neutral response, resulting in a Likert score of 3.58 (see Figure 5.26). This suggests that respondents decided that their use of the Edunet was "Quite enjoyable".



## Figure 5.26: Use of Edunet (enjoyable - unenjoyable)

Respondents were asked to indicate their view regarding whether it is necessary to use Edunet. 20.1% of respondents considered the use of Edunet unnecessary while 53.9% considered it necessary, giving a Likert score of 3.44 (see Figure 5.27). This suggests that respondents were uncertain whether the use of Edunet is necessary.



Figure 5.27: Using Edunet (necessary or unnecessary)

In Figure 5.28, the majority (74.4%) of respondents thought that using Edunet was beneficial, while 9.0% thought it was non-beneficial and 16.6% gave a neutral response. The Likert score was 3.88, suggesting that respondents felt that using Edunet is "Quite beneficial".



Figure 5.28: Using Edunet (beneficial or non-beneficial)

## **5.9 Principal Components Analysis and scale reliability**

#### **5.9.1 Principal Component Analysis**

The research variables were tested for construct validity; (in particular convergent and discriminant validity) using Principal Components Analysis (PCA). The 27 items in the questionnaire concerning the amended TAM were subjected to PCA using SPSS. Prior to performing PCA, the suitability of the data was assessed. An inspection of the correlation matrix revealed the presence of many coefficients of 0.3 and above. The Kaiser-Meyer-Oklin value was 0.91, exceeding the recommended value of 0.6 (Kaiser 1970 in Pallant 2005, p.182) and Bartlett's Test of Sphericity (Bartlett 1954, cited in Pallant 2005, p.182) reached a level of statistical significance, supporting the factorability of the correlation matrix.

Principal Components Analysis revealed the presence of six components with eigenvalues exceeding one (Table 5.6), explaining 32.0%, 7.9%, 6.7%, 5.6%, 5.2% and 4.1% of the variance respectively. An inspection of the screeplot revealed a break

between the fifth and sixth components (Figure 5.29); there is also a break after the sixth component.

Component	Initial Eigenvalues				
	Total	% of Variance	Cumulative %		
1	8.653	32.049	32.049		
2	2.146	7.948	39.998		
3	1.824	6.757	46.755		
4	1.535	5.687	52.443		
5	1.422	5.269	57.713		
6	1.130	4.187	61.900		



Figure 5.29: Screeplot of the eigenvalues of the factors from SPSS

By comparing eigenvalues from the Principal Components Analysis and the corresponding criterion values obtained from parallel analysis, it was decided to retain five components for further investigation (Pallant 2005, p.184) (see Table 5.7).

Component	Actual eigenvalue	Criterion value	Decision
number	from PCA	from parallel	
		analysis	
1	8.653	1.3241	Accept
2	2.146	1.2803	Accept
3	1.824	1.2452	Accept
4	1.535	1.2135	Accept
5	1.422	1.1874	Accept
6	1.130	1.1619	Reject

Table 5.7: Comparison of eigenvalues from PCA and parallel analysis

Varimax rotation was then performed to aid in the interpretation of these five components. The rotated solution revealed that the five components had a number of strong loadings, although not all variables loaded onto only one component (see Table 5.9). Pallant (2005, p.188) notes that if variables are loaded on more than one component, it is worth trying to rotate a different number of components and, in this instance, six components seemed to give the most satisfactory solution.

The six component solutions explained a total of 61.9% of the variance, with Component 1 contributing 12.6%, Component 2 contributing 11.4%, Component 3 contributing 10.3%, Component 4 contributing 10.3%, Component 5 contributing 10.1% and Component 6 contributing 7.2% (Table 5.8).

Total Vallalee Explained							
	Rotation Sums of Squared Loadings						
Component	Total % of Variance Cumulative %						
1	3.408	12.621	12.621				
2	3.069	11.368	23.989				
3	2.789	10.331	34.319				
4	2.784	10.312	44.631				
5	2.717	10.063	54.694				
6	1.946	7.206	61.901				

 Table 5.8: Variance explained by the six factors

 Total Variance Explained

Extraction Method: Principal Component Analysis.

#### **5.9.1.1 Factor Titles**

Factor 1 included all the attitudinal statements and one behavioural intention statement, and accounted for 12.6% of the variance. The highest factor loadings included whether the idea and the use of Edunet was good, wise, beneficial, necessary and enjoyable whilst the behavioural intention statement included the recommendation to other students to use Edunet (see Table 5.9). These aspects suggested that the title, 'attitude' was appropriate for this factor. Factor 2 accounted for 11.4% of the variance and included all the perceived ease of use statements. Factor 3, which included all the perceived enjoyment statements and one attitudinal statement, accounted for 10.3% of the variance. The highest factor loadings included whether the use of Edunet was enjoyable, pleasant and fun, whilst the attitudinal statement was whether the use of the Edunet was enjoyable. A suitable title for this factor was 'enjoyment of using Edunet'. Factor 4 accounted for 10.3% of the variance and included all the perceived usefulness statements while Factor 5 included all the behavioural intention statements and one subjective norm statement; these accounted for 10.0% of the variance. A suitable title for this factor was 'intention to use Edunet'. Finally, Factor 6 accounted for just 7.2% of the variance and included all the subjective norm statements.

	Rotated Compo	nent Matrix(a)				
			Componen	its		
	1	2	3	4	5	6
A: idea of using Edunet (Bad-Good)	.781					
A: idea of using Edunet (Foolish-Wise)	.774					
A: use of Edunet (unbeneficial-beneficial)	.741					
A: use of Edunet (unnecessary-necessary)	.704					
A: use of Edunet (unenjoyable-enjoyable)	.693		.344			
PEOU: easy to learn how to use Edunet		.829				
PEOU: Edunet flexible to interact with		.786				
PEOU: Edunet easy to use		.762				
PEOU: easy to become skilfull in using Edunet		.693				
PEOU: difficult to learn through Edunet portal		.559				
PE: using Edunet is enjoyable PE: Lessons in which Edunet is used are not			.847			
pleasant			.836			
PE: have fun using Edunet PE: interaction with sounds, colours and pictures is			.809	246		
pleasant			.518	.346		
PU: save time & effort				.758		
PU: easy to get information				.756		
PU: access many resources				.663		
PU: Edunet useful in my learning				.578		
PU: difficult to learn subject content				.532		
BI: intend to increse my use in future					.743	
BI: frequently use the Edunet in the future BI: strongly recommend other students to use					.738	
Edunet	.336				.703	
BI: intend to use Edunet regularly this semester					.691	
SN: use Edunet if my friends used it						.764
SN: My parents think that I should use Edunet						.684
SN: My teachers think that I should use Edunet						.644
SN: use Edunet even if no one I know was using it					.311	.584

#### Table 5.9: Rotated component matrix of the six-factor solution

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

A Rotation converged in 6 iterations.

As can be seen, convergent validity of the constructs is demonstrated by the fact that all factor loadings exceed 0.50 on their own construct (see Table 5.9). Similarly, discriminant validity is demonstrated by the fact there are no cross-construct loadings exceeding 0.50. These findings suggest that the constructs are unidimensional and factorially distinct. The results of this analysis support the use of perceived usefulness, perceived ease of use, attitude, perceived enjoyment, subjective norm and behavioural intention as the TAM's main variables.

#### 5.9.2 Reliability

Before analysing the data, reliability testing was conducted. The approach used in this study was to measure the internal consistency of the data and SPSS was used for this purpose by calculating Cronbach's alpha, which is a statistic that "reflects the homogeneity of the scale" (Litwin 1995, p.24).

According to Liwin (1995, p.31), levels of 0.70 or more are accepted as representing good reliability. It was found that the overall consistency reliability for the questionnaire was 0.91 in first fieldwork stage and .89 in second field work stage. Table 5.10 shows that all six constructs constituting the TAM in this study reported good reliability except one. Subjective norm responses showed a Cronbach alpha coefficient of less than 0.7. However, Pallant (2005, p.90) suggests that the Cronbach alpha value is quite sensitive to the number of items in the scale and states that "it is common to find quite low Cronbach values (e.g. .5)," especially in scales with fewer than ten items. Therefore, these scale reliabilities are all at levels considered adequate and acceptable for use in this study.

TAM sub scales	Cronbach alpha coefficient			
	Stage 1	Stage 2		
Perceived usefulness	0.75 (5 items)	0.70 (5 items)		
Perceived ease of use	0.82 (5 items)	0.75 (5 items)		
Subjective norm	0.64 (4 items)	0.58 (4 items)		
Perceived enjoyment	0.85 (4 items)	0.81 (4 items)		
Behavioural intention	0.84 (4 items)	0.79 (4 items)		
Attitude	0.87 (5 items)	0.83 (5 items)		

Table 5.10 Reliability of the TAM sub scales

# **5.10 Influences on computer experience**

This section considered the influences on computer experience of gender, age, ownership of a computer and having access to the Internet.

In terms of gender, Figure 5.30 shows the responses to the question "When did you first start using computers?" cross-tabulated with respondents' gender. This shows that the majority of both male and female respondents had more than three years' computer experience. More specifically, 71.3% of male respondents had more than three years' experience compared to 69.9% of female respondents. Only 5.4% of male respondents had less than one year of computer experience compared to 3.3% of female respondents.



Figure 5.30: Gender and computer experience

A  $\chi^2$  test was performed to test the significance of the relationship between gender and computer experience, where  $H_o$  stated that there was no difference between males and females in terms of computer experience, and H<sub>1</sub> stated that there was a difference between computer experience for males and females. The  $\chi^2$  statistic was (3.539, df = 3, P > 0.05). Thus,  $H_o$  cannot be rejected as there was no significant relationship between gender and computer experience.

In terms of ownership of a computer at home and computer experience, Figure 5.31 shows that 72.2% of respondents who owned a computer at home had more than three years' computer experience compared to 31.6% of respondents who did not have a computer at home. 28.9% of respondents who did not own a computer at home had

less than one year's computer experience compared to 3.4% of students who owned a computer.



Figure 5.31: Computer ownership and computer experience

A  $\chi^2$  test was performed to test the significance of the relationship between computer ownership and computer experience, where  $H_o$  stated that there was no relationship between these two variables, and H<sub>1</sub>stated there was a relationship between computer ownership and computer experience. The  $\chi^2$  statistic was (40.242, df = 3, p < 0.05). Thus, H<sub>1</sub>was accepted as there was a relationship between computer ownership and computer experience: having a computer at home has a significant relationship with students' computer experience.

In terms of age and computer experience, the age of respondents was recoded for the purposes of cross tabulation, with students' ages being categorised into two groups: under 16 and over 16 years (see Figure 5.32). 72.6% of respondents who were under 16 years of age had more than three years' computer experience, compared to 67.7% of respondents who were over 16. 15.4% of respondents who were over 16 had one to two years' computer experience compared to 11.0% of respondents who were under 16 years of age.



Figure 5.32: Respondents' age and computer experience

A  $\chi^2$  test was performed to test the significance of the relationship between respondents' age and computer experience. The  $\chi^2$  statistic was (4.163, df = 3, P > 0.05), which shows that there was no significant relationship between age and computer experience.

Figure 5.33 shows that about three quarters (75.8%) of respondents who had access to the Internet at home had more than three years' computer experience compared to 37.6% of respondents who had no Internet access. Only 2.6% of respondents who had Internet access at home had less than one year of computer experience compared to 16.0% of respondents who did not have access to the Internet.



Figure 5.33: Computer experience and having access to the Internet

A  $\chi^2$  test was performed to test the significance of the relationship between respondents' having access to the Internet at home and computer experience, where  $H_o$ stated that there was no relationship between these two variables, and H<sub>1</sub>stated that there was a relationship between respondents' having Internet access and their computer experience. The  $\chi^2$  statistic was (94.375, df = 3, p < 0.05). Thus, H<sub>1</sub>was accepted as there was a relationship between having access to the Internet and computer experience. In other words, having Internet access at home has a significant relationship with students' computer experience.

# 5.11 Use of Edunet

Respondents were asked about how frequently they used Edunet. About one third (31.3%) of respondents used Edunet daily compared to 68.7% of respondents who were infrequent users (see Figure 5.34). In other words, 20.6% of respondents reported using Edunet about once a day, 30.5% used Edunet a few times a week, 25.2% used Edunet a few times a month, and 10.7% used Edunet a few times a day. Furthermore, 13% of respondents used Edunet once a month or less.



Figure 5.34: Frequency of Edunet use

About a quarter (23.9%) of male respondents used Edunet once a day compared to 17.2% of female respondents (see Figure 5.35). Similarly, more males than females had been using Edunet a few times a week (31.2% and 29.7% respectively) and 29.1% of male respondents had been using Edunet a few times a month compared to 21.0% of female respondents. More females than males used Edunet for the remaining frequencies: for example, 17.0% of female respondents had been using Edunet a few times a day compared to 4.8% of male respondents.



Figure 5.35: The frequency of Edunet use (by gender)

Using chi square analysis, it was found that there was a significant association between the variables of gender and frequency of using Edunet:  $\chi^2 = 46.81$ ; df = 5; p <0.001, n = 926.

Respondents were also asked how much time they spent using Edunet each day. The median length of time students had been using Edunet was more than one hour but less than two; 13.2% of respondents indicated this was the case (Figure 5.36). 26.2% of the respondents reported that they had been using Edunet for half to one hour daily and 22.6% for less than half an hour daily. One fifth (20.8%) of the respondents had been using Edunet for more than an hour but less than three hours a day, while 24.3% of respondents reported that they almost never used Edunet.



Figure 5.36 Length of time spent using Edunet

28.9% of male respondents reported having used Edunet for half to one hour daily compared to 23.4% of female respondents (see Figure 5.37). Similarly, more male respondents had been using Edunet for longer than two hours but less than three (9.0% compared to 6.0%). However, 15.8% of female respondents had been using Edunet for longer than one hour but less than two. Only 9.1% of female respondents reported having used Edunet for more than three hours compared to 3.5% of male respondents.


Figure 5.37: Time spent using Edunet (by gender)

Using chi square analysis, there was a significant association between the variables of gender and length of time using Edunet,  $\chi^2 = 21.13$ ; df = 5; p <0.001, n = 926.

## 5.12 Students' acceptance of Edunet: an analysis

This section considers the aim of the study which was to measures students' acceptance of e-learning in order to explore the main factors influencing students' attitude and intention to use Edunet.

## 5.12.1 Correlation and regression analysis

This section shows how the research variables (TAM variables) were tested as contributory factors to Edunet acceptance by employing correlation and multiple regression.

#### **5.12.1.1 Correlation analysis**

The first step in testing the factors contributing to behavioural intention (BI) was to calculate correlation coefficients between all the independent variables and the behavioural intention (BI), and then to correlate all the independent variables with

each other. This step is important before conducting regression analysis, especially to investigate the multicollinearity which exists when the independent variables are highly correlated (r=.9 and above) (Pallant 2005, p.142).

Then, using Pearson Product-Moment Correlation Coefficients, the relationships between the scales were examined by using the total scores for each scale. Table 5.11 shows the product moment correlation coefficient for the five TAM sub-scales (independent variables) with the behavioural intention (dependent variable). It was found that all independent variables gave significant positive correlation with behavioural intention. Correlations between behavioural intention and the other five scales ranged from r = 0.37, df =926, p<0.001 to r = 0.60, df = 926, p<0.001, indicating that relationships between the variables ranged from medium to large (Table 5.11).

Measures	1	2	3	4	5
(1) PU (2) PEOU (3) SN (4) PE	.329* .286* .490*	.211* .364*	.324*		
(5) A	.406*	.368*	.376*	.506*	
(6) BI	.459*	.375*	.393*	.570*	.602*

Table 5.11: Pearson Product-Moment Correlations between the TAM sub-scales

Note: N=926. PU=Perceived Usefulness scale; PEOU=Perceived Ease of Use scale; SN=Subjective Norm scale; PE=Perceived Enjoyment scale; A=Attitude scale; BI=Behavioural Intention scale \*p<0.001

To find out how much variance the six variables shared, the coefficient of determination was then calculated. The results show that behavioural intention accounted for 21.1% of variance on the perceived usefulness scale, 14.1% on perceived ease of use, 15.4% on subjective norm, 32.5% on the perceived enjoyment scale and 36.2% on attitude. Similarly, perceived usefulness accounted for 10.8% on perceived ease of use, 8.2% on subjective norm, 24.0% on the perceived enjoyment scale and 16.5% on total attitude scores.

Perceived ease of use accounted for 4.4% on subjective norm, 13.2% on the perceived enjoyment scale and 13.5% on total attitude scores. Subjective norm accounted for 10.5% on the perceived enjoyment scale and 14.1% on total attitude scores. Perceived enjoyment helps to explain 25.6% of the variance in respondents' scores on the attitude scale.

It can be seen from Table 5.11 that the greatest correlation was between behavioural intention and attitude, where r = 0.60, df = 926, p<0.001; this accounted for 36.2% of variance in the total scores. This strong positive relationship suggested that the more positive student attitudes were towards the use of Edunet, the more they intended to use it in their learning. There was also a strong positive relationship between perceived enjoyment and behavioural intention, where r = 0.57, df = 926, p<0.001, suggesting that the more enjoyment students felt when using Edunet, the more they intended to use it.

There was a strong relationship between perceived enjoyment and attitude (r = 0.51, df = 926, p<0.001) and this accounted for 25.6% of the variance in the total scores. This strong positive relationship suggests that the higher students rated their perceived enjoyment of Edunet, the more positive their attitude to its use.

By extending the TAM and adding perceived enjoyment as intrinsic motivation, the researcher hoped to provide a better explanation of user acceptance of e-learning. Therefore, using regression analysis, the hypothesised relationships were tested in order that consistency with earlier studies could be maintained.

#### 5.12.1.2 Multiple regression analysis

Multiple regression is an extension of simple regression or bivariate (two variables) regression because it allows two or more independent variables to be examined (Vaughan 2001, pp.171-172). It analyses all the variables together and takes into consideration the overlaps or interactions among the independent variables. Multiple regression is used to find out how much variance in a dependent variable can be explained by the independent variables and shows which of the independent variables is the best predictor of the dependent variable or outcome.

A stepwise multiple regression technique was used in the current study to examine the contribution of each predictor variable to the regression model. Stepwise regression is a "controversial procedure, in which the order of entry of variables is based solely on statistical criteria" (Tabachnick & Fidell 2001, p.133). It is used to develop a subset of independent variables that is useful in predicting the dependent variable, and to eliminate those independent variables that do not give additional prediction to the independent variables already in the equation (Tabachnick & Fidell 2001, p.135).

In order to find out which of the predictors accounted for the greatest variance in attitude, a stepwise multiple regression was conducted, using attitude as the criterion, and enjoyment, ease of use, and usefulness as predictors. Stepwise regression puts in the best predictor first, the second best second, and so forth. The assumptions of linearity and homoscedasticity were assessed by plotting the residual versus the predicted values; there did not appear to be a curvilinear or non-constant variance. If a variable is not a significant predictor, the variable will not enter the equation. Table 5.12 shows that enjoyment was the best predictor of attitude and accounted for 25.6% of the variance in attitude (Model 1). Ease of use was the second best predictor of attitude accounting for 3.9% of variance (.295-.256) beyond what enjoyment accounted for in attitude (Model 2). Usefulness was the third predictor of attitude, accounting for 2.2% of the variance (.317-.295) beyond what enjoyment and ease of use accounted for in attitude (Model 3).

Model	Predictors <sup>a</sup>	F	R <sup>2</sup>	В	SE	β	t-value	Sig.
1	PE	318.64 <sup>b</sup>	.256	.581	.033	.506	17.850	.001
2	PE	193.29 <sup>b</sup>	.295	.493	.034	.429	14.475	.001
	PEOU			.232	.032	.211	7.126	.001
3	PE	142.50 <sup>b</sup>	.317	.409	.037	.356	11.052	.001
	PEOU			.199	.033	.182	6.104	.001
	PU			.186	.035	.172	5.398	.001

Table 5.12: Results of stepwise regression analysis - attitude

<sup>a</sup> PE, perceived enjoyment; PEOU, perceived ease of use; PU, perceived usefulness.

<sup>b</sup> P <.001

R square is the multiple coefficient of determination and it indicates the proportion of variation in Y that can be explained by the set of independent variables (Vaughan 2001, p.175). It ranges from 0.0 to 1.0, with high values representing a highly explanatory regression model. Table 5.12 shows that enjoyment accounted for 25.6% of the variability in attitude (Model 1). The beta  $(\beta)$  coefficients are "standardised regression weights that serve as a measure of how much individual influence each independent variable has on the dependent variable" (Al-Gahtani 1995, p.122). They are measured in standard deviation units, so they provide a better insight into the importance of a predictor in the model (Field 2005, p.193). Table 5.12 shows that the standardised beta values for perceived enjoyment have a higher degree of importance in the model. F-ratio is a "measure of how much the model has improved the prediction of the outcome compared to the level of inaccuracy of the model" (Field 2005, p.150). In other words, it shows whether the whole equation is statistically significant in explaining an outcome (Al-Gahtani 1995, p.122). Table 5.12 shows that the associated significance value of F-ratio is .001. This means that there is less than a 0.1% chance that an F-ratio would happen by chance. The t-test indicates whether the b-value is significantly different from 0 (Field 2005, pp.192-193) and is a measure of whether the predictor is making a significant contribution to the model. Therefore if a t-test is significant (p < .05) then the predictor is making a significant contribution to the model. Thus, the smaller the value of Sig. (and the larger the value of t), the greater the contribution of that predictor. Table 5.12 shows that perceived enjoyment has the highest impact on attitude whereas perceived ease of use and perceived usefulness had less impact.

In order to find out which of the predictors accounted for the greatest variance in intention to use, a stepwise multiple regression was conducted on intention to use as the criterion, and attitude, enjoyment, usefulness, and subjective norm as predictors. The assumptions of linearity and homoscedasticity were assessed by plotting the residual versus the predicted values; there did not appear to be a curvilinear or non-constant variance. Table 5.13 shows that attitude was the best predictor of intention to use and accounted for 36.3% of the variance in intention to use (Model 1). Enjoyment was the second best predictor of intention to use, accounting for 9.4% of the variance (.457-.363) beyond what attitude accounted for in intention to use. Usefulness (Model

3) and subjective norm (Model 4) were the third and fourth best predictors, respectively.

Model	Predictors <sup>a</sup>	F	R <sup>2</sup>	В	SE	β	t-value	Sig.
1	А	526.11 <sup>b</sup>	.363	.532	.023	.602	22.937	.001
2	А	388.85 <sup>b</sup>	.457	.373	.025	.422	15.001	.001
	PE			.362	.029	.356	12.676	.001
3	А	277.85 <sup>b</sup>	.475	.344	.025	.389	13.737	.001
	PE			.301	.030	.297	10.004	.001
	PU			.149	.027	.155	5.546	.001
4	А	219.93 <sup>b</sup>	.489	.314	.025	.355	12.346	.001
	PE			.283	.030	.279	9.468	.001
	PU			.135	.027	.141	5.060	.001
	SN			.145	.029	.129	4.973	.001

 Table 5.13: Results of stepwise regression analysis – behavioural intention

 $^{\rm a}$  A, attitude; PE, perceived enjoyment; SN, subjective norm; PU, perceived usefulness.  $^{\rm b}$  P <.001

In order to find out which of the predictors accounted for the greatest variance in enjoyment, a stepwise multiple regression was conducted, using enjoyment as the criterion, while perceived usefulness, perceived ease of use, and subjective norm were used as predictors. Table 5.14 shows that perceived usefulness, ease of use, and subjective norm explained 31.4% of the variance in students' enjoyment. In fact, perceived usefulness had a higher significant effect ( $\beta$ =0.374) on perceived enjoyment than perceived ease of use ( $\beta$ =0.204) and subjective norm ( $\beta$ =0.173).

Model	Predictors <sup>a</sup>	F	R <sup>2</sup>	В	SE	β	t-value	Sig.
1	PU	292.62 <sup>b</sup>	.241	.464	.027	.490	17.106	.001
2	PU	185.27 <sup>b</sup>	.286	.393	.028	.416	14.115	.001
	PEOU			.217	.028	.227	7.709	.001
3	PU	140.43 <sup>b</sup>	.314	.353	.028	.374	12.566	.001
	PEOU			.195	.028	.204	7.007	.001
	SN			.193	.032	.173	6.040	.001

Table 5.14: Results of stepwise regression analysis – perceived enjoyment

 $^{\rm a}$  PEOU, perceived ease of use; PU, perceived usefulness; SN, subjective norm.  $^{\rm b}$  P  $<\!.001$ 

In order to find out which of the predictors accounted for the greatest variance in usefulness, a stepwise multiple regression was conducted, using usefulness as the criterion, while perceived ease of use and subjective norm were used as predictors. Table 5.15 shows that ease of use and subjective norm explained 15.8% of the variance in usefulness. In fact, perceived ease of use had a higher significant effect ( $\beta$ =0.281) on perceived usefulness than subjective norm ( $\beta$ =0.227).

Table 5.15: Results of stepwise regression analysis – perceived usefulness

Model	Predictors <sup>a</sup>	F	R <sup>2</sup>	В	SE	β	t-value	Sig.
1	PEOU	112.45 <sup>b</sup>	.109	.332	.031	.329	10.605	.001
2	PEOU	86.30 <sup>b</sup>	.158	.284	.031	.281	9.106	.001
	SN			.266	.036	.227	7.330	.001

<sup>a</sup> PEOU, perceived ease of use; SN, subjective norm. <sup>b</sup> P <.001

Table 5.16 shows results of the research hypotheses. The data fully support the model and all hypotheses cannot be rejected on the basis of this empirical data. Intention is most dominantly influenced by attitude ( $\beta$ =0.355) and less so by enjoyment ( $\beta$ =0.279), usefulness ( $\beta$ =0.141) and subjective norm ( $\beta$ =0.129). Therefore, these four variables are robust in predicting intention and provide strong evidence for accepting hypotheses 1, 6, 8 and 10.

Regression tests <sup>a</sup>	R²	β	Hypothesis result
Intention to use (DV)	0.489 <sup>b</sup>		
Attitude (IV)		0.355 <sup>b</sup>	H10: supported
Enjoyment (IV)		0.279 <sup>b</sup>	H6: supported
Usefulness (IV)		0.141 <sup>b</sup>	H1: supported
Subjective norm (IV)		0.129 <sup>b</sup>	H8: supported
Attitude (DV)	0.317 <sup>b</sup>		
Enjoyment (IV)		0.356 <sup>b</sup>	H7: supported
Ease of use (IV)		0.182 <sup>b</sup>	H3: supported
Usefulness (IV)		0.172 <sup>b</sup>	H2: supported
Perceived usefulness (DV)	0.158 <sup>b</sup>		
Ease of use (IV)		0.281 <sup>b</sup>	H4: supported
Subjective norm (IV)		0.227 <sup>b</sup>	H9: supported
Perceived enjoyment (DV)	0.132 <sup>b</sup>		
Ease of use (IV)		0.364 <sup>b</sup>	H5: supported

Table 5.16: Results of hypotheses tests

<sup>a</sup> DV, dependent variable; IV, independent variable

<sup>b</sup>P<.001

The results also show that usefulness, ease of use and enjoyment explained 31.7% of the variance in students' attitudes toward e-learning (see Table 5.16). Attitude is most dominantly influenced by enjoyment ( $\beta$ =0.356) and less so by ease of use ( $\beta$ =0.182) and usefulness ( $\beta$ =0.172). Therefore, hypotheses 2, 3 and 7 cannot be rejected.

Furthermore, the direct impact of ease of use on attitude can probably be explained from the strong impact of this construct on both enjoyment ( $\beta$ =0.364) and usefulness ( $\beta$ =0.281), which supports hypotheses 4 and 5 (see Table 5.16). The hypothesised effect of subjective norm on perceived usefulness is also supported, showing a path coefficient of 0.22.

#### 5.12.2 Other factors affecting students' acceptance of Edunet

Based on the reviewed literature, a number of variables considered to affect students' acceptance of e-learning systems were tested in the next section. These variables included: gender, age, previous computer experience, and having Internet access.

#### Gender

To find out if there was any significant difference between males and females in the six TAM variables (Perceived Usefulness, Perceived Ease of Use, Subjective Norm, Perceived Enjoyment, Behavioural Intention, and Attitude), an independent-sample t-test was conducted. The test result shows that no significant differences existed in the comparison between males and females in the TAM variables except in terms of perceived usefulness.

An independent-sample t-test was conducted to compare the perceived usefulness scores for male and female students. There was a significant difference in the scores of males (M=18.22, SD=3.99) and females [M=19.27, SD=3.64; t (924) = -4.17, p<0.001]. The magnitude of the difference in the means was small (eta squared=.01). The result revealed that female students saw more usefulness in using Edunet than male students.

#### Age

To find out if there were any significant differences between age groups and the six TAM variable scores, a one-way analysis of variance was conducted with the three age groups as the independent variable and the six TAM variables as the dependent ones. This statistical method is appropriate for use with one independent variable with three or more levels or groups, and one dependent continuous variable (Pallant 2005, p.215). The results show that there were statistically significant differences for age with perceived usefulness but not with perceived ease of use, perceived enjoyment, subjective norm, behavioural intention and attitude.

Using the age groups stipulated in the questionnaire, a statistically significant difference at the p<0.05 level in mean usefulness scores for the three age groups [F (2, 923) = 7.1, p <0.001] was found. Despite reaching a level of statistical significance, the actual difference in mean scores between the groups was quite small. The effect size, calculated using eta squared, was .01. Post-hoc comparisons using the Tukey

HSD test indicated that the mean usefulness score for 15 year olds (M=19.10, SD=3.62) was significantly different from that for those aged 16 (M=18.08, SD=4.15). Respondents aged 17 (M=18.70, SD=3.95) did not differ significantly from any other age group.

#### **Computer experience**

A one-way analysis of variance was conducted to compare the four levels of computer experience and the six TAM variables. Respondents were grouped into four levels of experience (Group 1: less than one year; Group 2: 1-2 years; Group 3: 2-3 years; Group 4: more than 3 years). There were statistically significant differences for computer experience with both usefulness and ease of use but not with enjoyment, subjective norm, behavioural intention and attitude.

Statistically significant differences at the p<0.05 level in mean usefulness scores for the four computer experience groups were found [F (3, 922) = 4.3, p<0.001]. Despite reaching a level of statistical significance, the actual difference in mean scores between the groups was quite small. The effect size, calculated using eta squared, was .01. Post-hoc comparisons using the Tukey HSD test indicated that the mean usefulness score for Group 1 (M=17.51, SD=4.52) was significantly different from that of Group 2 (M=19.65, SD=3.68). Group 4 (M=18.57, SD=3.88) was significantly different from Group 2 (M=19.65, SD=3.68) while Group 3 (M=19.12, SD=3.41) did not differ significantly from any other group.

Statistically significant differences at the p<0.05 level in mean ease of use scores for the four computer experience groups were found [F (3, 922) =14.6, p<0.001]. Posthoc comparisons using the Tukey HSD test indicated that the mean ease of use score for Group 4 (M=18.70, SD=3.74) was significantly different from those of Groups 1, 2 and 3 (M=15.73, SD=3.50, M=17.30, SD=3.81and M=17.24, SD=3.73). The effect size,  $\eta^2$ =0.04, was small with computer experience; this accounted for just four percent of the variance in ease of use scores.

#### Having Internet access at home

To find out if there was any significant difference between those with and without access to the Internet at home in scores on the six TAM variables (Perceived Usefulness, Perceived Ease of Use, Subjective Norm, Perceived Enjoyment,

Behavioural Intention, and Attitude), an independent-sample t-test was conducted. The test results show that there were statistically significant differences between those with and without access to the Internet and perceived ease of use but not with attitude, usefulness, enjoyment or behavioural intention.

An independent-sample t-test was conducted to compare the perceived ease of use scores for students having access to the Internet at home and students not having access. There was a significant difference in scores for those not having Internet access (M=17.15, SD=3.75) and scores for those who did [M=18.38, SD=3.81; t (924) = -3.35, p<0.001]. However, the magnitude of the difference in the means was small (eta squared=.01). The results shows that respondents who had access to the Internet rated ease of use higher than respondents who had no Internet access.

## 5.13 Summary

The findings from the quantitative data revealed that 71.3% of male respondents had more than three years' computer experience compared to 69.9% of female respondents. Thus, the majority of respondents had used a computer for more than three years and there was no significant difference between males and females in their computer experience. Not having a computer at home was not an obstacle faced by students, as the findings revealed that about 96% of respondents owned a computer at home and 86.5% had Internet access at home.

Using one-way analysis of variance, significant differences were found in mean usefulness scores, related to age and computer experience. In addition, there were differences in mean usefulness scores with gender, identified using an independentsample t-test. In other words, female students saw Edunet as more useful than male students did. There were also significant differences in mean ease of use scores with computer experience, discovered using one-way analysis of variance.

The results of the study also revealed that attitude and enjoyment were the most important factors influencing students' intention to use Edunet. Perceived enjoyment was the best predictor of attitude and accounted for 25.6% of the variability in attitude.

Perceived usefulness had a higher significant effect on perceived enjoyment than perceived ease of use and subjective norm.

Overall, the extended TAM provided a better explanation of usage intention than the original TAM. It provided an adequate explanation (49%) of the variance in students' acceptance decision.

# 5.14 Stage 2: Fieldwork survey-after one year of experiencing e-learning

This section presents the findings derived from the quantitative data collected in the survey carried out between October 2007 and December 2007. The results focused only on changes from the first stage. Thus, the main outcomes of the second stage are presented in the following sections.

## **5.14.1** Participants

The survey was completed by 803 respondents from a sample of 1140 students resulting in a response rate of 70.4% (see Appendix 5).

Survey respondents included 375 males (46.7%) and 428 females (53.3%). Around half (52.7%) of respondents were aged 17 years, whilst 47.3% were aged 16 years. Similar to the findings of the first stage, the majority (76.0%) of the respondents had used a computer for more than three years, and there was no significant relationship between gender and computer experience. 87.4% of respondents had their own access to the Internet at home compared to 12.6% who did not.

#### 5.14.2 The role of experience in accepting e-learning system

The main purpose of the second stage of the fieldwork was to measure the impact of one year's experience on students' acceptance and actual usage. In other words, it investigated any change in students' attitudes and perceptions after one year's experience of the e-learning system. Therefore, the following sections discuss the impact of this year of experience on the students' use of the e-learning system together with the factors that influenced its actual use.

#### 5.14.2.1 Use of Edunet

Respondents were asked about how frequently they used Edunet. About two thirds (63.2%) of respondents used Edunet daily compared to 36.8% of respondents who were infrequent users (see Figure 5.38). In detail, 36.7% of respondents reported using Edunet about once a day, 17.7% used Edunet a few times a week, and 12.3% used Edunet a few times a month. Less than a tenth (6.8%) of respondents use Edunet once a month or less.



Figure 5.38: Frequency of Edunet use

43.5% of male respondents used Edunet once a day compared, to 30.8% of female respondents (see Figure 5.39). Similarly, more male respondents had been using Edunet a few times a day (29.6% compared to 23.8%). A higher proportion of females than males used Edunet for the remaining frequencies; for example, 22.4% of female respondents had been using Edunet a few times a week compared to 12.3% of male respondents.



Figure 5.39: The frequency of Edunet use (by gender)

Using  $\chi^2$  analysis, it was found that there was a significant association between the variables of gender and frequency of using Edunet:  $\chi^2 = 31.43$ ; df = 5; p <0.001, n = 803.

Respondents were also asked how much time they spent using Edunet each day. The median length of time students had been using Edunet was more than one hour but less than two; 20.9% of respondents indicated this was the case (Figure 5.40). 39.9% of the respondents reported that they had been using Edunet for half to one hour daily and 36.2% of the respondents had been using Edunet for more than an hour but less than three hours a day. Only 5.2% of respondents reported that they almost never used Edunet.



Figure 5.40 Length of time spent using Edunet

41.6% of male respondents reported having used Edunet for half to one hour daily, compared to 38.3% of female respondents (see Figure 5.41). About a quarter (24.0%) of male respondents had been using Edunet for longer than one hour but less than two, compared to 18.2% of female respondents. Similarly, more male respondents had been using Edunet for longer than two hours but less than three (18.4% compared to 12.6%). However, 11.7% of female respondents had been using Edunet for less than half an hour daily, compared to 4.3% of male respondents, and 12.9% of female respondents reported having used Edunet for more than three hours, compared to 7.7% of male respondents.



Figure 5.41: Time spent using Edunet (by gender)

 $\chi^2$  analysis showed that there was a significant association between the variables of gender and length of time using Edunet,  $\chi^2 = 28.50$ ; df = 5; p <0.001, n = 803.

## 5.14.2.2 The TAM variables

Similar to Stage One, this section describes the respondents' responses to perceived usefulness, perceived ease of use, behavioural intention, subjective norm, attitudes, and perceived enjoyment statements after one year of experiencing the e-learning system. Respondents specified their perceptions toward positive and negative statements using a Likert scale.

#### **Perceived usefulness**

For the statements in the section on perceived usefulness, respondents were asked their opinion of the usefulness of Edunet. As shown in Table 5.17, the majority (71.1%) of respondents answered either 'Agree' or 'Strongly Agree' that using Edunet would help them to get information at any time and at any place, while only 17.4% expressed a neutral response to the statement. The Likert score was 3.83, suggesting respondents' agreement with the capacity of Edunet to provide information at any time and at any place.

Statements	Strongly disagree	Disagree	Natural	Agree	Strongly Agree
Using Edunet helps me to	6.5%	5.0%	17.4%	40.8%	30.3%
and at any place					
Learning through Edunet	6.6%	8.6%	26.0%	36.4%	22.4%
saves me time and effort					
Using Edunet makes it	26.3%	36.4%	27.8%	6.8%	2.7%
difficult for me to learn					
Using Edupet enables me	17%	5 9%	20.0%	37.1%	32 3%
to access many resources	4.770	5.770	20.070	57.170	52.570
Overall, I find Edunet	4%	5.4%	15.9%	41.3%	33.4%
useful in my learning					

 Table 5.17: Perceived usefulness

Respondents were asked to indicate their view on the statement "Learning through Edunet saves me time and effort". Table 5.17 shows that 58.8% of respondents were in agreement with this statement, while 26.0% of respondents were neutral to it. The Likert score was 3.59, suggesting respondents' agreement that learning through Edunet saved them time and effort.

Responses to the statement "Using Edunet makes it difficult for me to learn subject content", indicated, as shown in Table 5.17, that 62.7% of respondents disagreed or strongly disagreed with the statement, while 27.8% of respondents were neutral towards it. A Likert score of 2.23 suggests that it is easy to learn subject content when using Edunet.

As shown in Table 5.17, 69.4% of respondents answered either 'Agree' or 'Strongly Agree' in response to the statement "Using Edunet enables me to access many resources", while 20% had a neutral opinion. The Likert score of 3.86 suggests that Edunet enables students to access many resources.

It is apparent from Table 5.17 that the majority (74.7%) of respondents gave answers of either 'Agree' or 'Strongly Agree' in response to the statement "Overall, I find Edunet useful in my learning", while 15.9% of respondents were neutral to it, giving a Likert score of 3.95. This result suggests that, overall respondents agreed that Edunet is useful in learning.

Overall, the Likert scores in this section ranged from 2.23 to 3.95, which revealed that respondents were more appreciative of the overall usefulness of the Edunet and its ability to help students to access many resources at any time and at any place.

## Perceived ease of use

For the statements in the section on perceived ease of use, respondents were asked about their opinion regarding Edunet's ease of use. They were asked to indicate if they found it "easy to learn how to use Edunet". Table 5.18 shows that 65.5% of respondents agreed with the above statement, while 22.4% of respondents were neutral toward it. The Likert score of 3.78 shows that respondents found it is easy to learn how to use Edunet.

Statements	Strongly	Disagree	Natural	Agree	Strongly
	disagree				Agree
Easy to learn how to use	5.7%	6.4%	22.4%	35.2%	30.3%
Edunet					
It is easy for me to become	3.5%	7.5%	24.4%	39.6%	25.0%
skilful in using Edunet					
Difficult to learn through	22.4%	31.8%	26.4%	12.7%	6.7%
the Edunet portal					
I find Edunet flexible to	3.4%	8.2%	31.6%	41.5%	15.3%
interact with					
Overall, I find Edunet easy	4.4%	4.9%	22.4%	43.3%	25.0%
to use					

Table 5.18: Perceived ease of use

As shown in Table 5.18, 64.6% of the respondents answered either 'Agree' or 'Strongly Agree' to the statement "It is easy for me to become skilful in using Edunet" while about a quarter (24.4%) gave a neutral response. The Likert score was 3.75, suggesting respondents generally agreed that it is easy to become skilful in using Edunet.

Respondents were asked to specify whether they found it "difficult to learn through the Edunet portal". Table 5.18 shows that 54.2% of the respondents disagreed or strongly disagreed with the above statement, while 26.4% gave neutral responses. A Likert score of 2.49 suggests that it is easy to learn through the Edunet portal. It can be seen from Table 5.18 that over half of the respondents (56.8%) answered either 'Agree' or 'Strongly Agree' in response to the statement "I find Edunet flexible to interact with", while 31.6% of respondents were uncertain about the statement. A Likert score of 3.57 suggests that respondents found Edunet flexible to interact with.

Respondents were asked to indicate their view regarding "Overall, I find Edunet easy to use". As shown in Table 5.18, 68.3% of respondents answered either 'Agree or 'Strongly Agree' in response to the above statement, while 22.4% gave a neutral response. Overall, ease of use received the highest average score of 3.80; this suggests that students agreed on the whole that Edunet was easy to use.

In general, the Likert scores in this section ranged from 2.49 to 3.80, suggesting that using Edunet was not difficult for students in terms of learning, flexibility and skill. Similar to overall usefulness, overall ease of use received the highest average score suggesting, on the whole, that students agreed that Edunet was easy to use.

## Subjective norm

In order to investigate the influence of peers and other people on students' decision to adopt technology during the second stage of the research (in 2007), respondents were asked to indicate their views regarding the statement "I would use Edunet even if no one I know was using it". Table 5.19 shows around half (55.3%) of respondents answered either 'Agree' or 'Strongly Agree' to the above statement, while 29.8% gave a neutral answers. A Likert score of 3.58 suggests that respondents felt confident in deciding to use Edunet regardless of others' use.

Statements	Strongly	Disagree	Natural	Agree	Strongly
	disagree				Agree
I would use Edunet even if	6.6%	8.3%	29.8%	31.3%	24.0%
no one I know was using it					
My teachers think that I	9.5%	12.8%	23.5%	37.6%	16.6%
should use Edunet in my					
future learning					
I would use Edunet if my	30.0%	32.8%	11.6%	14.3%	11.3%
friends used it					
My parents think that I	10.2%	13.9%	20.7%	31.8%	23.4%
should use Edunet in my					
future learning					

Table 5.19: Subjective norm

In Table 5.19, over half (54.2%) of respondents answered either 'Agree' or 'Strongly Agree' in response to the statement "My teachers think that I should use Edunet in my future learning", while only 23.5% of respondents were uncertain about the statement. The Likert score of 3.39 suggests that students were still uncertain about their teachers' views and whether they thought that students should use Edunet in their future learning.

With regard to the statement "I would use Edunet if my friends used it", 62.8% of the respondents disagreed or strongly disagreed with this statement, while 11.6% gave a neutral answer (see Table 5.19). The Likert score was 2.44, suggesting general disagreement with the statement, that is, students' use of Edunet is not influenced by their perception of their friends' views on its use.

Regarding respondents' views concerning the statement "My parents think that I should use Edunet in my future learning", Table 5.19 shows that over half (55.2%) of respondents agreed with this statement, while 20.7% of respondents were neutral in their answers, giving a Likert score of 3.44. The results suggest that students were still uncertain about their parents and their thoughts regarding the use of Edunet.

As in Stage One, the highest average score was awarded to the statement "I would use Edunet even if no one I know was using it" which was 3.58 (see Table 5.19). This suggests that students felt confident enough to use the system if they needed to and they did not require the influence of others.

## **Perceived enjoyment**

In order to gauge perceived enjoyment, respondents were asked about their opinion of the enjoyment they experienced when using Edunet. It can be seen from Table 5.20 that 57.8% of the respondents answered either 'Agree' or 'Strongly Agree' in response to the statement "The interaction with sounds, colours and pictures using Edunet is pleasant", while 24.7% gave neutral answers. A Likert score of 3.54 suggests that the interaction with sounds, colours and pictures using Edunet is pleasant.

Statements	Strongly	Disagree	Natural	Agree	Strongly
	disagree				Agree
The interaction with sounds,	9.2%	8.3%	24.7%	34.4%	23.4%
colours and pictures using					
Edunet is pleasant					
Lessons in which Edunet is	14.3%	38.7%	33.4%	11.1%	2.5%
used are not pleasant					
I have fun using Edunet	8.5%	9.8%	28.4%	38.5%	14.8%
Using Edunet is enjoyable	9.0%	9.3%	24.5%	38.4%	18.8%

 Table 5.20: Perceived enjoyment

With regard to the statement "Lessons in which Edunet is used are not pleasant", over half (53.0%) of respondents disagreed or strongly disagreed with this statement, while a third (33.4%) gave a neutral answer (see Table 5.20). A Likert score of 2.49 was obtained, suggesting that lessons are pleasant when Edunet is used.

As seen in Table 5.20, over half (53.3%) of the respondents were in agreement with the statement "I have fun using Edunet", while over a quarter (28.4%) gave neutral responses. A Likert score of 3.41, suggests that respondents were uncertain about whether they had fun when using Edunet.

Responses to the statement "Using Edunet is enjoyable" indicate, as shown in Table 5.20, that 57.2% of respondents answered either 'Agree' or 'Strongly Agree' in response to this statement, while about a quarter (24.5%) were neutral. The Likert score was 3.49, suggesting respondents agreed that using Edunet is enjoyable.

Overall, in relation to perceived enjoyment, the Likert scores ranged from 2.49 to 3.54, suggesting that overall using Edunet was enjoyable, with the statement that mentioned the interaction with sounds, colours and pictures receiving the highest average scores.

## **Behavioural intention**

For the statements in the section on behavioural intention, respondents were asked to indicate whether they intended to use the Edunet regularly in the current semester. Table 5.21 shows that over half (54.3%) of respondents agreed (that is, they responded 'Agree' or 'Strongly Agree') with this statement, while 22.8% were neutral, giving a

Likert score of 3.45. The results revealed that respondents were uncertain whether they would use Edunet regularly in the current semester.

Statements	Strongly	Disagree	Natural	Agree	Strongly
	disagree				Agree
Intend to use Edunet regularly	10.1%	12.8%	22.8%	30.6%	23.7%
this semester					
Intend to increase use in the	6.5%	8.2%	25.5%	34.6%	25.2%
future					
Recommending other students	6.7%	9.2%	23.5%	38.4%	22.2%
to use Edunet					
Intention to use Edunet	8.2%	6.4%	31.1%	28.1%	26.2%
frequently in the future					

 Table 5.21: Behavioural intention

When asked about their intention to increase their use of Edunet in the future, Table 5.21 shows that over half (59.8%) of respondents agreed to the statement, while a quarter (25.5%) gave neutral responses. The Likert score of 3.64 shows that respondents were intending to increase their use in the future.

Table 5.21 shows that 60.6% of respondents agreed overall with the statement "I strongly recommend other students to use Edunet", while about a quarter (23.5%) gave neutral responses. The Likert score of 3.60 suggests that students were strongly inclined to recommend the use of Edunet to other students.

When respondents were asked whether they intended to use Edunet frequently in the future, Table 5.21 shows that over half (54.3%) of respondents at least agreed with the statement, while about one third (31.1%) were neutral. The Likert score of 3.58 shows that respondents were intending to use Edunet frequently in the future.

In general, the Likert scores for the four statements ranged from 3.45 to 3.64. The results suggest that, overall, students intended to increase their use of Edunet in the future and they were happy to recommend its use to other students.

## Attitude

This section includes five statements concerned with students' feelings and perceptions about Edunet and its use. Scoring in this section was based on a semantic differential scale.

A consideration of students' opinions revealed that 43.3% of respondents thought that the idea of using Edunet was "extremely good" while only 3.9% thought it was "extremely bad" (see Figure 5.42). The Likert score was 4.12, suggesting respondents' agreement with the idea that using Edunet is "quite good".



Figure 5.42: Bad or good idea to use Edunet

In Figure 5.43, the majority (71.3%) of respondents thought that the idea of using Edunet was wise compared to 12.3% who thought it was foolish, giving a Likert score of 3.84. This suggests that the idea of using Edunet was "quite wise".



Figure 5.43: Foolish or wise idea to use Edunet

Regarding respondents' views about the use of Edunet, 61.1% of respondents considered the use of Edunet as enjoyable, while 22.2% gave a neutral response, giving a Likert score of 3.59 (see Figure 5.44). This suggests that respondents decided that their use of the Edunet was "quite enjoyable".



Figure 5.44: Use of Edunet (enjoyable - unenjoyable)

Respondents were asked to indicate their view regarding whether it was necessary to use Edunet. One fifth (20.8%) of respondents considered the use of Edunet unnecessary while over half (56.7%) considered it necessary, giving a Likert score of

3.48 (see Figure 5.45). This suggests that respondents decided that their use of Edunet was "quite necessary".



Figure 5.45: Using Edunet (necessary or unnecessary)

In Figure 5.46, the majority (75.0%) of respondents thought that using Edunet was beneficial while 9.9% thought it was non-beneficial and 15.1% gave a neutral response. The Likert score was 3.89, suggesting that respondents felt that using Edunet was "quite beneficial".



Figure 5.46: Using Edunet (beneficial or non-beneficial)

Overall, the scores ranged from 3.48 to 4.12, higher scores in comparison with the other TAM variables. Respondents decided that their use of the Edunet was quite good and quite beneficial.

#### 5.14.2.3 Correlation analysis

The hypotheses relationships between research variables were examined using Pearson Product-Moment Correlation Coefficients. Table 5.22 shows the product moment correlation coefficient for the five TAM sub-scales (independent variables) with the behavioural intention (dependent variable). It was found that all independent variables gave significant positive correlations with behavioural intention. Correlations between behavioural intention and the other five scales ranged from r = 0.37, df =803, p<0.001 to r = 0.62, df = 803, p<0.001, indicating that relationships between the variables ranged from medium to large (Table 5.22).

To find out how much variance the six variables shared, the coefficient of determination was then calculated. The results show that behavioural intention accounted for 23.1% of variance on the perceived usefulness scale, 13.8% on perceived ease of use, 17.1% on subjective norm, 32.4% on the perceived enjoyment scale and 38.2% on attitude. Similarly, perceived usefulness accounted for 11.1% on perceived ease of use, 8.6% on subjective norm, 24.7% on the perceived enjoyment scale and 18.0% on total attitude scores.

Perceived ease of use accounted for 4.8% on subjective norm, 13.0% on the perceived enjoyment scale and 13.9% on total attitude scores. Subjective norm accounted for 11.4% on the perceived enjoyment scale and 15.0% on total attitude scores. Perceived enjoyment helps to explain 27.6% of the variance in respondents' scores on the attitude scale.

Measures	1	2	3	4	5
(1) <b>D</b> L					
(1) PU (2) PEOU	333*				
(2) I LOC (3) SN	.294*	.220*			
(4) PE	.497*	.361*	.338*		
(5) A	.424*	.373*	.387*	.525*	
(6) BI	.481*	.372*	.413*	.569*	.618*

 Table 5.22: Pearson Product-Moment Correlations between the TAM sub-scales

Note: N=803. PU=Perceived Usefulness scale; PEOU=Perceived Ease of Use scale; SN=Subjective Norm scale; PE=Perceived Enjoyment scale; A=Attitude scale; BI=Behavioural Intention scale \*p<0.001

It can be seen from Table 5.22 that the greatest correlation was between behavioural intention and attitude, where r = 0.62, df = 803, p<0.001; this accounted for 38.2% of variance in the total scores. There was also a strong positive relationship between perceived enjoyment and behavioural intention, where r = 0.57, df = 803, p<0.001; this accounted for 32.4% of variance in the total scores. The results show that attitude and enjoyment continue to be critical factors that influence students' intention to use Edunet. Furthermore, perceived usefulness accounted for 18.0% of the variance in the total attitude scores whereas perceived enjoyment accounted for 27.6% of the variance in the total scores. This suggests that the greater the enjoyment students felt when using the system, the more positive their attitude towards the system and its use.

#### 5.14.2.4 Regression analysis

A stepwise multiple regression technique was used to examine the contribution of each predictor variable to the regression model. This technique is used to find out how much variance in a dependent variable can be explained by the independent variables and shows which of the independent variables is the best predictor of the dependent variable.

To find out which of the predictors accounted for the greatest variance in attitude, a stepwise multiple regression was conducted, using attitude as the criterion, and enjoyment, ease of use, and usefulness as predictors. The assumptions of linearity and homoscedasticity were assessed by plotting the residual versus the predicted values;

there did not appear to be a curvilinear or non-constant variance. If a variable is not a significant predictor, the variable will not enter the equation. Table 5.23 shows that enjoyment was the best predictor of attitude and accounted for 27.5% of the variability in attitude (Model 1). Ease of use was the second best predictor of attitude, accounting for 3.9% of the variance (.314-.275) beyond what enjoyment accounted for in attitude (Model 2). Usefulness was the third predictor of attitude, accounting for 2.4% of the variance (.338-.314) beyond what enjoyment and ease of use accounted for in attitude (Model 3). Overall, Table 5.23 shows that intrinsic motivational factor (perceived enjoyment) had a greater impact on attitude than the extrinsic motivational factor (perceived usefulness).

Model	Predictors <sup>a</sup>	F	R²	В	SE	β	t-value	Sig.
1	PE	304.19 <sup>b</sup>	.275	.609	.035	.525	17.441	.001
2	PE	183.20 <sup>b</sup>	.314	.520	.036	.448	14.274	.001
	PEOU			.232	.035	.211	6.735	.001
3	PE	135.84 <sup>b</sup>	.338	.430	.040	.370	10.823	.001
	PEOU			.200	.035	.180	5.713	.001
	PU			.202	.038	.181	5.340	.001

Table 5.23: Results of stepwise regression analysis - attitude

<sup>a</sup> PE, perceived enjoyment; PEOU, perceived ease of use; PU, perceived usefulness.

<sup>b</sup> P <.001

In order to find out which of the predictors accounted for the greatest variance in intention to use, a stepwise multiple regression was conducted on intention to use as the criterion, and attitude, enjoyment, usefulness, subjective norm as predictors. The assumptions of linearity and homoscedasticity were assessed by plotting the residual versus the predicted values; there did not appear to be a curvilinear or non-constant variance. Table 5.24 shows that attitude was the best predictor of intention to use and accounted for 38.1% of the variability in intention to use (Model 1). Enjoyment was the second best predictor of intention to use, accounting for 8.3% of the variance (.464-.381) beyond what attitude accounted for in intention to use. Usefulness (Model 3) and subjective norm (Model 4) were the third and fourth best predictors, respectively.

Model	Predictors <sup>a</sup>	F	R <sup>2</sup>	В	SE	β	t-value	Sig.
1	А	493.97 <sup>b</sup>	.381	.542	.024	.618	22.225	.001
2	А	346.65 <sup>b</sup>	.464	.386	.027	.440	14.484	.001
	PE			.344	.031	.338	11.121	.001
3	А	252.37 <sup>b</sup>	.487	.351	.027	.401	13.117	.001
	PE			.276	.032	.271	8.509	.001
	PU			.173	.029	.176	5.886	.001
4	А	201.48 <sup>b</sup>	.502	.319	.027	.364	11.747	.001
	PE			.256	.032	.251	7.929	.001
	PU			.158	.029	.161	5.428	.001
	SN			.157	.031	.140	5.056	.001

 Table 5.24: Results of stepwise regression analysis – behavioural intention

<sup>a</sup> A, attitude; PE, perceived enjoyment; SN, subjective norm; PU, perceived usefulness. <sup>b</sup> P < .001

To find out which of the predictors accounted for the greatest variance in enjoyment, a stepwise multiple regression was conducted, using enjoyment as the criterion, while perceived usefulness, perceived ease of use, and subjective norm were used as predictors. Table 5.25 shows that perceived usefulness, ease of use, and subjective norm explained 32.1% of the variance in students' enjoyment. In fact, perceived usefulness had a higher significant effect ( $\beta$ =0.378) on perceived enjoyment than perceived ease of use ( $\beta$ =0.195) and subjective norm ( $\beta$ =0.184).

Model	Predictors <sup>a</sup>	F	R²	В	SE	β	t-value	Sig.
1	PU	263.39 <sup>b</sup>	.247	.480	.030	.497	16.229	.001
2	PU	163.78 <sup>b</sup>	.291	.409	.030	.424	13.430	.001
	PEOU			.211	.030	.220	6.968	.001
3	PU	125.85 <sup>b</sup>	.321	.365	.031	.378	11.884	.001
	PEOU			.186	.030	.195	6.243	.001
	SN			.203	.034	.184	5.980	.001

Table 5.25: Results of stepwise regression analysis – perceived enjoyment

<sup>a</sup> PEOU, perceived ease of use; PU, perceived usefulness; SN, subjective norm.

<sup>b</sup> P <.001

In order to find out which of the predictors accounted for the greatest variance in usefulness, a stepwise multiple regression was conducted, using usefulness as the criterion, while perceived ease of use and subjective norm were used as predictors. Table 5.26 shows that ease of use and subjective norm explained 16.2% of the variance in usefulness. In fact, perceived ease of use had a higher significant effect ( $\beta$ =0.282) on perceived usefulness than subjective norm ( $\beta$ =0.232).

Model	Predictors <sup>a</sup>	F	R <sup>2</sup>	В	SE	β	t-value	Sig.
1	PEOU	99.94 <sup>b</sup>	.111	.330	.033	.333	9.997	.001
2	PEOU	77.36 <sup>b</sup>	.162	.280	.033	.282	8.503	.001
	SN			.265	.038	.232	6.987	.001

Table 5.26: Results of stepwise regression analysis – perceived usefulness

<sup>a</sup> PEOU, perceived ease of use; SN, subjective norm.

 $^{b} P < .001$ 

To test the research hypotheses, a multiple regression analysis was conducted on the variables actual usage, intention to use, attitude, perceived enjoyment and perceived usefulness. Table 5.27 shows the results of the five regression tests. It can be seen from the table that all the research hypotheses cannot be rejected. It shows that attitude, enjoyment, usefulness and subjective norm are significantly associated with intention to use e-learning at a 0.1% significance level. Therefore, these four variables are robust in predicting intention and provide strong evidence for accepting hypotheses 1, 6, 8 and 10.

Regression Tests <sup>a</sup>	R²	β	Hypothesis result
Actual usage (DV)			
Intention to use (IV)	0.518	0.720 <sup>b</sup>	H11: supported
Intention to use (DV)	0.502 <sup>b</sup>		
Attitude (IV)		0.364 <sup>b</sup>	H10: supported
Enjoyment (IV)		0.251 <sup>b</sup>	H6: supported
Usefulness (IV)		0.161 <sup>b</sup>	H1: supported
Subjective norm (IV)		0.140 <sup>b</sup>	H8: supported
Attitude (DV)	0.338 <sup>b</sup>		
Enjoyment (IV)		0.370 <sup>b</sup>	H7: supported
Ease of use (IV)		$0.180^{b}$	H3: supported
Usefulness (IV)		0.181 <sup>b</sup>	H2: supported
Perceived usefulness (DV)	0.162 <sup>b</sup>		
Ease of use (IV)		0.282 <sup>b</sup>	H4: supported
Subjective norm (IV)		0.232 <sup>b</sup>	H9: supported
Perceived enjoyment (DV)	0.131 <sup>b</sup>		
Ease of use (IV)		0.361 <sup>b</sup>	H5: supported

#### Table 5.27: Results of hypotheses tests

<sup>a</sup> DV, dependent variable; IV, independent variable <sup>b</sup> P<.001

The results also show that usefulness, ease of use and enjoyment explained 33.8% of the variance in students' attitudes toward e-learning (see Table 5.27). Attitude is most dominantly influenced by enjoyment ( $\beta$ =0.370) and less so by ease of use ( $\beta$ =0.180) and usefulness ( $\beta$ =0.181). Therefore, hypotheses 2, 3 and 7 cannot be rejected.

Furthermore, the direct impact of ease of use on attitude can probably be explained from the strong impact of this construct on both enjoyment ( $\beta$ =0.361) and usefulness ( $\beta$ =0.282), which supports hypotheses 4 and 5 (see Table 5.27). The hypothesised

effect of subjective norm on perceived usefulness was also supported, showing a path coefficient of 0.23.

Linear regression was conducted to determine whether or not behavioural intention to use Edunet was a significant predictor of actual usage. As expected, behavioural intention was significantly correlated with usage (see Table 5.27). Therefore, hypothesis 11 cannot be rejected. In addition, consistent with the theories, none of the other TAM variables (attitude, subjective norm, perceived enjoyment and perceived usefulness) had a significant effect on usage over and above behavioural intention. The finding reconfirms the strong role of intention as a mediator between beliefs and

The finding reconfirms the strong role of intention as a mediator between beliefs and actual usage.

## 5.15 Conclusion

The analysis of the quantitative data in the second stage revealed that the majority of respondents had used a computer for more than three years and there was no significant difference between males and females in their computer experience. As was also found in the first stage, the proportion of males who owned a computer at home was not significantly different from the proportion of females who possessed a home computer.

Increased use of Edunet was found in the second stage analysis. Around two thirds (63.2%) of respondents used Edunet daily compared to 31.3% in the first stage. 43.5% of male respondents used Edunet once a day compared to 30.8% of the female respondents. The findings from the second stage also revealed that 39.9% of respondents used Edunet for half to one hour daily compared to 26.2% of respondents in the first stage.

Using Pearson Product-Moment Correlation Coefficients, it was found that all independent variables gave significant positive correlations with behavioural intention. The results show that behavioural intention accounted for 23.1% of variance on the perceived usefulness scale, 13.8% on perceived ease of use, 17.1% on subjective norm, 32.4% on the perceived enjoyment scale and 38.2% on attitude. Therefore, attitude was the best predictor of intention to use.

Perceived usefulness accounted for 18.0% of the variance in the total attitude scores whereas perceived enjoyment accounted for 27.6% of the variance in the total scores. Thus, perceived enjoyment was the best predictor of attitude.

By using a stepwise multiple regression technique, the result showed that behavioural intention was significantly correlated with usage. Consistent with the theories, usage behaviour is predominantly explained by intention to use. In addition, the results show that attitude continued to be the main factor influencing students' technology acceptance decisions. Having a positive attitude is important to ensure continuity of use and the success of new technology. The effect of both perceived usefulness and perceived ease of use on students' attitudes was also supported by responses from the second stage data. According to research findings, the influence of intrinsic motivation factors exceeds the influence of extrinsic one. This shows the importance of the system being enjoyable and attractive to ensure its continued acceptance, especially for teenage students. An unexpected finding was the influence of peers and other people on students' decisions regarding the technology which was thought to diminish after one year. However, the findings of this study revealed that the effect of subjective norm on behavioural intention was significant and appeared to have strengthened with students' experience. Overall, the research model exhibited satisfactory explanatory power for explaining technology acceptance decisions and the variance appeared to increase as students became more experienced.

## CHAPTER SIX QUALITATIVE DATA ANALYSIS

## **6.1 Introduction**

This chapter presents the qualitative data collected during the same period as the quantitative data. Qualitative data supplement the quantitative data gathered through the questionnaire survey, and these data include interviews with schoolteachers who were involved in e-learning classes, focus groups with students, and the survey comments (students' comments on the questionnaire). Twenty-four schoolteachers were interviewed to explore their perceptions towards students' acceptance of e-learning in two stages (see Table 4.4). As the secondary school education system in Bahrain segregates males from females, twelve male and twelve female schoolteachers were selected. The interviews with schoolteachers were semi-structured to give participants the opportunity to express their opinions and perceptions freely. Each schoolteacher was asked the same questions (see Appendix 3) and these questions were based on the aims and objectives of the study. Some follow-up questions were transcribed first into Arabic and were then translated into English.

In addition, eight focus groups were conducted with students in two stages to get more in-depth information about those issues that could not be explained by quantitative data, such as the reasons for the low use of Edunet. Between five and eight students participated in each group (see Table 4.6); they were grouped into single gender groups because the schools are single sex.

Due to the nature of the data and for the purpose of convenience, responses to the open-ended questions from the questionnaire survey have been analysed together with data from the focus groups, under related themes; this analysis has been incorporated into this chapter.

## 6.2 Organisation of data

The transcribed interviews were coded according to themes which coincided with the main subjects investigated by the interview questions. In the next sections, the following themes are discussed:

- Teachers' perceptions about e-learning systems
- Teachers' opinions about students accepting e-learning
- The use of e-learning in class activities

## 6.3 Stage 1: Fieldwork survey-before experiencing e-learning

#### **6.3.1 Schoolteachers**

Teachers are an essential element of the learning process in schools and understanding their perceptions regarding e-learning systems is therefore important. As a result, interviews with schoolteachers were conducted to find out their opinions regarding the new system.

#### 6.3.1.1 Teachers' perceptions about the e-learning system

The introduction of e-learning resources into classrooms creates a learning environment and uses tools different from those employed in more traditional learning processes. School teachers need to cope with this change in order to ensure effective learning. The perceptions of teachers play an important role in the students' learning process, particularly with regard to encouraging students to accept e-learning.

Kersaint *et al.* (2003, p.560) found that teachers who believe a technology is important tend to be those who are more comfortable with using it and hence usually incorporate it into their teaching. In fact, the success of any new educational programme depends strongly on the

support and attitudes of the teachers involved (Woodrow 1992, p.216). Similarly, Abouchedid and Eid (2004, p.18) noted that teachers are the key players in curriculum development and evaluation. Therefore, it is important to understand their perceptions and attitudes towards e-learning.

Schoolteachers involved in the current study were asked about their perceptions regarding shifting from traditional teaching to e-learning. Several schoolteachers stated that, implementing e-learning is the right option in enhancing the learning process. One teacher said:

I strongly agree with the shift toward e-learning. This will greatly improve the learning process if used and implemented precisely and moved in the right direction. (Male Science teacher)

Similarly, another teacher said:

I believe it is a good decision to shift toward e-learning and such an opportunity must be taken seriously. (Male English teacher)

Other teachers commented that this project, implementing e-learning in secondary schools, is a challenge and requires support from the learning process stakeholders. These include: schoolteachers, school management, students, parents and society. One teacher stated:

Shifting to e-learning is a challenge that needs support from teachers, students, parents and the community itself. (Female English teacher)

The introduction of e-learning to secondary schools is a relatively new process in Bahrain. Adapting to this new style of learning will require time and effort from stakeholders in the schools; it will also take some time to get properly established in all secondary schools. One teacher said:
*I think we need more time to use e-learning so we can see what difference it makes.* (Female Science teacher)

Therefore, it is important for the teachers to appreciate and understand the role of time in exploring the real value and benefits of e-learning as it is unreasonable to expect to see quick results and benefits from e-learning at an early stage of its implementation. Unfortunately, there are some teachers who expect to see immediate benefits from e-learning systems, as noted by one English teacher:

As we move towards e-learning, we will need time to see its benefits and only then can we compare it with the current system. There are several people within the education environment who expect immediate successful outcomes. (Male English teacher)

E-learning is a new approach for schools and teachers. With the introduction of the system, teachers use different methods of teaching; some teachers use an e-learning system when possible, whereas other teachers depend mostly on printed textbooks. To use e-learning systems, teachers need time to gain the required skills and knowledge to use them effectively. To spend extra time and effort in learning new systems, teachers need the appreciation and understanding of the decision makers within the Ministry of Education (MoE) and school management, as indicated in the excerpts below:

Teachers are not motivated to use e-learning. At the end of the academic year, a teacher who uses e-learning and a teacher who does not try it will both receive the same result when they receive their evaluation report. (Female English teacher)

The above statement was also confirmed by a male Science teacher:

The current system does not motivate teachers to use and adopt e-learning in their teaching. There is nothing to distinguish between a teacher who puts a lot of time and effort into e-learning and another teacher who does not. Motivation is an essential factor to ensure that teachers are willing to achieve the objectives of the project and to ensure its continued development and success. Teachers need to be motivated to use the system by having either financial or moral incentives. As mentioned earlier, in evaluating teachers' work at the end of year, school management does not take into account the use of e-learning.

The results of the current study also revealed that there is a number of teachers who found difficulties in moving to e-learning and understanding its potential advantages. This was especially noticeable in teachers who had spent many years using traditional teaching methods. It is difficult to persuade them to change. It was clear from several responses that teachers' educational background, teachers' age, personal interest and teaching subject play an important role in teachers' perception and adoption of e-learning systems in schools. One teacher commented:

New teachers who graduated recently from university can easily shift to the new system and learn how to use it. However, older teachers who have spent many years using the old system are difficult to persuade to change, especially teachers who are within a few years of retiring. (Female English teacher)

Klassen and Vogel (2003, p.38) argued that teachers prefer to carry on with their current traditions and norms. In other words, they prefer to remain "with what has been done for centuries. They are afraid of the "loss of performance" in the lecture theatre, afraid that the video screen will not allow for the same level of inspiration that is felt in a live performance". Similarly, it was found in the current study that there are some teachers who are happy with traditional mode of learning and they felt their roles in class are more important than their roles in the new learning approach. They added that with the traditional mode of learning, they can control classes effectively.

Furthermore, the Mathematics teachers interviewed for the study tended to have a different perception of the benefits of e-learning when compared to the teachers of other subjects. A number of Mathematics teachers believed that it is ineffective to teach Mathematics electronically and difficult to develop an e-learning system with an entertaining approach to

learn Mathematics. They suggested that e-learning in general, and Edunet in particular, are not appropriate tools for teaching Mathematics. Here are some of their opinions:

I believe it is not the right choice to teach Mathematics electronically. The difficulty is that Mathematics uses many unusual symbols. (Female Mathematics teacher)

Subjects such as Biology and Chemistry can benefit from the system as they can provide pictures and different attractions. I cannot see how Mathematics can be taught effectively by using e-learning. (Male Mathematics teacher)

From another perspective, a number of teachers viewed the e-learning system as not secure and they expressed strong concerns about system security. Some of them were reluctant to insert their records and students' details on the system. One teacher said:

The main concern for us is the system security. We want to protect our personal data from hackers. We are still unable to trust the security of the system. Many teachers are hesitant to give their personal details and teaching materials. (Female Mathematics teacher)

In an e-learning environment, security is an important issue (Ndubisi 2004, p.254). Security against unauthorised access, alteration, editing and deletion of files or documents is an important issue that all e-learning system developers must consider. The e-learning system should provide security for users' personal information. Learners need to be confident that their data and course contents are secure and will not be influenced by outside users.

## **6.3.1.1.1 Impact of moving toward an e-learning system**

A shift towards e-learning leads to changes in teachers' roles within the classroom as well as their interactions with other stakeholders, such as parents; a teacher becomes a guide and a facilitator instead of being a leader (Salinas 2008, p.659). In interviews schoolteachers explored this issue in some detail. Teachers indicated that their role and responsibilities will be changed dramatically in an e-learning environment. This needs to be accepted by learners and their parents. One teacher said:

Having e-learning will change the role of the teacher. The role of the e-learning system is to support the learning process. The role of the teacher is essential in supervising and advising students and in managing the e-learning process. (Male Mathematics teacher)

Teachers today are not trained for those roles (Salinas 2008, p.659). Therefore, teachers need to be familiar with the technology and interact very closely with it.

Another important issue explored in the interviews was the teachers' workload associated with the changes in their roles and responsibilities in an e-learning environment. Some teachers believed that their workload would be increased due to changes in their responsibilities. Teachers argued that they would be responsible for training students to use electronic resources effectively as well as advising, monitoring and interacting with students electronically during class time and after school time on some occasions. One teacher said:

> Shifting toward an e-learning approach increases teacher responsibilities. Besides advising, monitoring, and interacting with students, teachers are responsible for training students to use electronic resources effectively. (Female English teacher)

On the other hand, some teachers commented that the use of e-learning would decrease teachers' responsibilities and workload. One said:

*E-learning saves teachers' time and effort. I spend a lot of effort at the beginning of course development.* (Male Mathematics teacher)

Reducing paperwork and the use of paper in learning activities was explored as one aspect of the impact of implementing e-learning. One teacher said:

*E-learning reduces teachers' responsibilities. Most of the tasks will be conducted online and it will reduce paper output.* (Male English teacher)

Thus, e-learning facilitates online communication between a number of stakeholders such as between students and teachers. Students can send their homework via e-mail and receive teacher feedback electronically. Reduction in the use of paper and ink is one of the benefits of online learning listed by Ndubisi (2006, p.586). Abuhamdieh and Sehwail (2007, p.45) reported that email is an important means of communication and they found in their study that both students and faculty actively used email for communication.

# 6.3.1.2 Teachers' opinions about students accepting e-learning

Teachers play an important part in understanding students' reactions to new systems (Martins & Kellermanns 2004, p.20). The qualitative data revealed that there was a number of essential factors influencing students' acceptance of e-learning. These are: usefulness, ease of use, attitude, motivation, social influence, and computer competency. These are discussed below.

### 6.3.1.2.1 Usefulness of e-learning

The qualitative data provided some insight into the usefulness of e-learning in general and of Edunet in particular. A number of schoolteachers stated that Edunet is a useful tool in secondary education if used effectively and extensively. For example, a Mathematics teacher said

My personal view is that the system is quite useful to students if used effectively and for other subjects. Students found the system useful for doing their reports and preparing their projects with the system's aid. (Male Mathematics teacher) A few teachers also mentioned that e-learning systems will help students who can learn and understand very quickly and who can study above their current level. One teacher commented:

The system gives high potential (intellectual) students the opportunities to develop further and move to their natural ability level without the need to wait for the rest of the class. (Male Mathematics teacher)

Several teachers indicated the main usefulness of e-learning is the recognition of diversity among students. They explored that an e-learning system provides an environment that helps students to work at their own pace, time and ability. They can manage and monitor their progress, and design and develop their own projects. One teacher stated:

> The main and crucial usefulness of e-learning is helping students to work at their own pace, time and ability, and a recognition of students' differing learning abilities and learning speeds. (Male English teacher)

Similarly, Clarke *et al.* (2007, p.14) noted that online learning offers its users an opportunity to learn at a speed that meets their learning preferences.

Parents also benefit from e-learning, as expressed by schoolteachers. A number of teachers commented that an e-learning system provides an excellent way for parents to follow their son's or daughter's progress online.

One teacher said:

The system helps and encourages communication between parents, students and teachers through online communications. This gives the parents the opportunity to follow their son or daughter's progress without relying on and waiting for the parents' evening. (Female English teacher)

Another teacher said:

If used extensively, it will connect parents with the school administration so parents can check grades online and send an e-mail if they have any questions. (Female Science teacher) These are the main benefits of an e-learning system as highlighted by schoolteachers. It was also found that some teachers were optimistic about e-learning systems and indicated that extending the project to include all schools would help in the development of the country as a whole.

## 6.3.1.2.2 Ease of use

Ease of use is one of the main factors influencing students' and teachers' use of e-learning. Some of the schoolteachers indicated that Edunet was easy to use. This factor motivates students to continue their learning after class as well as after school. This gives students the opportunity to take the lead in their learning in their own time, pace and place. Among the views expressed were:

> Ease of use of the system facilitates the continuity of the learning process. Students and teachers can carry on their tasks and activities after the typical 45 minutes class time. (Male Science teacher)

Furthermore, some of the teachers stated that using Edunet is easy and does not required advanced skills. One teacher said:

It is not difficult to use Edunet. Most students can use it; they don't need particular skills. (Female English teacher)

# 6.3.1.2.3 Students' attitudes

Teachers are an important part of the learning process. They spend a considerable amount of time observing, training and teaching students and have considerable experience in understanding students' concerns. Attitude has been found in previous studies to have a strong impact on behaviour (Ndubisi 2006, pp.585-586). If students have a positive attitude toward the new system, it will have a greater chance of being adopted.

Schoolteachers expressed their opinion regarding students' attitudes, asserting that the majority of students had a positive attitude toward using e-learning. They recognised the importance of e-learning and appreciated its usefulness, especially in their future learning. One teacher said:

Gaining e-learning skills and knowledge at an early stage in the students' education will help them when they start university education, as well as in their careers. (Male Mathematics teacher)

Some teachers explained this issue further by listing a number of points that can lead to a positive attitude:

- Students' computer knowledge. With rapid developments in ICT, most students are competent in using electronic resources
- Ease of use of the system. Although students need to be trained to use the system effectively, the system in general is not difficult to use,
- A fast means of communication. Students can communicate with colleagues, teachers, and administrative staff through e-mail,
- Entertainment and enjoyment can be experienced when using the site,
- Access to learning materials is available at any time and at any place.

Other teachers, however, argued that there are students with negative attitudes toward e-learning systems. Such students are afraid that the new system will replace the current one completely and they do not want to lose physical communication with teachers. Stokes (2000, no page number) pointed out that e-learning will not replace the traditional classroom. However, e-learning has the potential to change the purpose and function of the classroom because it offers new ways to deliver education.

Furthermore, a few teachers argued that changing students' attitudes toward e-learning cannot be achieved in a short time. One teacher said:

Students are not using the new system widely, so they still rely on printed textbooks. Therefore, to change their attitude toward electronic learning, they need more time. (Male Science teacher)

Changing students' attitudes requires time and effort from stakeholders in the schools. Students need time to realise the benefit of e-learning.

#### 6.3.1.2.4 Motivation

Motivation is one of the main internal drivers of individual actions and behaviour. A number of teachers participating in the study commented that students are motivated to use e-learning as part of their learning process. They explained further that students who have ICT skills are more motivated than others who are not so skilled. One of the statements in this regard said:

Students' are highly motivated to use e-learning. I believe this reflects their ICT experience as society moves towards being an information society. They find enjoyment in their e-learning activities. (Male Science teacher)

In addition, some teachers commented that one important factor for motivating students is their feeling that the system is useful. A feeling of usefulness builds a positive drive to motivate students to use electronic systems. Therefore, when they believe the system is useful, this motivates students to use it repeatedly.

Other teachers noted that students at this age like to have online discussions with other students and such features motivate them to use the site. One teacher said:

By having group discussions with students from different schools, they can discuss different issues. This can contribute positively to students' motivation. (Male English teacher)

Overall, it was found from the discussion with schoolteachers that if students feel the system is useful and has the ability to enhance communication between them, this motivates them to adopt and use this mode of learning.

# 6.3.1.2.5 Social influence

Some teachers stated that social factors are important in student learning because students can be influenced by their parents, friends and other relatives, since they live in a society that is strongly dependent on their relatives and peers. Students' peers play an important role in encouraging students to accept a new system (Martins & Kellermanns 2004, p.21). In addition, creating the right e-learning environment in the home plays an important role in enhancing the students' learning process. The right environment motivates and encourages students to use e-learning. Schoolteachers highlighted this factor as an important one which influences students' acceptance and use of e-learning.

#### 6.3.1.2.6 Computer competency

Users who have computer experience are more likely to have favourable attitudes towards elearning than inexperienced users (Abouchedid & Eid 2004, p.25). Similarly, Song *et al.* (2004, p.68) found that experience of computer technologies influences students' perspectives regarding how useful the technologies for online learning could be for them.

In the current study, most of the teachers who were interviewed asserted that both male and female students are, in general, competent in using a computer. They justified their argument based on the fact that students use computers at an early age. One teacher said:

Using electronic resources is not a problem for students nowadays because they start using computers when they are 6 years old. (Female English teacher)

Some teachers commented that some students help their teachers during lessons and solve any problems without referring to their teachers. This shows the lack of ICT skills among some schoolteachers and the need for effective training programs that are capable of enhancing teachers' skills.

Other teachers stated that they thought that boys have a different approach to computers when compared to girls. Boys like to play electronic games and other activities whereas girls like to have online communication with their friends. Similarly, in the Netherlands, Volman *et al.* (2005, p.35) found that at secondary level, girls and boys carried out different tasks when they were working on the computer and that they tackled tasks differently. Boys spend more time playing computer games than girls, while girls use e-mail more often than boys.

#### 6.3.1.3 Use of e-learning systems

Van Raaij and Schepers (2008, p.838) noted that the success of e-learning systems depends on students' acceptance and use of the system. With regard to this study, some of the schoolteachers who were interviewed stated that the use of the system by students was limited. They added that the system was not used as expected. One teacher said:

The system is relatively new for students and staff. The system started two years ago and throughout the two years the system has been disconnected several times. (Male English teacher)

The interviews with schoolteachers also indicated that the current system is restricted to a few subjects of the school curriculum namely Science, Mathematics and English. Therefore, students' use is limited to these subjects.

On the other hand, there were other teachers who believed that there was an improvement in students' use of the system. This may due to an increase in the students' competence in using the system and an increase in their awareness of the usefulness of this mode of learning.

# 6.3.2 Students

Students' learning is, of course, the main aim of school education. Positive student attitudes and motivation towards their learning process are essential in accepting the process as well as in learning itself. Packham *et al.* (2004, p.340) noted that "...for a student to be successful on an e-learning course they must be a suitable candidate and be committed to a course of study". According to the researchers, commitment and motivation are influenced by a number of factors including: student profile, personal circumstances and the perceptions of the learner.

Furthermore, Williams (2002, p.52) notes:

The Web can be a marvellous medium both for information dissemination and interactivity, but it can only facilitate true learning if it genuinely meets the needs of those for whom it is employed. Eight focus groups were conducted with students to investigate their perceptions regarding elearning systems (see Table 4.6, p.148). The following sections present students' opinions about the new mode of learning, their actual use and the main problems they experienced when using the new system.

# 6.3.2.1 Students' perceptions about the e-learning system

The analysis of the qualitative data revealed that the majority of students appreciated the elearning system as it contained a number of features that needed. These included:

- Curriculum: the required modules for each year of study
- E-textbooks
- Electronic mail
- Group discussions
- Announcements or advertisement boards
- Other learning materials
- Visual library: students can access visual resources anywhere
- Student records: these contain students' grades and other personal information.

Students had positive perceptions towards the use of the e-learning system. They indicated that this mode of learning helped them to access a variety of resources and helped them in keeping up with curriculum changes. One focus group participant stated:

Using Edunet keeps me up to date with major changes in the curriculum...it gives me a wide range of information and learning materials. (Male student: focus groups)

In addition, a large number of students commented that Edunet was easy to learn and to use. They further explained that using e-learning made it easy for them to communicate with teachers and they could access learning materials and grades online.

Some students expressed the importance of e-learning to support traditional learning, as one student commented:

The traditional system produced famous scientist and scholars. I think e-learning will support and enhance the traditional learning because technology is everywhere. (Male student: survey comments)

Similarly, there were other opinions similar to:

While the importance of computers and e-learning will grow, the use of pen and book will continue. Computers will never be a substitute for a book. (Female student: focus group)

We still need previous systems. I think both can complement each other, but the new system can't replace the previous system. We still need a teacher inside the classroom. (Female student: focus group)

On the other hand, a few students commented that they did not like to use e-learning systems; they preferred traditional learning methods which involved the use of printed textbooks. Some students, especially from the female groups, preferred face-to-face interaction with a teacher as indicated in the excerpts below:

Receiving information and knowledge directly from the teacher is not the same as from the system. (Female student: focus group)

We don't want to talk to a computer. We want to talk with a teacher and discuss the lesson in more detail. (Female student: focus group)

Students had spent a number of years using the traditional learning approach which depends mostly on teachers as the source of information. Changing to a new approach, which requires students to take a more active roles in the learning process, lead a few students to prefer the previous traditional approach.

Teacher guidance and support are important for learning and communication (Vonderwell 2003, pp.83-87). In an e-learning context, students felt that the communication is less personal and this was a concern of some female students.

Furthermore, a large number of students complained about the lack of awareness regarding the Edunet. They also indicated there was a lack of appreciation of their opinions and attitudes toward the adoption of e-learning systems. Students stressed that this research is the first time their opinions have been taken into account and discussed to some extent. One student said:

It is the first time somebody [this researcher] has come here and asked about our opinion regarding the system. No one cares about our thoughts or feelings. I think those who are responsible for this project need to come to school and ask teachers, parents and students about it and what kind of problems they face. (Male student: focus group)

#### 6.3.2.2 The use of e-learning in class activities:

As stated by most students in the study, the use of Edunet is limited. Students are free to use either textbooks or e-textbooks because it is not compulsory to use the system in any of the schools studied at this stage. Use of the Edunet is not compulsory and the students are given the option to use traditional learning materials or electronic resources. This is mainly due to the restricted number of modules available in the system. Students who participated in the study also raised the problem of a lack of available resources in their schools. Each school has only two labs for all the students which actually influence the use of Edunet in the school. As one student commented:

> Actually, I haven't got lots of time to just sit around and use the site because we have only two electronic classrooms in the school. (Male student: focus group)

Furthermore, students used Edunet for a variety of purposes besides using e-textbooks. They used it to communicate with their colleagues, access personal e-mail, develop personal projects and do school homework. Here are some of their opinions:

I use the site to communicate with colleagues, to remind them about exams and to discuss assignments. (Male student: focus group)

*I use it to check my email and to do my homework and different projects.* (Female student: focus group)

#### 6.3.2.3 Social impact

Students who participated in the current study indicated that they had been influenced to use Edunet by their friends, while a number of students asserted that using Edunet was their own decision. One student said:

If I see the system is beneficial, I will use it again, regardless of whether others have used it. (Male student: focus group)

Therefore, a feeling of its usefulness was the main driver for using the system, as stated by many of the student participants. One respondent said:

I respect my friends' opinions, but I believe that using the system depends on my own experience with the system and its usefulness to my learning. (Male student: focus group)

On the other hand, some students stated that their teachers encouraged them to use the site and to have online communications. One focus group respondent said:

My teacher motivates me and my colleagues to use the system and to have online communication. (Female student: focus group)

Another student stated:

Our Science teachers encourage students to use Edunet and to have online communication with them especially during exam periods. Most teachers are ready to receive students' questions and send an immediate answer. (Female student: focus group)

In summary, web technologies facilitate and enhance communications among teachers and students and provide tools to encourage creativity and initiative (Rezaei *et al.* 2008, p.85). Indeed, McNicol, Nankivell and Ghelani (2002, p.401) noted that the attitudes of teachers play a critical role in determining a child's use of technology.

#### 6.3.2.4 The main obstacles that affect acceptance of an e-learning system

Students identified a number of problems that they perceived could affect the use of e-learning systems. For example, some students stated that student records on the site were out of date. One respondent noted:

Student records are not updated regularly. It takes a long time to change data there. (Female student: focus group)

Another point which was made by many respondents was the lack of control on the part of teachers. This was due to the fact that students felt that the availability of a computer for each student within e-classrooms might distract the focus of the learners, leading to a loss of control of the class by the teacher. The following student responses are typical of those which illustrate this point:

The availability of a computer for each student will distract the focus of the students, so I prefer to have only a smart board and one computer for the teacher only. (Male student: focus group)

Lack of control in some e-classrooms can happen because some students start playing with computers and others with chairs. (Male student: survey comments)

Some students also asserted that a potential barrier is students' access to PCs after class time. The fact is that not all students own a computer at home and, even when they do, they do not all have Internet access; this was noted by many respondents. One student said:

> There is a problem for students who don't have a computer or even do not have access to the Internet. How they can study or do their homework after school hours is a real issue. (Female student: focus group)

Some students recommended the use of Internet cafés or public libraries as a solution for students who do not have Internet access at home; however, others were against this. They argued that using Internet cafés is a difficult option due to their cost, the distance from home, the fact that some students need to be accompanied by a parent and it is often not convenient for

the parents, and there are social barriers for female students. Besides the previous reasons, public libraries are also not a good option because of the lack of Internet access in most public libraries in Bahrain. Typical student responses illustrate the point:

Students who don't have Internet access at home find this is a problem, especially for girls in our culture because it is inappropriate for girls to use an Internet café. (Female student: focus group)

Public libraries are located in different areas and they do not always have Internet access, so students who do not have a computer at home will suffer. (Female student: focus group)

Further obstacles that were noted included the lack of ICT training for students, the lack of technical support, and slow Internet access. The latter, it was thought, leads to negative attitudes toward the system and thereby affects acceptance and usage. One student said:

The Internet is slow. Especially when I download a picture, it takes time. (Male student: focus group)

Similarly, Musameh (2008, p.12) found that students who participated in his study commented on the difficulty they faced when accessing the network; according to their opinions, this was the main problem they faced.

Breakdown of the network during the lesson was also noted by a number of students who participated in the current research. Furthermore, a lack of resources in schools was also raised as an obstacle by students. The students explained that there is a lack of e-classes to support the e-learning process. Students felt that the limited number of e-classrooms would affect their use of it within school hours. One respondent stated:

We have two e-classrooms for all students, so we use it one or two times every two weeks. (Male student: focus group)

Survey respondents also complained about the facilities within electronic classrooms. Some complained about the furniture and others complained about the darkness of the room.

#### 6.3.3 Role of the Ministry of Education in creating a successful e-learning system

The success of an e-learning system depends upon its frequency of use. McFarland (2001, p.2) wrote: "for a system to be successful it must be used and it must foster learning". Furthermore, Song *et al.* (2004, p.59) argued that course design, time management, learner motivation, and comfortableness with online technologies affect the success of online learning.

In the current study, the majority of participants expressed the need for creating a positive elearning environment. To ensure the success of an e-learning system at school level, support from the Ministry of Education and also technical support are needed.

#### 6.3.3.1 Ministry of Education (MoE) support

The Ministry of Education's strategy was to implement and encourage e-learning in secondary school education. However, after one year of introducing the e-learning system the MoE changed the educational approach from specialist to general education. This new approach added more modules to those already taught by teachers in one academic year. Subsequently, this approach increased the pressure on students and teachers to cover a wider range of subjects in an already overloaded timetable. This has led to less time being focused on e-learning systems, as indicated in the excerpts below:

The Ministry of Education has changed the secondary school education system to a system that requires more modules in one academic year. This has led to an increase in pressure on students and teachers to cover a wider range of subjects. (Female Science teacher)

How can I find time to use e-classrooms and train students with crowded timetables and curriculum? (Female Mathematics teacher)

Another issue raise by schoolteachers was the lack of MoE support in maintaining and increasing the speed of the current schools' network. Slow Internet access and broken links were raised by a number of schoolteachers. There were many complaints about the slowness of accessing the site. One teacher stated:

The speed of Edunet loading is quite slow. This has led to students' frustration and a loss of motivation towards using *it*. (Female Mathematics teacher)

Other teachers added that broken links disturbed the lesson and caused inconvenience inside the class. The blame for such a problem, as indicated by some teachers, could be laid upon the Bahrain Telecommunications Company (Batelco) which provides the Internet service, and the lack of MoE support in solving the problem. One teacher said:

There is always a need to return to a printed textbook especially when there is an access problem or electrical problem. (Female Science teacher)

In addition, Internet fees need to be reduced, especially for students. A Mathematics teacher stated:

*To use Edunet, students must have access to the Internet. Internet fees are expensive and not everyone can pay.* (Female Mathematics teacher)

Abouchedid and Eid (2004, p.17) stated that costs are the main barrier to Internet access in the Arab region. Telephone usage tariffs are expensive in many parts of the Arab world, which limits the use of the Internet as an e-learning tool. Similarly, Weber (2009, p.95) commented that "the lack of competitive telecommunications markets in the GCC region results in substantial Internet usage fees, which limits access to online learning resources". It is the responsibility of the Ministry of Education (MoE) to arrange for the Bahrain Telecommunication Company (Batelco) to fix Internet access charges in order to help students to use electronic learning materials at home.

The other important issue that was explored was the lack of MoE support in training teachers to enhance their ICT skills. Teachers' skills were also noted as a barrier to the successful adoption of e-learning and the lack of skills of teachers in using ICT was a real problem inside the classroom. This has also been noted by Drent and Meelissen (2008, p.195), who suggested that a lack of ICT competence is an obstacle to the further integration of ICT into education.

Students commented that inexperienced teachers are afraid to use e-learning systems and are unable to solve many problems which may occur when accessing the site. One respondent said:

My teacher is afraid to use a computer or even a smart board. (Male student: focus group)

Another focus group respondent stated:

Limited ICT skills of some teachers are actually a problem. How can they teach using tools when they do not know how to use them? (Female student)

Some teachers have basic computer skills, whereas others are more knowledgeable and competent in using ICT. A few teachers do not have even basic skills. One teacher stated:

The educational background of the teacher is an important factor in accepting e-learning as a tool in the learning process. Some teachers don't have basic computer skills. (Male English teacher)

Another teacher stated:

Although we live in an information age, there are still some teachers who are incompetent when using a computer. (Female English teacher)

In fact, the MoE encourages teachers to improve their computer skills in order to use e-learning systems more effectively. Therefore, the MoE provides training programmes for teachers every year and, by the end of the training period, teachers get an ICDL certificate. ICDL is the International Computer Driving Licence, "the world's leading program providing individuals with basic computer skills training and validation/certification testing" (ICDLUS 2005). The main problem with this training is that it takes place outside the teachers' normal working hours, which conflicts with their personal and family commitments. Female teachers especially are against this approach, as indicated in the excerpts below:

The time after school working hours belongs to my family, especially my children. I need time to teach them and to take care of them. (Female Mathematics teacher)

Teachers' training time and dates given are usually inconvenient to teachers. The Ministry of Education plans teachers' training after our school time. This is usually in conflict with our social, family and personal commitments. (Female Mathematics teacher)

Some schoolteachers suggested that the training should be held at the start of the academic year or during the mid-year holiday. Other teachers argued that the preparation for a new system should be at the beginning of the academic year, not when teachers start teaching and get involved with other activities.

> As a new system, it needs to be prepared before the beginning of the academic year, not when we start teaching students and get involved with other activities. (Male Science teacher)

Another factor to be considered by the MoE is the number of e-classrooms in each school. The current number of e-classrooms is insufficient to cope with the e-learning strategy, as commented by several of the schoolteachers and students who were interviewed. This lack of e-classrooms has forced teachers to depend on traditional learning processes. One teacher said:

It is a planning problem as the Ministry of Education has been expanding the programme rapidly. They are increasing the number of schools with e-learning technologies but have a limited number of e-learning classrooms; they have done this without evaluating and expanding classes for the schools. (Male English teacher)

Another factor that influences the adoption of e-learning for both teachers and students is competence in using the English language. Competence in the English language is essential for the effective use of e-learning resources as the great majority of resources that are available on the Internet and in educational learning software are mainly in English. Hughes (2005, p.5)

observed that linguistic factors have a significant impact on international students' use of online resources. Abouchedid and Eid (2004, p.17) highlighted the fact that the lack of Arabic content and related applications limits access to the Internet for people who know limited French or English. Therefore, competence in the English language is needed by both teachers and students for them to access and use e-learning resources. One teacher stressed this point by saying:

Teachers and students need to learn the English language in order to use e-learning resources effectively. (Male Science teacher)

Regular evaluation of the system is another point raised by a number of schoolteachers. Implementing a new system requires regular evaluation and feedback from different stakeholders. One teacher said:

The use of Edunet in schools is relatively short. The experience gained needs to be evaluated and discussed with the educational authority. Currently, there is no such plan. (Male Science teacher)

Moreover, increasing the awareness of society about this mode of learning was recommended by both schoolteachers and students. Society as a whole needs to be made more aware of the project. This should be done through different media, such as daily newspapers and school newsletters. Any development or issues related to the system could be reported there to increase public awareness. Some students recommended the use of a school homepage to increase students' awareness about the e-learning system and its features.

In sum, schoolteachers and students highlighted a number of factors that should be considered by the MoE to ensure the successful implementation of the system. These are: IT infrastructure, teachers' skills, Internet fees, awareness, training time and lack of Arabic language learning materials on the Internet.

#### **6.3.3.2** Technical support

Ralph (1991) quoted in Ngai, Poon and Chan (2007, p.254), defined technical support as "knowledge people assisting the uses of computer hardware and software products". This includes help desks, online support services, hotlines, machine-readable support knowledge-bases, faxes, automated telephone voice response systems, remote control software and other facilities. As students and staff become familiar with e-learning, reliable technical support is essential (Packham *et al.* 2004, p.336).

Technical support is needed in each school in order to provide effective technical advice, as well as to maintain and update the system. However, few studies have highlighted this issue (Hara & Kling 1999, no page number). More than half of the schoolteachers interviewed in the current study indicated that the technical support was insufficient at their school. This is understandable as the research revealed that there are some teachers lacking the basic skills and knowledge to use computers. This puts extra work and pressure on the technical support personnel. One teacher said:

Each school has only one information specialist and one technician to maintain and support the Edunet system and the ICT activities. How can they manage their time with a lot of other responsibilities? (Male English teacher)

A number of students who participated in the current study highlighted this lack of technical support. This has lead to delays in students' progress in learning and in completing their coursework. The Ministry of Education should support the schools to ensure the success of elearning. A number of students suggested the need for online help so they could get support at any time and in any place. One focus group participant said:

Online help is not available. Students have to wait until the next day for technical advice and repairs. (Female student: survey comments)

Having one information specialist and one technician in each school is clearly insufficient. These staff have other responsibilities besides helping students and teachers. If students are unable to make the technology work and do not receive support, they will give up (Alexander 2001, p.246).

#### 6.3.4 Summary

The results from the analysis of the qualitative data revealed that a number of teachers found difficulties in moving to e-learning and understanding its potential advantages. This was especially noticeable in teachers who had spent many years using the traditional system. Furthermore, the Mathematics teachers who were interviewed for the study tended to have a different perception of the benefits of e-learning when compared to the teachers of other subjects. A number of Mathematics teachers believed that it is ineffective to teach Mathematics electronically and that e-learning is not appropriate for the teaching this subject. However, some teachers were optimistic about e-learning systems and indicated this by suggesting that the project should be extended to include all schools; this they thought, would help in the development of the country.

Furthermore, a number of essential factors influenced students' acceptance of e-learning. These were usefulness, ease of use, social influence, attitude, computer competency, and motivation. The majority of students had a positive attitude toward using e-learning, as stated by most schoolteachers. They recognised the importance of e-learning and appreciated its usefulness, especially in their future learning. However, some students, especially girls, preferred face-to-face interaction with a teacher. Such students were afraid that the new system would replace the current system completely. They did not want to lose physical communication with teachers. As online learning does not have traditional face-to face communication, teachers should understand the humanity of online learners.

The results also revealed that the use of the Edunet was limited in the schools selected for the current study, due to a number of barriers identified by schoolteachers and students. The major barriers faced by schoolteachers were lack of time, slow Internet access and broken links, lack of support from the MoE, training needs and training time. From a student perspective, the limited number of e-classrooms, a lack of teacher control, the availability of computer and Internet access at home, slow Internet access and broken links, and lack of technical support were the major barriers that influenced students' use.

#### 6.4 Stage 2: Fieldwork survey-after one year of experiencing e-learning

This stage was carried out between October 2007 and December 2007. Eight focus groups were conducted with students in their classrooms, in the presence of the Information Technology specialist and at a time suitable for students and staff (see Table 4.6). Fifty three students participated in the focus group sessions to identify any changes in their perceptions regarding the e-learning system after one year of experiencing the system. An interview with schoolteachers was also conducted to find out what changes had occurred between the first and second fieldwork visits, especially in their attitudes and actual use of the system. The main outcomes of the second stage are presented in the next sections, focusing only on changes from the first stage.

# 6.4.1 Students' perceptions about e-learning system after one year of experiencing the system

The main driver for the second stage of the qualitative data was to explore any changes in students' perception towards e-learning after one year's experience of using Edunet, the impact of one year's experience in using Edunet, and to explore the main factors that contributed to the changes.

The analysis of the qualitative data in the second stage revealed that the great majority of the focus group participants and questionnaire survey respondents commented that e-learning in education is important. Students have become more aware of the importance of e-learning in their learning process. This represents a shift in the students' attitude towards e-learning after one year of experience. One student commented:

*E-learning is useful and important, especially nowadays.* (Male student: survey comments)

Some students indicated that e-learning has promoted their knowledge and improved their exam grades. This point was not raised by students in the first stage. One student stated:

*E-learning is important. It improved my knowledge and my exam grades. Through web-based learning, I access a variety of educational resources.* (Female student: focus group)

Furthermore, students participating in the second stage recognised the importance of using elearning at their age level. They recognised that e-learning at this age would help and support their future academic and career development. Clarke *et al.* (2007, p.15) noted that "In an age in which 90 percent of new jobs require ICT skills, this is a significant factor to consider." One focus group participant said:

> Using e-learning at this age will help us in the future, either at work or in our university education. (Male student: focus group)

Female students also supported the male view regarding the use of e-learning at this age and its impact on education in the future. One female student explained further and related the issue to the Bahraini policy toward e-government and society's use of e-commerce. She said:

Early use of e-learning prepares students for college education and work. As you notice, the country is now moving to e-government and the fact that e-commerce is starting to take place in our market today. (Female student: focus group)

After one year of using the e-learning system, students' perceptions changed toward the new mode of learning. Many students preferred the e-learning system over the traditional learning method. One focus group participant said:

*I prefer e-learning to traditional learning methods.* (Male student: focus group)

On the other hand, there were a few female students who still preferred direct interaction between students and teachers. One student said:

I prefer face to face communication with my teacher. I understand the lesson quickly when she talks to me directly. (Female student: focus group)

Similarly, Alexander (2001, p.242) found that a number of students believed "that the best form of learning occurred when teachers gave lectures, and resisted all attempts by teachers to involve them in activities which facilitated knowledge construction rather than reception of information". Similar findings were echoed by Musameh (2008, p.15) and Dagada (2005, p.1126) who found that learners missed real-life interaction with their colleagues and instructors when using online learning. Kim, Liu and Bonk (2005, p.340) also added that the lack of emotional connection when students worked in the online learning environment was a key obstacle to effective communication among students.

### 6.4.2 Factors affecting students' use of e-learning

While educational institutions have invested considerable resources in e-learning systems, the benefits of such investment will not be realised if learners fail to use the system (Pituch & Lee 2006, p.223). A great majority of the focus group participants stated that their use of Edunet was much greater than in the previous year, which was also confirmed by a number of teachers interviewed in the second field-work visit. Students were using the system more, despite the slowness of the Internet. This was because students had become more competent in using Edunet than the previous year. Here are some of their opinions:

Although Internet access is still slow, we use the Edunet more than last year. (Male student: focus group)

I believe now I have the experience and have become more competent in using Edunet. I am using it now with more confidence. (Female student: focus group)

Several students noted on the questionnaire that they were using the system every day. They found it more convenient and enjoyable. One student said:

I use it every day for this course. Edunet is enjoyable to work with. I hope to use the scheme for all education levels. (Male student: survey comments) This increased use of Edunet was due to a number of factors as expressed by both schoolteachers and students. These are presented and discussed in the next sub-sections.

### 6.4.2.1 Training approach

It was noted that students who participated in focus group sessions were more willing to train and to gain ICT skills compared to the previous year. A variety of training workshops had been organised for students in the current year, and students found training more enjoyable than the previous year.

Students were highly motivated to be trained. It was noted through discussions with students that the main reason behind such behaviour was the use of a new approach to training. The new approach was to give students a role and responsibility in the training process. Trained teachers took responsibility for training students and then competent students trained their peers.

After a group of students had been trained, these students trained other students and according to some focus group respondents, they found it easier to learn from other students than from teachers. One student said:

It is easier to be trained by another student who is similar in age, so training will be informal and it is easier to ask questions. (Female student: focus group)

The new training approach was said to help and support teamwork, which is an important factor in the learning process. Students expressed their view strongly regarding the new approach, which helped them to work as a group; this helped their learning. One respondent said:

We feel as if we are working as a group. Training as a group and being trained by our colleagues helped and speeded up our learning. (Female student: focus group)

Peer training appeared to be an important factor in the students accepting training and in making the training interesting and flexible. The main characteristics of peer training identified by students who participated in the focus group discussion were similar age, shared interest with the trainer, and easy interaction.

## 6.4.2.2 Ministry of Education support

Decision makers and school management play an important part in controlling and building a positive learning environment in secondary schools. During 2007, the Ministry of Education (MoE) focused mainly on two issues, as explained by schoolteachers: first, increasing awareness in society about the use of e-learning in education and, second, training stakeholders (teachers, students, administrative staff and parents).

Furthermore, the MoE asked each school to establish a committee with ten members in each school. These committees included the head teachers and a number of schoolteachers. Their main concern was the e-learning system and related issues. In other words, they were responsible for evaluating the system, training teachers, and raising any important issues to the MoE. For example, they could advise the MoE of the type of training needed.

To motivate schoolteachers to use the system, the MoE provided incentives to schoolteachers who taught mostly by using the new method of teaching. A competition between schools had been arranged by the MoE to select the best electronic lessons prepared by a schoolteacher. Schoolteachers added that an annual competition was organised among schools to stimulate teachers and administrative staff to use the available resources in order to produce electronic content in a creative way. One of the objectives of the contest was to encourage the creativity of teachers in the area of e-learning and to create a spirit of competition in the educational environment.

#### 6.4.2.3 Usefulness and ease of use

Ease of use and the usefulness of the system play an important role in students' motivation. A feeling of usefulness builds a positive drive to motivate students to use the system. Therefore, students who believe the system is useful find that this motivates them to use it again and again. Chang and Tung (2008, p.71) added that using computer networks and multimedia makes the use of learning tools easier and more convenient.

The analysis of the qualitative data revealed that the majority of questionnaire respondents and focus group participants stated that Edunet was easy to use and to learn, and was more attractive than they thought last year. Students believed that these features motivated them to use the system.

In term of usefulness, information materials provided by the system constituted a critical factor for students' acceptance of it. Therefore, updating the system regularly made the system more useful to the students, as indicated by most focus group participants. This motivated them to use the Edunet more and more. Several students who participated in the focus groups stated the system had improved from the previous year. Most text-books had been transferred to e-textbooks and made the system more useful. Here are some of their opinions:

> The inclusion of grades, required courses and all etextbooks, school rules and announcements made the system very useful and motivatd me to use the system. (Female student: focus group)

Through the site, I can check my grades, absent days and my schedule for each year. (Male student: focus group)

The inclusions of most e-textbooks within the site helped me during the exam period... I will not be afraid if I lose the printed textbook or forget it in school. (Female student: focus group) Sanders and Morrison-Shetlar (2001, p.260) reported similar findings: that students appreciated the online access to the course syllabus in the event that they misplaced the printed course syllabus. Therefore, by transferring most textbooks into e-textbooks, students found them more convenient to use.

Besides having a smart board in e-classes, most schools that had adopted e-learning were now using an active board, as indicated by most students. Active boards have more features than smart boards and schoolteachers can use one pen with different colours.

The interaction with sounds and colours motivated most students who participated in the second stage to use web-based learning. Atkinson and Kydd (1997, p.59) noted that "due to the colorful and moving images that come to a user through the WWW, it seems like fun to use it".

Some students commented that the interaction with sounds and colours helped them to understand the subject and to remember lessons very easily. This motivated them to use the system. One focus group participant said:

> The inclusion of sounds and colours motivate students to become more active in the class than when using the traditional method in teaching. (Female student: focus group)

A colourful web portal interface is necessary because it catches the user's attention (Large & Beheshti 2005, p.327). In his study, Paris (2004, pp.98-101) examined differences in attitudes between paper-assisted learning and Online Web-Assisted Learning (OWAL) and found that most students favoured OWAL offerings of diagrams, games, animations and movies. It is apparent that the use of multimedia facilities in the learning process, such as those provided by websites, attracts students and keeps them motivated. Using video increases significantly the acceptance and motivation rate of the participants (Deneke 2003, cited in Lange & Steinborn 2006, no page number).

#### 6.4.2.4 System interactivity

A number of researchers pointed out the value of interaction within the learning process. For example, Palloff and Pratt (1999, p.5) stated that: "key to the learning process are the interactions among students themselves, the interactions between faculty and students, and the collaboration in learning that results from these interactions". Similarly, Siemens and Yurkiw (2002, p.134) wrote that online communication between students and instructor is one of the main benefits of online learning. Liaw, Huang and Chen (2007, p.1078) added that the interaction between learners and teachers is a success factor for enhancing the effectiveness of e-learning systems.

Students participating in the focus groups indicated that online communication with schoolteachers had increased over the year and they found it useful and interesting. They found it useful to communicate with their teachers particularly during the exam period. One student said:

It is interesting to have online communication with teachers after school time. We are communicating with our teachers more than last year. (Male student: focus group)

Sanders and Morrison-Shetlar (2001, p.252) argued that "active participation by the instructor played an important role in increasing student participation in online activities which, in turn, increased learning through interaction with one another." In addition, Selim (2003, p.357) noted that the availability of course material at anytime and anywhere enhances student-student and student-instructor communication.

#### 6.4.2.5 Teachers' skills

Teachers' ICT skills and competence in using the e-learning system is an important element of the e-learning process. This element is more important at secondary school due to the age and computer experience of the students. Holden and Rada (2009, p.848) pointed out the need to have skilled and knowledgeable teachers "in order to reach this new generation". Students who participated in this study explored the concept of teachers' lack of ICT skills and competence and thought it an obstacle to e-learning acceptance. They indicated that teachers without such skills would not encourage students to use the system.

Teachers who do not have computer skills prefer traditional ways of teaching. (Female student: focus group)

Schoolteachers also added that training was the main concern of the Ministry of Education (MoE) in the current year (2007). A number of training workshops had been arranged by the MoE during the year, such as Publisher, Front Page, and Data show. Most of these training sessions were conducted during school time or within a school break.

It was noted during the second stage that there was some improvement in teachers' skills. The Ministry of Education encouraged schoolteachers to attend training workshops and provided incentives to those who planned their lessons electronically.

On the other hand, participants in the second-field work visit highlighted a number of issues that negatively influenced use of the system. These issues, which were also raised by students and teachers in the first-field work visit, included the following:

### 6.4.2.6 Slowness of the Internet

Students who participated in the focus groups stated that it took time to open a site and download resources particularly during the holidays. This led to student frustration. Students expressed their willingness to use the system but the downloading of resources and accessing information took time. One female student said:

We want to use it, but the Internet is slow, so it takes a long time to download materials from the site. (Female student: focus group)

It is also important to note that this factor was also expressed by students who participated in first field-work visit.

# 6.4.2.7 Technical problems and lack of technical support

Breakdown of the Internet was another problem noted by many students. This affected students' motivation and teachers' preparation of the lesson. The breakdown of the network during the lesson caused teachers to revert to a traditional method of teaching. One student stated:

Breakdown of the network during the lesson is the biggest problem faced by most users. (Male student: focus group)

Similarly Sun *et al.* (2008, p.1195) argued that technology which suffers from frequent technical difficulties will discourage students from using this mode of learning. Furthermore, technical support is needed to provide maintenance to computers and to provide help and support to the system users. As in the first stage, most participants complained about the lack of technical support. The number of technical support personnel was said to be insufficient to help students and teachers.

Most of the schools had one information specialist to maintain and support the system users. Some students complained that most computers needed maintenance. In the students' opinion, one information specialist was not enough to perform all tasks.

#### 6.4.2.8 Ownership of computer and having Internet access at home

E-learning in Bahrain started with secondary education, but now starts in a number of primary and intermediate schools. Adapting online learning to all education levels raises another difficulty for students, as expressed by schoolteachers. Using online learning increases the financial cost for students and having a computer and Internet access at home is a financial problem for some students. The great majority of families in Bahrain have more than four children, and if all adopted e-learning, it would be a real problem. In Arab countries, the Internet costs are high and connection speeds are low because of two reasons (Aladwani 2003, p.13). First, there is a monopoly in the Internet service provider market, which means there is one Internet service provider in operation and other firms are prevented from entering the market. Second, Internet service providers are not allowed to give their own international gateways. Weber (2009, p.95) also noted that "lack of competitive telecommunications markets in the GCC region results in substantial Internet usage fees, which limits access to online learning resources".

Aladwani (2003, p.14) reported that Internet access prices in most Arab countries exceed the purchasing power of average citizens. Students who participated in focus group sessions worried about this issue and how it affected their use of the e-learning system. This concern was also reported by Mashhour (2008, p.4) who studied students' perceptions of online courses at the University of Bahrain. This factor needs to be considered by the decision makers.

# **6.5** Conclusion

An analysis of the qualitative data in the second stage revealed that there were some changes in the perceptions of students towards e-learning after one year's experience of using Edunet. Students recognised the importance of using e-learning at their age level and were more aware of the importance of e-learning in their learning process. They believed that e-learning would help and support their future academic and career development. However, a few female students who participated in the focus group sessions still preferred face to face interaction with schoolteachers. The increased use of Edunet in this year was due to a number of factors, as explained by both schoolteachers and students. These included training approaches, MoE support, system interactivity and teachers' skills. In addition, ease of use and the usefulness of the system played important roles in the students' motivation. A feeling of usefulness created a positive drive to motivate students to use the system.

Furthermore, increasing awareness in society about e-learning and training stakeholders were the main concerns of the MoE. A number of training workshops had been arranged during the year, and most of these training sessions were conducted during school time or within a school break. The MoE encouraged schoolteachers to attend training workshops and provided incentives to those who planned and presented their lessons electronically.

Furthermore, schoolteachers and students highlighted a number of issues that negatively influenced use of the system. These were: the slowness of the Internet, technical problems, lack of technical support and the availability of resources either at home or at school.

There now follows a discussion of the results of the study, bringing together all of the data gathered.
### CHAPTER SEVEN DISCUSSION OF THE STUDY

#### 7.1 Introduction

E-learning is considered to be the "fastest growing learning tool in the Middle East" (Aldhafeeri, Almulla & Alraqas 2006, p.712). Its use is growing rapidly and it is increasingly affecting different sectors, such as education. In an educational context, e-learning offers learners and teachers a number of capabilities, such as the ability to access a variety of online resources anywhere and anytime.

As mentioned in Chapter One, Gulf governments have invested a great deal in online education and the government of the Kingdom of Bahrain was a pioneer in making such an investment. It has been confirmed that the success of using e-learning systems depends to a considerable extent on students' acceptance and use of these systems. Consequently, measuring learners' acceptance and use of e-learning system is vital and worth investigation. Therefore, this study aimed to investigate, analyse and measure students' acceptance and use of e-learning system in Bahrain Secondary Schools. Measuring schoolteachers' perceptions regarding e-learning systems was also among the aims of this study.

This chapter discusses the main outcomes of the study and provides explanations of the results in the light of the reviewed literature. It begins with a discussion of the main factors that influence students' acceptance of e-learning, together with the perceptions of teachers and students regarding the e-learning system. The role of experience in the acceptance of e-learning and motivational factors that influence the use of e-learning are also presented.

#### 7.2 Factors influencing students' acceptance of e-learning

The primary objective of this study was to explore the critical factors influencing students' acceptance of e-learning using an extended version of the TAM. Consistent with other researchers, such as Lee (2006), Ajzen and Fishbein (1980), van Schaik Barker and Moukadem (2005) and Abbad, Morris and Al-Ayyoub (2008), this study attempted to predict students' acceptance from a measure of their intentions and the ability to explain these intentions in terms of a number of factors.

The findings revealed that attitude is critical determinant of student acceptance of an e-learning system (see Figure 7.1). In other words, intention is most dominantly influenced by attitude ( $\beta$ =0.355) and less so by enjoyment ( $\beta$ =0.279), usefulness ( $\beta$ =0.141) and subjective norm ( $\beta$ =0.129). Having a positive attitude toward the system appears to be a significant driver, especially for initial acceptance. This implies that attitude is indeed a powerful mediator between beliefs and the intention to use. It is worth mentioning that although some researchers (e.g., Davis & Venkatesh 1996; Venkatesh 2000) excluded attitude in their models and reported that inclusion of attitude is not significant, there are a number of researchers (e.g., Morris and Dillon 1997; Thompson 1998; Klobas & Clyde 2000; Al-Gahtani 2001; Moon & Kim 2001; van der Heijden 2003; and Lau & Woods 2008) have found attitude to be a significant predictor of behavioural intention. The findings of the current study emphasised the role of attitude in influencing students' acceptance of e-learning.

According to the study findings, perceived enjoyment played an important role in students' acceptance of the e-learning system. In fact, enjoyment ( $\beta$ =0.279) is a stronger determinant of intention to use the e-learning system than perceived usefulness ( $\beta$ =0.141) and subjective norm ( $\beta$ =0.129) (see Figure 7.1). These findings were consistent with the findings of the studies conducted by van der Heijden's (2004) and Lee, Cheung and Chen (2005). Students will tend to accept a technology that they feel will bring them enjoyment. From the researcher's point of view, e-learning offers students a new environment of learning which is different from the conventional environment. Students perceive that this new environment of learning is

enjoyable.



Figure 7.1: Factors influencing students' acceptance of the e-learning system

After students' attitude and enjoyment, the perceived usefulness factor was found to be an important determinant that influenced students' intention to use the e-learning system. This factor plays an important role in the students' motivation. The perception of system utility builds a positive drive to use the system, so that students who believe the system is useful will be motivated to use it over and over again. Based on this finding, it can be argued that perceived usefulness is more important than perceived ease of use in influencing students' intention to use the e-learning system. However, it is interesting to mention that Davis, Bagozzi and Warshaw (1989, p.1000) employed a similar argument when they explained that users might be willing to invest the required learning and effort to use a difficult interface in order to gain access to a needed function. Therefore, the significant influence of perceived usefulness on students' intention highlights the importance of this factor in students' acceptance of an e-learning system.

A noteworthy result of this study showed that intrinsic motivation factors have a greater influence on usage intentions than extrinsic factors. Along this line, enjoyment appeared to be a more significant driver for initial acceptance than usefulness (see Figure 7.1). In fact, through this study, it was noted that students' attitudes toward the e-learning system were clearly influenced by enjoyment. Perceived enjoyment was the best predictor of attitude and accounted for 25.6% of the variance in attitude (see Table 5.12). More precisely, the researcher noted that the higher the students rated their perceived enjoyment of Edunet, the more positive their attitude was about its use. Although in this regard the current study agrees with the results of others (e.g. Liao, Tsou and Huang (2007)), it obviously disagrees with other studies (e.g. Selim (2003); Davis, Bagozzi and Warshaw (1992); and Igbaria, Iivari & Maragahh (1995)) which found that perceived usefulness had a higher influence on usage intention than perceived enjoyment. One possible explanation for the disagreement with these studies, in the researcher's opinion, is that the participants in the current study were young, more technologically minded, and more concerned about the fun and pleasure they gained when using the e-learning system. Being young, students were easily stimulated to look at and use web pages that were attractive and easy to use. However, older users, such as the ones who participated in the other studies, were more mature and less technologically minded; they recognised the value of successful performance for future job opportunities and successful work and thus, usefulness in the longer term was more important for them than enjoyment.

Subjective norm was added to the TAM for two reasons. The first reason concerned the belief that the Bahraini culture, like other Arab cultures plays an important role in social interaction, in the decision making of individuals, and in motivation. Similarly, Al-Ammary (2010, p.17) expressed the idea that "Arabic families used to have strong and tight relationships". Secondary school students are at an age where they still live with their parents and part of Bahrain's culture is that sons and daughters respect and follow their parents' advice and suggestions. Indeed, it is often difficult for a son or daughter to argue with or reject his/her parents' decisions. The second reason was the age of the sample as, because these were teenage students, it was expected that the

influence of peers would be great since peer influence is of paramount importance in the lives of young people (Focus Adolescent Services 1999) and the opinions of peers often carry more weight than those of parents.

The findings of the current study showed that subjective norm had a significant effect on usage intentions, that is, less than what usefulness, attitude and enjoyment explained in terms of behavioural intention (see Figure 7.1). Thus, the opinions of friends and others appear to be an important factor that influences a student's decision to accept the e-learning system. In other words, students may have aligned their initial acceptance decisions with friends' opinions or the decisions of others. Overall, the empirical evidence supporting the role of the subjective norm varies (Venkatesh & Morris 2000, p.116): some investigations have found the construct to have no significance (e.g., Davis, Bagozzi & Warshaw1989; Mathieson 1991) while others have found it to be significant (e.g., Hartwick & Barki 1994; Taylor & Todd 1995b; Abbad, Morris & Al-Ayyoub 2008; Al-Ammari & Hamad 2008; Park 2009; Lee 2010). These differences may be related to a number of other factors such as differences in the type and size of the sample, usage patterns, types of software, and perhaps, most importantly, the context. The findings of the study also showed empirical evidence supporting the effect of subjective norm on perceived usefulness. Both perceived ease of use and subjective norm explained 15.8% of the variance in usefulness (see Table 5.15). In fact, perceived ease of use had a higher significant effect ( $\beta$ =0.281) on perceived usefulness than subjective norm ( $\beta$ =0.227) (see Figure 7.1). The significant effect of subjective norm on perceived usefulness goes in line with the findings of several studies like those of Lee (2006), van Raaij and Schepers (2008) and Jan and Contreras (2011).

When considering the TAM's basic beliefs, this study found that both perceived usefulness and perceived ease of use had a significant effect on students' attitudes although perceived usefulness ( $\beta$ =0.172) had a lesser effect than perceived ease of use ( $\beta$ =0.182) (see Figure 7.1). In other words, students tended to use the e-learning system because it was easy to use and did not require advanced skills. This supports the findings of Al-Gahtani (2001, p.37) and Moon and Kim (2001, p.225) who found that the total effect of ease of use on attitude exceeds the total effect of usefulness.

Another interesting finding of this study was the consistent lack of a direct relationship between ease of use and intentions, and the consistent presence of a relationship between ease of use and usefulness. Based on this finding, the researcher concluded that perceived ease of use is an important determinant of perceived usefulness and it accounted for 10.9% of the variance in perceived usefulness (see Table 5.15). Perceived ease of use influences students' technology acceptance decisions via perceived usefulness. In fact, the significant, but indirect, effect of perceived ease of use in order to promote a strongly positive attitude toward usage. It is worth mentioning that a similar argument was made in several studies (such as Hu, Clark and Ma (2003); Igbaria, Guimaraes and Davis (1995); van Schaik, Barker and Moukadem (2005) and Liu, Liao and Pratt (2009).

The study also revealed that perceived ease of use was an important determinant of perceived enjoyment which, in turn, influenced students' attitude toward the system (see Figure 7.1). Perceived ease of use accounted for 13.2% on the perceived enjoyment scale (see Table 5.11). This implies that ease of use has a greater effect on students' attitudes for systems that are both enjoyable and advantageous to use than those that are not enjoyable and offer fewer advantages to users.

Overall, the proposed TAM model accounted for 49% of the variance in intention to use the e-learning system (see Figure 7.1), which is compatible with the findings of previous TAM studies, such as those of Chau (2001); van der Heijden (2003); Martins and Kellermanns (2004); Ong, Lai and Wang (2004); Tseng and Hsia (2008); Wangpipatwong (2008). The finding reconfirms the strong role of intention as a mediator between beliefs and actual usage.

When comparing the original TAM with the extended TAM, both models explained a significant percentage of variance in behavioural intention. In other words, the original TAM explained 42% of variance and the extended TAM, with the addition of both perceived enjoyment and subjective norm, explained 49% of variance in behavioural intention (see Table 7.1). Attitude toward using the system ( $\beta$ =0.498;  $\beta$ =0.355) had a strongly significant effect on behavioural intention in both models.

		Original TAM				Extended TAM			
	Predictors <sup>a</sup>	R²	В	SE	t-value	R²	β	SE	t-value
Α		0.226 <sup>b</sup>				0.317 <sup>b</sup>			
	PU		0.320 <sup>b</sup>	0.033	10.424		0.172 <sup>b</sup>	0.035	5.398
	PEOU		0.262 <sup>b</sup>	0.034	8.557		0.182 <sup>b</sup>	0.033	6.104
	PE		-	-	-		0.356 <sup>b</sup>	0.037	11.052
BI		0.418 <sup>b</sup>				0.489 <sup>b</sup>			
	А		0.498 <sup>b</sup>	0.024	18.125		0.355 <sup>b</sup>	0.025	12.346
	PU		0.257 <sup>b</sup>	0.026	9.338		0.141 <sup>b</sup>	0.027	5.060
	SN		-				0.129 <sup>b</sup>	0.029	4.973
	PE		-				0.279 <sup>b</sup>	0.030	9.468

 Table 7.1: Comparing the original TAM with the extended TAM

<sup>a</sup> A, attitude; PU, perceived usefulness; PEOU, perceived ease of use; PE, perceived enjoyment; SN, subjective norm; and BI, behavioural intention to use.

<sup>b</sup> P <.001.

Furthermore, the TAM with its basic beliefs (perceived usefulness and perceived ease of use) accounted for 23% of the variance in attitude while the extended TAM, with the addition of perceived enjoyment, explained 32% of the variance in attitude (see Table 7.1). In fact, perceived enjoyment had a strong effect in the extended TAM. Perceived enjoyment was the best predictor of attitude and accounted for 25.6% of the variability in attitude (see Table 5.12).

# 7.2.1 Other factors affecting students' attitudes (factors not addressed in the TAM)

A number of variables which were considered likely to affect attitudes towards elearning were tested in the current research. These variables included the gender, age, previous computer experience, and computer ownership of students. These factors were selected based on the reviewed literature. However, the test results showed no significant relationship between these variables and students' attitudes toward elearning.

The lack of a significant relationship between students' age and their attitude can be attributed to the fact that the students who participated in this research were very close in age (15-17 years old) so the range, at a maximum of two years, was relatively small (see Figure 7.2).

Furthermore, there have been indications that a lack of experience with computers increases the likelihood that an individual will hold less positive attitudes towards computers. In fact, the influence of prior computer experience on students' attitudes was found to have no significance in this research, probably because the student participants were in almost the same age range and followed the same curriculum. Although schools in Bahrain are not co-educational, textbooks, educational media, teaching methods and examination systems are the same for both genders in all schools (Kingdom of Bahrain Ministry of Education 2004, p.47). In addition, the survey results showed that the majority of respondents had used a computer for more than three years and there was no significant difference between males and females in their computer experience. Sanders and Morrison-Shetlar (2001, p.259) note that: "as the gap between levels of computer experience becomes smaller and smaller among students, improvement in student attitudes toward web-based instruction will be observed".

Gender difference was not an issue in the current research. Besides the reasons mentioned previously, the Kingdom of Bahrain is a relatively democratic country which recognises women's rights. Her Majesty Shaikha Sabeeka bint Ibrahim Al Khalia, wife of His Majesty King Hamad and chairwoman of the Supreme Council for Women, has said, "Women hold the keys, alongside men, to the country's development" (United Nations Development Program, 2008). Shaikha Sabeeka has added that empowering Bahraini women is critical in the development of the nation and Bahrain is already a more open society compared with its neighbour Gulf State countries, such as Saudi Arabia and Qatar, since both males and females can apply for admission to any field which interests them.

Another reason gender difference is not an issue here can be explained by the shift in the attitudes of parents and teachers towards computers and related technologies. Yeloushan has noted: "A major social barrier for females is the attitudes of parents and teachers who believe that computers are learning tools predominantly for males" (Janssen Reinen & Plomp 1997, p.69). As a result, because parents play an essential

role in shaping their children's interest in learning (Shashaani 1994, p.361), parents who have a positive attitude towards technology will encourage their sons and daughters to be involved with computer technology. In the Kingdom of Bahrain, both women and men work in many fields, especially in recent years, and, in some fields, women are more qualified than men. In the past, however, mothers spent most of their time taking care of the family and were not concerned with education or technology. However, the situation in Bahrain is different now, and women have the same rights as men. They have the right to vote and there are now two female ministers. Thus, women's attitudes toward technology have changed and this will influence their children's attitudes.

As mentioned earlier, teachers play a central role in students' learning. It was found in the current study that schoolteachers who have recently graduated have an open mind towards technology and to recent technological advances. As a result, schoolteachers now recognise the importance of technology and are more motivated to learn new systems. Therefore, their attitudes will influence students in this regard.



Figure 7.2: Tested variables on students' attitudes

Furthermore, personal ownership of a computer has been shown to affect attitudes towards computers (Robertson *et al.* 1995, p.74) since differences have been found between owners and non-owners, with owners having a more positive attitude. The results of the current research revealed that the majority (95.9%) of respondents owned computers and the proportion of males who owned a computer at home was not significantly different from the proportion of females who possessed a home computer. This finding explains why most students in the current research had positive attitudes toward the e-learning system because most of the participants owned a computer at home.

#### 7.3 The e-learning system and challenges

The links in the chain of the implementation of e-learning in Bahrain secondary schools consist of three elements: the authority (the owner of the e-learning project), secondary schools (the implementer of the system) and students (the system users). The findings of the current study revealed that the three elements involved in the implementation of the e-learning system have encountered a number of challenges. For the authority (MoE), the introduction and achievement of the e-learning project by itself has been a challenge in terms of; whether the schools, students and society are ready to accept such a project. In fact, the findings indicated that the MoE plans to generalise the project to all schools in Bahrain and at all levels. Therefore, the success of this project is crucial, especially in the first phase of the implementation.

For secondary schools, introducing such a project also represents a challenge since school teachers need to be willing to accept and integrate the e-learning system into their teaching strategies. Based on the results of interviews, the study revealed that teachers who have spent years using conventional methods of teaching thought it would be difficult for them to adapt to the newly introduced system. One schoolteacher said:

> It is difficult for older staff to shift to e-learning. They are finding it difficult to change. They prefer to stay with the traditional teaching methods. (Male Science teacher)

#### Another teacher stated:

New teachers who graduated recently from university can easily shift to the new system and learn how to use it. However, older teachers who have spent many years using the old system are difficult to persuade to change, especially teachers who are within a few years of retiring. (Female English teacher)

The reason behind this, as the researcher came to understand, might be that the elearning system is likely to change the roles and responsibilities of these teachers; which would place a heavy burden on their shoulders. Another aspect of the challenge for the secondary schools, as the findings of the study pointed out, was creating a suitable e-learning environment since it would require dramatic changes to be made to schools' infrastructures and serious investment to be made in terms of hardware and software.

For students, especially during the first year of implementation, the findings of the study indicated that accepting the e-learning system has been a challenge since it presents a shift in the learning processes by allowing them to access a tremendous amount of resources and making them more independent in their learning. Therefore, it is essential that students accept the use of e-learning as part of their learning processes if the project is to be successful. It is interesting that, from the researcher's point of view, the role of the teacher has also been expected to change as a result of extending the responsibility given to the learner.

# 7.4 Teachers' and students' perceptions regarding the e-learning system

#### 7.4.1 Teachers

The teacher is a core element in the learning process of students in both the conventional approach and the e-learning approach. As mentioned earlier, introducing the e-learning system into Bahraini secondary schools has posed a challenge in terms of changes to the teachers' responsibilities and roles. In fact, the system has demanded additional skills and approaches in preparation, assessment and class management, which, have met with some resistance from teachers who have

found it difficult to change accordingly. Therefore, understanding teachers' perceptions and attitudes toward e-learning will play an important role in the learning process of students particularly with regard to encouraging them to deal with the e-learning system.

The current study explored teachers' perceptions concerning e-learning in two stages. In the first stage, the researcher attempted to focus on teachers' perceptions regarding e-learning at the early stage of its implementation and to identify obstacles that might hinder their adoption of e-learning. In the second stage, the researcher planned to focus more deeply on any issues or changes that had occurred between the first and second fieldwork visits which may have influenced their perceptions and actual use of the e-learning system.

The results of the interviews uncovered a number of factors that influenced teachers' perceptions regarding the e-learning system. These included educational background, age, teaching subject, years of experience in teaching, and motivational factors. Based on perceptions toward e-learning, the interviews also identified three groups of teachers (see Figure 7.3).



Figure 7.3 Schoolteachers' perceptions of e-learning

The first was a group of teachers who were in favour of and supported the project. This group of teachers had positive and clear perceptions regarding the use of e-learning and the vast majority had a reasonable level of competence and interest in ICT. The group was generally of a young age and the shift towards e-learning did not surprise them or represent a shock in terms of their teaching approach. Typical teacher responses that illustrate the point are:

> I strongly agree with the shift toward e-learning. This will greatly improve the learning process if used and implemented precisely and moved in the right direction. (Male Science teacher- First stage)

> I believe it is a good decision to shift toward e-learning and such an opportunity must be taken seriously. (Male English teacher- First stage)

This group of teachers also highlighted the importance of this mode of learning in helping students who are able to learn and understand very quickly and who can study above their current level. Some such opinions are offered below:

The system gives high-potential (intellectual) students the opportunities to develop further and move to their natural ability level without the need to wait for the rest of the class. (Male Mathematics teacher)

The main and crucial usefulness of e-learning is helping students to work at their own pace, time and ability, and the recognition of students' differing learning abilities and learning speeds. (Male English teacher)

The second group consisted of teachers who were uncertain about the effectiveness of the e-learning system. Although they had positive perceptions about the system to some extent, they were more concerned about identifying barriers that would influence teachers' and students' use of the system. They tried to explore barriers and obstacles for its implementation, although they also made several statements showing positive attitudes towards an e-learning system. The main concern of this group, however, was to explore the obstacles. One teacher said: As we move towards e-learning, we will need time to see its benefits and only then we can compare it with the current system. (Male English teacher-First stage)

The popular excuses for low use of the new system were lack of time and incentives, lack of training, technical issues and lack of support. This type of teacher is reluctant to change his/her teaching approach, especially at an early stage of implementation. One teacher stated:

> Teachers are not motivated to use e-learning. At the end of the academic year, a teacher who uses e-learning and a teacher who does not try it will both receive the same result when they receive their evaluation report. (Female English teacher-First stage)

A Science teacher commented:

The current system does not motivate teachers to use and adopt e-learning in their teaching. There is nothing to distinguish between a teacher who puts a lot of time and effort into e-learning and another teacher who does not. (Male teacher-First stage)

Therefore, motivation is an essential factor to ensure that teachers are willing to achieve the objectives of the project and to ensure its continued development and success.

The third group of teachers comprised those who objected to e-learning and were in favour of traditional teaching. This group lacked motivation and an appreciation of what e-learning might offer. They blamed the education system and their traditional education backgrounds; they had extensive experience in traditional ways of teaching and preferred to continue to use these methods. This group was reluctant to change to e-learning. They, and especially those who had spent many years using traditional teaching methods, lacked the willingness and motivation to change. It will be difficult to persuade them to change.

An example of such a group was the Mathematics teachers who believed that it is ineffective to teach Mathematics electronically. Here are some of their opinions:

I believe it is not the right choice to teach mathematics electronically. The difficulty is that mathematics uses many unusual symbols. (Female Mathematics teacher)

I have taught mathematics in this school for more than eight years. I do not think it is easy to teach mathematics electronically and it is difficult to add entertainment to this subject. (Female Mathematics teacher)

Therefore, Mathematics teachers' perceptions are unlikely to motivate students to use e-learning. They represent an obstacle to the implementation of an e-learning system because their perception will influence students' acceptance of it.

Based on what is mentioned here, it can be said that understanding the beliefs and perceptions of teachers in each group is important in supporting the e-learning system and identifying the main issues that hinder its acceptance. Since the success of the e-learning system is affected by teachers' perceptions and support, it might be useful to consider these issues when designing and implementing the system and the training programs.

#### 7.4.2 Students

Introducing the e-learning system first to students at secondary school level has constituted a critical development, especially because of their age. Students at this stage have been exposed to about ten years of traditional teaching and learning and then, in this final stage of their education, a new approach of teaching and learning has been introduced by the MoE. Therefore, it is important that the MoE ensures that the system is effective in order to offer an e-learning system that is capable of achieving the aims of the e-learning project.

The qualitative results show that the great majority of the focus group participants and survey respondents felt that e-learning in education is important. The researcher noticed that students were more aware of the importance of e-learning in the learning processes, especially after one year of experience of using the e-learning system. One student commented:

*E-learning is useful and important, especially nowadays.* (Male student: survey comments)

Students recognised that e-learning would help and support their future academic and career development. One participant said:

Using e-learning at this age will help us in the future, either at work or in our university education. (Male student: focus group)

Similarly, Wang, Kwan and Wong (2010, p.489) argued that secondary school education provides a foundation for university education and, therefore, without a solid foundation, a student will not achieve success in his/her university education.

Students now need to be prepared for lifelong learning and require the skills to meet the demands of a changing business world. One student stated:

> Early use of e-learning prepares students for college education and work. As you notice, the country is now moving to e-government and the fact that e-commerce is starting to take place in our market today. (Female student: focus group)

In addition, some students expressed the importance of e-learning to support traditional learning, as one student commented:

The traditional system produced famous scientists and scholars. I think e-learning will support and enhance the traditional learning because technology is everywhere. (Male student: survey comments)

Similarly, one student stated:

We still need previous systems. I think both can complement each other, but the new system can't replace the previous system. (Female student: focus group)

On the other hand, there was a number of female students who preferred face-to-face interaction with a teacher, as indicated in the excerpts below:

*Receiving information and knowledge directly from the teacher is not the same as from the system.* (Female student: focus group)

We don't want to talk to a computer. We want to talk with a teacher and discuss the lesson in more detail. (Female student: focus group)

These findings are similar to those reported by Klassen and Vogel (2003, pp.42-43) who found that a lack of human interaction in an e-learning environment can affect some students more than others. Some students may lack motivation to learn without human contact. Authors like Quintana (1996), Bada and Khazali (2006), and Musameh (2008) support this contention. In addition, Vonderwell (2003, pp.83-84) found that the lack of a "one-on-one relationship" was one of the disadvantages of online learning for students. Learning interactions that developed in the face-to-face classroom may not develop in the online classroom and therefore, teachers should realise that there are some students who dislike learning online (Siemens & Yurkiw 2002, p.136).

Overall, most students who participated in the current study had positive attitudes toward the e-learning system which was also confirmed by their schoolteachers. This finding supports the results arising from the quantitative results. Schoolteachers related these results to a number of factors that they thought influenced students' attitudes. These included:

- The level of computer competence of students
- The usefulness and ease of use of the system
- Fast and easy communication between learners and teachers
- Entertainment and enjoyment can be experienced when using the site
- Learning materials can be accessed at any time and from any place.

Finally, it can be concluded that enjoyment had a more significant effect on students' attitudes than other measured constructs. Consequently, students were highly motivated and eager to use the e-learning system.

#### 7.5 The role of experience in accepting e-learning

Experience gained through regular use of the system can positively or negatively influence students' acceptance and continuity of use. Positive experiences enhance

students' attitude and motivation toward the system, whereas negative experience can lead to user frustration, anger and boredom. These can then de-motivate the users.

Students who participated in this research had recently been introduced to e-learning for the first time; they had no previous experience in using the e-learning system. Using this mode of learning is new, especially for secondary students in the Kingdom of Bahrain. This study examined students' acceptance of this mode of learning in the early stages of implementation and after one year of experience of using the system. The main purpose of the second stage of the fieldwork was to measure the impact of the one year of experience on students' acceptance and actual usage. It is important to know the critical factors that influence students' intention to continue using e-learning. Understanding key acceptance drivers can help decision makers to identify areas that hinder student acceptance.

Judging by the statistical significance, the strength of path coefficient and explanatory power, several factors were found to be important for students' technology acceptance. The influences of these factors become more prominent and significant as students acquire additional experience. This suggests an increasing explanatory power of fundamental acceptance determinants beyond students' initial encounter with a new technology.

However, the current study suggests that students consider a richer set of factors when making initial acceptance decisions but concentrate on fundamental acceptance drivers in their continued acceptance decision-making. This is consistent with what was suggested by Hu, Clark and Ma (2003).

In fact, the findings of this study emphasised a significant and prominent core influence path from perceived enjoyment to students' attitude towards the system. As shown in Figure 7.4, perceived enjoyment was the most important determinant of students' attitude and its influence appears to increase as students continue using the system and become more experienced, showing a path coefficient increase from 0.356 (stage 1) to 0.370 (stage 2). It is crucial to notice that the feeling of enjoyment continues to be the key acceptance driver. These results are in accordance with those reported by a number of researchers, such as Moon and Kim (2001); Liao, Tsou and Huang (2007) and

Mitchell, Chen and Macredie (2005). It is important that decision makers and technology professionals highlight and demonstrate issues that enhance the feeling of enjoyment in order to foster users' acceptance.



Figure 7.4: Model testing results-after one year

According to the findings of this study, perceived usefulness is a significant determinant of students' acceptance and its influence appears to increase as students gain more knowledge and skills. Figure 7.4 shows that perceived usefulness had a significant positive effect on intention to use the system. Compared to the findings of stage one, the effect of perceived usefulness on intention appeared to have strengthened with user experience: e.g. showing a path coefficient increase from 0.141 to 0.161. This suggests that this factor plays an important role in users' acceptance. It is worth noticing that a feeling of usefulness promotes students' attitude which, in turn, influences continuity of use.

A surprising finding of this study was the increased influence of subjective norm on intention to use as students gained additional experience. In fact, this is inconsistent with the findings of other researchers such as Hu, Clark and Ma (2003) who found that the influence of subjective norm on usage intention diminished as individuals became more experienced with the technology and became independent users. This, however, can be explained by the reason that, although the influence of peers and other people is critical at an early stage of implementation, the influence of peers and other people becomes more important in subsequent periods. This may have happened because of cultural differences. In general, the culture of Bahrain plays an important role in an individual's decision making. As was noted earlier, Arabic families have strong and tight relationships. Therefore, the opinions of peers or teachers increasingly influence subsequent acceptance decision making.

Based on the analysis of the second stage data, students' attitudes towards the e-learning system played an important role in usage intention; this is the most critical factor which influences user acceptance (see Figure 7.4). Students with positive attitudes tended to like to use the e-learning system, which was fundamental to the acceptance and success of the system. According to the core TAM beliefs, perceived usefulness and perceived ease of use had a significant effect on students' attitudes. This result was consistent with those of Ngai Poon and Chen (2007) and Pituch and Lee (2006). These findings show the importance of the system being useful and easy to use in order to promote strong positive attitudes toward usage. These two factors should not be ignored as students become experienced with the system. Data analysis also indicated that perceived ease of use is an important determinant of both perceived usefulness and perceived enjoyment (see Figure 7.4). Consequently, perceived ease of use influences and perceived enjoyment.

As expected, behavioural intention was significantly correlated with usage (see Figure 7.4); in fact, usage behaviour is predominantly explained by intention to use. A number of researchers reported similar results, such as Davis, Bagozzi and Warshaw (1989); Moon and Kim (2001); Gao (2005); van der Heijden (2003); Fusilier and Durlabhji (2005); Lau and Woods (2008). Overall, the research model was able to account for a significant portion of variances in students' acceptance decisions: 49% at

the initial stage and 52% in the second stage (after one year of experience). The model's explanatory power was satisfactory and appeared to increases slightly as students continued using the system.

#### 7.6 Motivational factors

According to Packham *et al.* (2004, p.340), motivation is a subjective element which can be influenced by many factors. The findings of this study identified a number of motivational factors during the first and second fieldwork visits that were believed to lead to positive attitudes toward e-learning (see Figure 7.5). System designers and policy makers who conduct strategic planning need to understand and focus on these factors to make necessary changes and adjustments to reduce or eliminate barriers faced by students or any other users. The motivational factors identified by this study were: training policy, teacher's skills, students' awareness, MoE support, system interactivity, usefulness, and ease of use. In the following subsections, these factors are thoroughly discussed.



**Figure 7.5 Motivational factors** 

#### 7.6.1 Training Policy

It is widely believed that providing training is important to ensure the success and effective use of e-learning in schools. Therefore, planning and implementing a training policy for both students and teachers is essential in order to enhance their skills and knowledge. The researcher realised that a number of training sessions had been assigned during school time for students. These training sessions were run by teachers but largely by students who had finished training. According to some focus group respondents, students found it easier to learn from other students rather than from teachers. This approach motivated students to learn and to use the site effectively. By exploring the site with a peer, a student usually recognised its benefits. One student said:

It is easier to be trained by another student who is similar in age, so training will be informal and it is easier to ask questions. (Female student: focus group)

Furthermore, the new training approach helped and supported teamwork, which was an important factor in the learning process. One respondent said:

We feel as if we are working as a group. Training as a group and being trained by our colleagues helped and speeded up our learning. (Female student: focus group)

The current research found that colleague training appears to be an important factor in students' acceptance of training; this can motivate students to use the e-learning system. Students' peers play an important role in encouraging students to accept the new system. It is critical to mention that teachers' and parents' perceptions also influence the use of the system by students.

In light of the above discussion, the researcher deeply believes that school management should focus on early adopters of e-learning and use them as champions to attract their colleagues to the system and explain its benefits.

#### 7.6.2 Ministry of Education Support

Although the MoE has no direct communication with students' activities, it was found that it has an important indirect influence on students' acceptance of e-learning as part of their learning process. As mentioned before, the MoE is the owner and sponsor of the e-learning project and schools in Bahrain are under the MoE management umbrella, so its policies and decisions find their way into schools. Therefore, management support is a key factor that influences the integration of e-learning in education.

According to the findings of the study, the MoE has indirectly influenced the students' acceptance of e-learning by its decision to assign, in each school, a committee which is responsible for evaluating the system, training teachers and raising any important issues with the MoE. The committee is also responsible for planning and evaluating students' and teachers' e-learning training programmes, as well as increasing awareness in society about e-learning in education. In addition, the MoE encourages the use of e-learning by providing incentives to schoolteachers who are teaching mostly using this new method of teaching. The researcher believes that by giving incentives for the best electronic lessons prepared by schoolteachers and by providing the resources needed, the MoE is effectively supporting schools and enhancing the use of the e-learning system.

In light of the above discussion, the researcher came to the conclusion that the MoE's support affected teachers' motivation and usage behaviour; this, in turn, influenced students' attitudes and motivation. Consequently, it had an indirect impact on students' e-learning acceptance decision-making.

#### 7.6.3 Teachers' skills and competence in using the e-learning system

As discussed, schoolteachers' competence and knowledge in e-learning have played an important role in students' acceptance and motivation to use the e-learning system. In fact, improving teachers' skills has been the main concern of the MoE. Therefore, a number of training workshops have been organised every semester to encourage and increase teachers' participation. Most of these workshops were conducted during school time or during school breaks. The findings of this study revealed that a large number of school teachers had attended training workshops planned by the MoE and the school management.

As a result of these training workshops, most teachers have become more knowledgeable and competent in using the e-learning system. They were highly motivated to prepare students for e-learning and to ensure the continuity of learning and the development of skills. This consequently influenced students' motivation to use the system.

#### 7.6.4 Students' awareness

Increased awareness about the role of online learning in education was noticeable during the second fieldwork visit. The MoE has used different media to raise public awareness about the King Hamad Schools of the Future Project. Therefore, students who participated in the current research had become more aware of e-learning especially after they had spent more time using the e-learning system. One student commented:

*E-learning is useful and important, especially nowadays.* (Male student: survey comments)

After one year of experience in e-learning, the researcher noticed that students started to feel the benefits and potential of e-learning in achievement and learning outcomes. One student said:

*E-learning is important. It improved my knowledge and my exam grades. Through web-based learning, I access a variety of educational resources.* (Female student: focus group)

It was noticeable that most students who participated in the current research study were highly motivated to use the system. In fact, since most jobs require Information and Communication Technology skills, students seemed to realise the importance of using e-learning to support their future academic and career development.

#### 7.6.5 System interactivity

One of the main benefits of online learning is the communication between students and the instructor. The findings of the current study revealed that most of the students asserted that their online communication with schoolteachers increased over the year. One student said: Our Science teachers encourage students to use Edunet and to have online communication with them especially during exam periods. Most teachers are ready to receive students' questions and send an immediate answer. (Female student: focus group)

The study in this regard aligns with a number of studies (e.g. Siemens and Yurkiw (2002, p.134); Kim, Liu and Bonk (2005, p.342)) that have argued that online learning offers an opportunity for more interaction to take place with instructors.

Therefore, the researcher believes that schoolteachers who were highly motivated to participate in online communication with students were able to motivate students to share knowledge with other students and to take an actual role in online education. Based on the above discussion, it can be concluded that online interaction can enhance learners' motivation and this is, therefore, considered the main motivation factor in an online environment.

#### 7.6.6 Usefulness and ease of use

As stated earlier, ease of use and the usefulness of any technology play an important role in users' motivation to use that technology. In this current study, the findings showed that students who believed that the e-learning system was useful and easy to use were motivated to use the system over and over again. In fact, students indicated in the second fieldwork visit that they could access their grades and other personal information more easily than before. They also added that most textbooks had been transformed into e-books which had motivated them to use the system frequently. It's interesting to mention that the researcher noticed that the use of multimedia facilities in the learning process, such as those provided by websites, were attracting students and keeping them motivated.

An analysis of the quantitative data from the second stage revealed that perceived usefulness accounted for 24.7% on the perceived enjoyment scale, whereas perceived ease of use accounted for 13.0% on the same scale. However, subjective norm accounted for 11.4% on the perceived enjoyment scale. Based on these figures, it can be stated that once students find the system useful, they will become motivated to use it. Therefore, students' perceptions regarding ease of use and the usefulness of the system acted as critical factors that influenced students' motivation to use the system.

Generally speaking, the acceptance of this mode of learning (i.e. e-learning) depends on the utility and the simplicity of the e-learning system, which in turn, motivates learners to use it more frequently.

#### 7.7 Barriers that hinder the effective use of the e-learning system

This section discusses the main barriers that influenced the acceptance and effective use of the e-learning system in teaching and learning. Based on the two fieldwork visits, schoolteachers and students identified a number of barriers that they perceived could affect the acceptance and use of the e-learning systems. During the second fieldwork visit, the researcher found that some of these barriers were overcome or at least their impact was diminished as users continued to use the system.

#### 7.7.1 Teachers

From schoolteachers' perspectives, preference for conventional teaching methods, language barriers, lack of time, lack of technical support, training need and training time, teachers' skills and knowledge, lack of motivational drive, system security, teachers' beliefs and attitudes, technical problems and lack of awareness were the main barriers that influenced the effective use of the e-learning system (see Figure 7.6).

The findings of the study indicated that schoolteachers who were used to using conventional teaching methods preferred to keep using these methods with their students. In fact, they were reluctant to use any new technology in education. The researcher deeply believes that these teachers lack the necessary skills and knowledge to use technology. Teachers also lack competency in using the English language which is necessary to access online resources effectively.

Figure 7.6 shows other barriers that should be considered by the MoE, which include a lack of strategic initiatives to promote awareness, teachers' skills and knowledge. On one side, the researcher noticed that teachers needed to be motivated to spend time and effort to learn about and use the new e-learning system; on the other side, she realised that improving teachers' English proficiency was necessary to connect teachers with the international community and to take advantage of the

availability of online resources. Needles to say, security was a critical barrier since users needed to be confident that their data and course content were secure and were not influenced by outside users.

During the second fieldwork visit, the researcher noticed that some barriers identified in the first fieldwork visit still existed and influenced continuity of use. These barriers were lack of time, competency in using the English language, technical problems, lack of technical support, and teachers' beliefs and attitudes. The researchers' interpretation of this is that a number of barriers identified in the first fieldwork visit were overcome by the frequent use of the e-learning system.



Figure 7.6 Barriers influencing the acceptance and use of the e-learning system

#### 7.7.2 Students

From a student perspective, lack of training, inexperienced teachers, lack of awareness, technical problems, lack of technical support, preference for face-to-face interaction with the teacher, poor English language skills, and a lack of computers and Internet access at home were the main barriers that influenced students' effective use of the e-learning system.

The findings of the study indicated that most students lacked the necessary training to use the e-learning system. Although a number of training workshops were conducted for students, a lack of sufficient skills was obvious among students; lack of awareness was also obvious. In fact, the researcher noticed that some students did not have a clear idea about what e-learning is.

Technical problems and a lack of technical support were persistent barriers. Students always needed help when facing a technical problem. In fact, it was indicated that students had a serious concern about technical support as some students mentioned that when they needed technical help, they did not know where to go. Another barrier indicated by students was their preference for face-to-face interaction with the instructor. The findings of this study indicated that these students thought that face-to-face interaction with the instructor was more efficient than any type of interaction found in the online environment. Similar to teachers, students also lacked the necessary competency in using the English language. As mentioned before, most resources found on the web are in fact written and expressed in English, not in Arabic. Therefore, to ensure an effective use of e-learning, students need to have the necessary competency in English.

A lack of computers and Internet access at home was also among the barriers identified by students. Without a computer connected to the Internet, accessing the e-learning system from home is impossible. Some students mentioned that their parents did not allow them to have computers and Internet access at home because they, (the parents) were concerned about the misuse of the Internet especially from a religious point of view.

#### 7.8 Conclusion

The use of the amended TAM model has identified the main factors that influenced students' acceptance of e-learning in Bahrain secondary schools. The results showed that the majority of students displayed positive attitudes towards the e-learning systems. Students' attitudes were found to be the major determinant of intention to use the system. In addition, motivation played an important role in individuals' behaviour which influenced their acceptance of the system. Therefore, incorporating both intrinsic and extrinsic motivators into the TAM provided a better explanation of students' acceptance and usage behaviour. Although both motivational factors significantly influenced students' intention to use the system, the intrinsic motivation factor (perceived enjoyment) had a greater influence on usage intention than the extrinsic factor (perceived usefulness). In other words, perceived enjoyment was more powerful than perceived usefulness in creating positive attitudes. Teenage students were most concerned with the enjoyment they felt when using the e-learning system. Moreover, they tended to use the system since it was easy to use and did not require advanced skills. Therefore, the researcher believes that attracting teenagers is a major concern of the technology market.

The culture of Bahrain plays an important role in social interaction and in an individual's decision making. As expected, students' peers played an important role in encouraging them to use the new mode of learning. It was established through interviews with students that peers, teachers and parents played an important part in their intention to use the e-learning system. Therefore, the researcher believes that it is essential to identify early adopters of the system and use them as "champions" to persuade their colleagues of the benefits of the system.

It has been shown in this study that the e-learning system changed several roles and responsibilities of schoolteachers. Unfortunately, conventional teacher-preparation programmes have not effectively provided teachers with sufficient experience relating to the integration of technology into education. Therefore, this represents a challenge for the schools to change their teachers' perceptions and attitudes towards the use of e-learning. The researcher believes that teachers need to cope with this change in order to ensure effective learning take place. They also need to be competent, well trained,

and able to deal with e-learning resources. Training and support should be provided on an ongoing basis to ensure continued acceptance.

To create a suitable e-learning environment, a number of barriers were pointed out by respondents. From the perspectives of students and teachers, both need support, training and motivation in order to use the system effectively. For an e-learning system to be accepted, it should be simple to use and easy to deal with.

In essence, it can be concluded that the success of the e-learning system depends to a large extent upon its use, which is influenced by the attitude and motivation of learners.

### CHAPTER EIGHT CONCLUSIONS AND RECOMMENDATIONS

#### 8.1 Introduction

This chapter presents the conclusions of the study derived from this research work; a number of recommendations are also provided based on these findings. Moreover, some suggestions are given for possible future research in this field and in other related areas.

The chapter is divided into five main sections. The first of these, Section 8.2, summarises the main findings of the study, Section 8.3 contains an explanation of the contribution this research makes to the literature, while the limitations of the research are listed in Section 8.4. Based on the research findings and limitations, further research possibilities and recommendations are suggested and presented in the final sections.

#### 8.2 Main findings

This research has investigated and measured students' acceptance of e-learning as the main tool in the learning process in Bahrain's secondary schools. The primary findings of the research are summarised in relation to the aims and objectives listed in Chapter One.

#### 8.2.1 Measuring students' acceptance of the e-learning system

The first objective of this research was to measure students' acceptance of the e-learning system based on the TAM, with particular emphasis on exploring the main factors influencing students' acceptance of the system.

Using an extended version of the TAM, the findings show that the research model employed in this study exhibited satisfactory power for explaining students' technology acceptance decisions. The addition of perceived enjoyment and subjective norm to the original model increased the explanatory power of the research model and provided a better explanation of students' technology acceptance decisions.

The study findings support all the research hypotheses (see Chapter Five, Table 5.16). As hypothesised, students' intention to use e-learning is affected by perceived enjoyment, attitude, perceived usefulness, and subjective norm. Students' attitude is the key predictor of intention to use the e-learning system. Having a positive attitude towards the system appears to be a significant driver for initial acceptance and for the successful implementation of the system. The effect of the TAM's basic beliefs (perceived usefulness and perceived ease of use) on students' attitudes was also supported, which indicated the importance of the system being useful and easy to use in order to promote a strongly positive attitude towards usage. Consistent with the findings of other studies, this study's findings support the mediating role of attitude between the TAM's beliefs and intention to use.

The findings also revealed that perceived enjoyment played an important role in the students' acceptance of the system. Its influence on intention to use exceeded the influence of perceived usefulness or subjective norm on intention, which suggests that the intrinsic motivation factor (perceived enjoyment) is more important for secondary students than the extrinsic factor (perceived usefulness). Students at this age are more easily stimulated to use a web site that is attractive and easy to use. On the other hand, the role of perceived usefulness on students' intention was also supported in the current study. This factor plays an important role in the students' motivation. The perception of system utility builds a positive drive to use the e-learning system. In other words, students who believe the system is useful and provides relevant functions will be motivated to use it over and over again.

Subjective norm had a significant positive effect on usage intention but, less than what usefulness, attitude and enjoyment explained in terms of behavioural intention. Thus, the opinions of friends and others appear to be an important factor that influences students' decision to accept the system. Students who participated in the current study tended to align their initial acceptance decisions with friends' opinions or the decisions of others.

## 8.2.2 Schoolteachers' and students' perceptions regarding the use of the e-learning system

The second objective of this research was to explore schoolteachers' and students' perceptions regarding the use of an e-learning system in Bahrain secondary schools. The perceptions of teachers play an important role in encouraging students to accept e-learning.

#### 8.2.2.1 Schoolteachers' perceptions

Schoolteachers hold three different perspectives towards the use of the e-learning system. The first perspective is in favour of and supports this mode of learning. The majority of this group were generally of a young age and had positive perceptions towards the use of an e-learning system. The second perspective is reluctant to change from a conventional mode of teaching. Such schoolteachers were more concerned about identifying barriers that might influence their use of the system. The third perspective is against the e-learning mode and in favour of the conventional mode of teaching. Examples of this group of teachers were the Mathematics teachers who believed that it is ineffective to teach Mathematics electronically.

It can be concluded that schoolteachers who participated in the current research held different perspectives and there were a number of factors which influenced their perceptions, including their age, educational background, teaching subject, personal interest, and the number of years of experience in teaching. These factors have an important influence on the perceptions of teachers. Teachers who have spent a number of years using one method of teaching and believe it to be an effective way of teaching will be difficult to persuade that other methods might be more effective.

#### 8.2.2.2 Students' perceptions

From the point of view of students, the great majority of the focus group participants and survey respondents recognised the importance of this mode of learning. They were aware of its importance in their learning processes and thought that e-learning could help and support their future academic and career development. In addition, the majority of students appreciated the system because it contains a number of features, such as student records, a visual library, e-textbooks, e-mail and group discussion facilities, as well as other learning materials.

Although most students believed that using online learning made it easy for them to communicate with teachers, some female students still preferred face-to-face interaction with the teacher. Such students were afraid that the new system would replace the current system completely and said they did not want to lose physical communication with teachers. Students added that having direct contact with teachers helped them to understand subjects more easily and feel comfortable in the classroom rather than having online communications.

It can be concluded that, although some female students felt uncomfortable with the e-learning mode, the majority of students showed positive attitudes toward this mode of learning. These perceptions need to be considered by decision makers. Applying the e-learning system to all educational stages would require time and effort from the various stakeholders. Students need time to recognise the difference between the traditional learning method and the e-learning method. Active participation of teachers in online communication may reduce such problems and motivate students to participate effectively.

#### 8.2.3 Teachers' opinions about students' acceptance of e-learning

The third objective of this research was to explore teachers' opinions about students' acceptance of e-learning. The experience of teachers, gained from daily interactions with students in the learning process, provides valuable information regarding students' acceptance of e-learning. Teachers revealed that most students had a positive attitude toward using e-learning. According to the teachers, students recognised the benefit of e-learning in pursuing a university education and in a future career. E-learning offered a flexible form of learning to students according to their learning needs and styles. Students can access learning materials at any time and place and such features motivate students to use this mode of learning. Having online communications with different stakeholders is another stimulating factor. Teachers also stated that the majority of students have the basic skills for using computers.

According to teachers, students in this generation generally learn to use computers when they are six years old.

#### **8.2.4 Motivational factors**

Understanding which factors motivate students to use an e-learning system was one of the research objectives. Such information is beneficial to both software designers and policy makers because it may provide suggestions that can be used to enhance the acceptance and utilisation of the system. As was noted earlier, enjoyment explained 32.5% of the variance in usage intention. In other words, enjoyment had a greater effect on intentions to use the system than TAM's basic variables and subjective norm. The qualitative method helped to understand in-depth what motivated students to use the e-learning system in school and an analysis of these data demonstrated that a number of factors led students to be motivated to use the system (see Chapter Seven, Section 7.6). These are:

- Increased awareness among the schools about this mode of learning;
- Students' recognition of the usefulness of the system;
- Simplicity of the system;
- Ministry of Education (MoE) support;
- A training approach which supports team work;
- Online interaction between learners and their teachers;
- Use of multimedia facilities in the learning process (which enhances the ability of students to understand subjects very easily).

It can be concluded that students' age and computer competence help them to accept the new system and to react positively to training. Support from the MoE also influenced the students' motivation to use the system. Creating a committee in each school responsible for evaluating the system and raising any important issues with the decision makers helps to increase awareness about the system among schools and contributes to solving problems faced by both students and teachers.

#### 8.2.5 The role of experience in accepting e-learning

The fifth objective of the research was to examine the impact of one year's experience on students' acceptance and actual usage. The purpose of the second fieldwork visit was to investigate any change in students' attitudes after one year's experience of the
e-learning system and to find out what are the critical factors that influence acceptance and continuity of use. It was demonstrated in the preceding chapter that experience gained through regular use of the system could positively or negatively influence students' acceptance and continuity of use. Therefore, positive experiences enhanced students' attitudes and motivation toward the e-learning system, whereas negative experiences led to frustration, anger and boredom among users.

Furthermore, the study findings shed light on key acceptance drivers and their influences on usage intention over time. As expected, behavioural intention was significantly correlated with usage. Consistent with the findings of other studies, behavioural intention was the main determinant of usage; its influences exceeded the influence of other research variables. Judging by the variances that were explained, the research model's explanatory power was satisfactory and appeared to increase as students continued using the system and gained additional knowledge.

Based on the analysis of the second stage data, students' attitudes towards the system continued to play an important role in students' acceptance and continuity of use. Perceived usefulness, ease of use and enjoyment explained 34% of the variance in students' attitudes toward e-learning. Perceived enjoyment was the best predictor of attitude. It can be concluded that, although enjoyment is important for Internet users, perceived usefulness and perceived ease of use had significant effects on students' attitudes.

When comparing the influence of extrinsic and intrinsic factors on usage intention after one year, the findings revealed that the influence of the intrinsic motivation factor (perceived enjoyment) exceeded the influence of the extrinsic factor (perceived usefulness). Compared to the findings of stage one, the effect of perceived usefulness on intention appeared to have strengthened with user experience. Feeling the system is useful promotes students' attitude which, in turn, influences actual use. Findings also revealed that perceived ease of use is an important determinant of both perceived usefulness and perceived enjoyment. This implies that ease of use has a greater effect on students' attitudes for systems that are both enjoyable and advantageous to use as opposed to those that are not enjoyable and offer little advantage to users. An unexpected finding was the increased influence of subjective norm on intention to use as students gained additional experience. The Kingdom of Bahrain, like other Arab countries have strong and tight relationships. Students tend to rely on friends, teachers and the opinions of other people when making decisions.

#### 8.2.6 Barriers hindering the adoption of an e-learning system

The sixth objective of the research was to identify the main barriers that might hinder the adoption and use of the e-learning system as stated by students and schoolteachers. An analysis of the qualitative data revealed a number of barriers that have a negative influence on the adoption and use of the e-learning system. For example, the first year of implementation represented a difficult time for both students and schoolteachers as they did not have a clear view of the system itself and whether it would be effective in teaching and learning. They faced a number of difficulties which discouraged them from accepting such a change. Some of these problems were solved later or diminished as users continued using the system. This was confirmed during the second field work visit; nonetheless, the major barriers faced by schoolteachers were:

- Lack of time (work overload)
- Technical problems (slow Internet access and broken links)
- Lack of technical support
- Lack of training
- Language
- Lack of awareness
- System security
- Teachers' skills and knowledge
- Teachers' beliefs and attitudes (preference for conventional teaching methods).

From a student perspective, the limited number of e-classrooms, a lack of training, the non-availability of a computer and Internet access at home, inexperienced teachers, preference for face-to-face interaction with a teacher, lack of awareness, technical problems and a lack of technical support were the major barriers that hindered the acceptance and use of the e-learning system. Similar to teachers, students also lacked the necessary competency in using the English language.

Adopting online learning for all educational levels raises another difficulty for students. Using online learning increases the financial cost for students and having a computer and Internet access at home is a financial problem for some. In addition, some students mentioned that their parents did not allow them to have computers and Internet access at home.

Based on these findings, it can be concluded that, although most schoolteachers and students who participated in the current study showed a positive attitude toward the e-learning system and were highly motivated to train and develop their skills, a number of issues influence their use of an e-learning system. Among them are the availability of resources, technical problems and a lack of technical support. A few teachers also expressed dissatisfaction with the number of changes which occurred in the education system from time to time without teachers' perceptions being considered. They stated that such changes have an indirect impact on the ability of teachers to keep abreast of developments in the world of technology. With the crowded curriculum, teachers felt unable to manage their time for teaching, training and other administrative tasks.

### 8.3 Contribution of the research

This research has made a number of contributions to the literature. Firstly, while the literature review identified a number of factors (such as usefulness, ease of use, subjective norm, enjoyment, attitude, culture, computer self-efficacy and visual attractiveness) that influence users' acceptance of technology in developed countries, little is known about whether the same factors apply to a developing country. This research attempted to fill this gap in the literature by identifying the main factors that influenced students' acceptance and use of e-learning in Bahrain secondary schools by adopting the Technology Acceptance Model (TAM). Therefore, a comprehensive research study was conducted using both quantitative and qualitative methods. The use of mixed methods was appropriate in the current study to give a better understanding of the phenomenon under investigation.

In addition, a review of the available literature revealed that this research is the first in-depth research within a Bahraini context. It has reviewed the related literature and has collected extensive data during two fieldwork visits. The first visit was made at an initial stage where the students had little or no experience of using an e-learning system while data from the second stage aimed to measure the impact on acceptance after one year's experience in using the system. Therefore, it can be claimed that this study is among the most exploratory and comprehensive pieces of research in this field and can be used as a basis for further studies.

The participants in the current research were Bahraini secondary school students. A number of studies have reported that culture plays an important role in the existence and strength of relationships in the Technology Acceptance Model (e.g. Straub, Keil & Brenner 1997, cited in van Raaij & Schepers 2008, p.839). However, the findings of this research show that the core TAM relationships hold well for the Bahraini culture and all the hypothesised relationships are supported by the data. Thus, the findings match what Pituch and Lee (2006); van Raaij and Schepers (2008) and Al-Khateeb (2007) found in their research. For example, Pituch and Lee, who used the TAM to explain students' intention to use an e-learning system at a college in Taiwan, found perceived ease of use and perceived usefulness had statistically significant effects.

Furthermore, the application of the TAM framework for a specific system (Edunet) is more powerful than using the TAM to test Internet usage in general, as reported by van der Heijden (2003, p.541).

A further contribution is that the outcomes of this study provide guidelines for strategy makers concerning some possible courses of action that might be required to increase the acceptance and successful utilisation of online learning at school level.

### **8.4 Limitations of the research**

The results of the current research must be considered in the light of certain limitations. For example, the results of stepwise regression showed that the acceptance factors used in this study accounted for approximately 50% of the variance

in behavioural intention to use the e-learning system. However, other factors were not accounted for in this research that might have an effect on users' beliefs and usage, such as students' satisfaction, Internet experience, computer anxiety and computer self-efficacy.

Also, the ultimate objective of the TAM was to predict use; this has most often been measured by previous researchers through self-reporting (e.g. Legris, Ingham & Collerette (2003, p.196); Fusilier & Durlabhji (2005, p.233)) and so the measurement of usage in the current study is also self-reported. A number of researchers have argued that there are differences between self-reported and actual usage: for example, Igbaria, Schiffiman, and Wieckowski (1994), Szajna (1996), and Legris, Ingham and Collerette (2003). Obtaining objective data by using system log files was difficult in the current research for security and administrative reasons. Therefore, future research should attempt to obtain objective data to enhance accuracy; this was, also suggested by Gao (2005).

A further limitation was that this research was confined to the secondary school stage with the participants of the current research being students between 15-17 years of age. Therefore, the findings cannot realistically be generalised to a wider population. Students at a different age, such as primary or intermediate students, have different perceptions and needs; therefore, factors that are significant to secondary school students in terms of accepting technology might not be so important to other students. Therefore, a different pattern of response might be obtained if the survey covered all school stages.

Finally, the research focused on school teachers who teach Science, Mathematics and English. This is because the King Hamad's School of the Future Project started with these three subjects and other subjects will be introduced gradually. Therefore, these three subjects were the only subjects available to the researcher at the time of the fieldwork. However, it would be beneficial for some future research to explore the perceptions of teachers of other subjects.

### 8.5 Further research

In light of the results of the current study, the researcher has identified a number of areas that are fertile for further investigation. These areas are presented next:

- Although Arab countries are similar in many ways, such as in their customs, language, religion and history, they differ in size and wealth (Aladwani 2003, p.9). Therefore, the advancement of technology and degree of education is different from one country to another, especially between Arab Gulf countries and other Arab countries (Elango, Gudep & Selvam 2008, pp.33-34). The findings of the current research show that there are a number of factors that influence students' acceptance of e-learning in Bahrain secondary schools. However, to ensure the generalisability and external validity of its findings, this research could be duplicated in other Arab countries applying the same system. Thus, it would be worthwhile to examine, through further comparison and research, whether the same factors influence the degree of acceptance in these countries.
- Comparative, longitudinal studies on the differences between traditional learning and e-learning should be carried out in order to see which of these modes help students the most. It is also important to identify the learning needs/learning styles of students.
- This research has identified some of the factors that influence the acceptance of an e-learning system in Bahrain secondary schools. However, future research should build on this study by identifying other factors that affect the acceptance of e-learning. For example, the role of student satisfaction in the use of online learning could be examined and the relations between students' satisfaction and behavioural intention to use the system could be explored.
- Future research could study the influence of the cost and availability of the Internet on students' acceptance of an e-learning system.

- There is a need to explore the perceptions and attitudes of primary and intermediate students in the Kingdom of Bahrain. Understanding their perceptions and the main factors that influence their acceptance would give a complete picture of students' acceptance of e-learning at different school stages and would be valuable as a comparative study.
- Research is needed to investigate the perceptions of parents, school administrative staff and those involved with the system, such as educational technology specialists and others.
- There is a demand to evaluate the Edunet website. This could be approached through usability testing, a "process that employs participants who are representative of the target population to evaluate the degree to which a product meets specific usability criteria" (Rubin 1994, pp.25-26). According to Rubin, the overall goal of usability testing is to identify usability deficiencies existing in websites.
- There is a need for further investigation of students' acceptance of e-learning using other acceptance models such as the Theory of Planned Behaviour (TPB) or the Unified Theory of Acceptance and Use of Technology (UTAUT).

## **8.6 Recommendations**

The shift to e-learning has been a critical matter for both developed and developing countries since e-learning can deliver common educational opportunities to all age groups and in almost all different regions. Aladwani (2003, p.19) argued that the Internet would improve the quality of life, especially in less developed Arab countries, by transferring knowledge and information technology from developed countries (such as the USA and UK). It is, in fact, a good opportunity for Arab countries to build up a store of experience in this area and to transform traditional schools into e-schools with the collaboration of different parties.

The last objective of the research was to recommend strategies and practical solutions for the improvement and successful utilisation of e-learning systems in school education. The success of e-learning is a shared responsibility among the Ministry of Education (MoE), schools, and students. However, all government schools in the Kingdom of Bahrain are administered and managed by the MoE. Besides, the MoE is the controller of schools' budgets and all recruitment and movement of teachers must go through the MoE. Moreover, the introduction, implementation, sponsoring and piloting of e-learning in secondary schools was initiated by MoE. In fact, e-learning represents the MoE's vision and strategy in education. Therefore, it is important that the MoE plays an indispensable role in promoting e-learning to achieve its vision and to ensure that an effective education system is provided in the Kingdom of Bahrain. As a result, most of the following recommendations are directed to the MoE:

- E-learning policy: The MoE needs to develop a clear and cohesive policy that provides a definition of e-learning, a statement of the mission, and goals for e-learning. It also needs to establish a particular pedagogical approach (e.g. blended learning) for the development of 21<sup>st</sup> century learning skills. An e-learning policy could include the following aspects: learner centred approaches, best practice, collaboration, innovation, sustainability and a focus on the unique identity of the schools in Bahrain.
- **On-going teacher professional development**: This research has shown that there is an urgent need to provide professional development for teachers in order for them to capitalise on the opportunities provided by new educational technologies and to learn how to integrate technology into their teaching practice. While there has been a focus on training teachers to gain skills using technology, there is now a need for teachers to understand how e-learning can provide the context for students to develop 21st century learning skills.
- **Teachers' workload**: Reducing teaching and administrative work is necessary to give teachers an opportunity to train and participate effectively and successfully in the project. In fact, lack of time was one of the most significant problems raised by schoolteachers who emphasised that, with the

current curriculum, they will not find time to develop their skills. Therefore, it is the MoE's responsibility to hire more administrative/technical support and to formulate a solid plan to overcome this problem, as well as to provide schools with an adequate number of staff.

- Spreading the culture of e-learning through awareness and media campaigns: Increasing awareness in society concerning e-learning and its benefits in schools is critical in preparing the community for accepting and interacting with this mode of learning. It would be valuable for the MoE to arrange a series of seminars or educational conferences to underline the need for e-learning, together with its benefits and its national and international influences on the development of the Kingdom of Bahrain in particular and of the Arab countries in general.
- Develop "21<sup>st</sup>-century Skills": In an e-learning environment, students need different skills from those required from a traditional teaching and learning approach. Example of these skills were noted by Gewertz (2008, p.1) who stated that "...young people need to know how to innovate, solve problems, and work with people from other cultures". Many educators refer to these skills as "21<sup>st</sup> -century skills". The shift to e-learning is important because it provides the context for students to develop 21<sup>st</sup> century skills. Therefore, the MoE has to encourage students and teachers to recognise their role in an e-learning environment and to work effectively on developing the skills necessary for that environment.
- English proficiency: Since the great majority of e-learning resources available on the Internet and in educational software are in English, competence in the English Language is critical for both teachers and students if they are to access and use e-learning resources effectively. Liu *et al.* (2008, p.222) argued that English is "an important tool of international communication in the era of globalisation because of more frequent international exchanges for business and educational purposes". Therefore, the MoE needs to help students and teachers to improve their English

proficiency by offering necessary workshops and facilitating their participation in these workshops.

- Preparing learners for e-learning: Since students' learning is the main aim of school education, it is vital to consider learners' needs when introducing a new system of learning. Students learn in a variety of ways and each of them prefers methods for learning which need to be supported with appropriate learning technologies (Quintana 1996). Therefore, system developers and interface designers at the MoE should take into account this diversity when designing and developing e-learning applications. Thus, applying a "one learning style fits all" approach to e-learning does not seem to be an appropriate decision (Lanham & Zhou 2003, p.280). This is an important issue since the MoE is in the process of expanding its e-learning project to cover all government schools in the Kingdom of Bahrain.
- Training methods and training time: The development of a training programme should take into account the time and the different levels of skill schoolteachers and students currently have. It is well known that training methods are important in building learners' skills, increasing confidence and reducing anxiety. Therefore, the implication for MoE decision makers is the need to discover more flexible training methods that can save teachers' time while training a large number of teachers quickly (e.g. through web-based training and the "cascade model", also known as "trainer training"). In this model "one group trains another group who then go on to train others, so that the educational benefit is supposed to 'cascade' downwards" (Bax 2002, pp.165-166).
- Internet service providers: It is important to point out that the cost of Internet access in most Arab countries exceeds the purchasing power of average citizens (Aladwani 2003, p.14). The findings of the current study showed that lacking Internet access from home was among the main barriers to accessing e-learning resources. The researcher deeply believes that allowing new Internet service providers to enter the market would reduce the cost of accessing the Internet and improve the service provided. Therefore,

the MoE needs to make serious efforts to encourage new Internet service providers to enter the Bahraini market and compete with other existing providers.

- Support from the private sector: Lack of computers at home was one of the main barriers for accessing e-learning resources, as indicated by the findings of this study. The research recommends that the MoE approaches the private sector in the Kingdom of Bahrain to support the community by helping students and teachers to obtain computers for home use. The private sector can also help in providing computers in public libraries in different districts or in increasing the number of Internet cafés in the region.
- **Competition:** Based on the findings of this study, the researcher recommends that the MoE creates a project website where students and staff can showcase their work and make it available for viewing by the wider community. The MoE can also motivate students and schools to compete by offering competitions and prizes on that website for the best instructional design of e-learning materials and applications.
- Collaboration between schools and parents to enhance student learning: In school education, parents are an important stakeholder group and are one of the key contributor groups supporting information technology in learning (Kong & Li 2008, p.275). Schools therefore need to work with families to foster an understanding of how to use online resources effectively in learning.
- **Evaluation**: Methodological and sound research mechanisms should be established to evaluate the effectiveness of an e-learning system. Surveying users who have direct contact with the system is important and highly recommended.

To conclude, knowledge and education are critical in terms of building a healthy and progressive economy because, currently, concepts such as the knowledge economy, the knowledge community and knowledge transfer reflect a major concern in civilised countries. As a result, little economic reform can actually take place without educational reform. In fact, the whole world economy has been built and developed through knowledge and the development of education. However, the transition to elearning alone is not enough to change the overall development of education. Instead, this requires the creation of an integrated package of measures for comprehensive reform and development and for review and evaluation.

It is of paramount importance to refer to the Arab culture and its role in accepting elearning in schools. The researcher believes that resistance and reluctance to use elearning is a major problem for educators who want to introduce this mode of learning in schools and even in universities. As a result, the introduction of e-learning must be handled cautiously at the beginning in order to gain wider acceptance. With the rapid changes in technology, there is a need to develop curricula on a periodic basis, to have on-going programmes of professional development for teachers, and to spread the culture of e- learning throughout Bahraini society

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# **Appendix 1**

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Ministry of Education



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15 August 2007

To whom it may concern

This is to inform you that Nawal Zewayed will be conducting the second phase of the fieldwork for her PhD from October 2007 to April 2008. This will include conducting interviews and distributing questionnaires to pupils and staff in various schools in Bahrain.

We would be very grateful if you could provide her with the necessary support and help to ensure she receives the collaboration necessary for effective data collection.

Yours faithfully

Shanged In R. Mm 2

Dr Sally Maynard and Mr Ian Murray Lecturers, Department of Information Science



### Kingdom of Bahrain Ministry of Education

Educational Research and Development Centre

الرقم: 1-4/ 100 م ب ت 2006

في: 2006/ 10/30 ج

مملكسة المحصري

وزارة التربية والتعليم

مركز البحوث التربوية والتطوير

الموضوع: تسبين مهمات باحث

إقرار من مقدم الطلب : توال جالهم رول هذا التصريح باجراء البحث لغرض تقديمه إلى الجهة الطالبة المشار إليها أدناه أقط. ولا يحق في استخدامه لأغراض أخرى أو نشره أو توزيعه. نرايع الباهن: حوالرور اسم الباحن: فوال جما سم نرو لا المعهة الطالبة: جامعة لعمل (البرطانية) وطوع البحث العقامي الالكري فاحدارس المفانون علكم العربي . المعهات العطلوب تتفيذها: تصبيح الإستيبا فة خ ثمانية حدار ما توية حص مرفقات: ١ - رسالة الحاصة حقوق استخدام الأدوات محفوظة للباحث فقط obie XI-c رأى مركز السعوية التربوية والتطوير : بحد الإطلاح على المرفقات والبيانات المطلوبة : م يرافق المركز على تتفيذ المهمة أعلام لا يو افق المركز على تنفيذ المهمة المطلوبة. الاسم: د. معصومة عبدالصاحب الوظيفة: القادَّم بأعمال رئيس مركز البحوث النربوية والتطوير خنم المريخز. التوقيع جعي رأي انجهة المعنية : ممرم لحرق لمعلم لمحا مرك بعد الإطلاع على المرفقات وبناء على رأي مركز البحوث النربوية والتطوير توانق الإدارة على تنفيذ المهمة أعلاه لا توافق الإدارة على تنفيذ المهمة المطلوبة. الاسم: ابدا هم محمد جمعان هجرس الوشيفة: الملقائم وباعال معسم ادارة المقليم التانوى ختم الإدار التوقيع : هاتف : ٦٨٠٠٨٣ (٢٠٩٧٣) - فاكس : ٦٨٠١٦٨ (٢٠٩٧٣) - ص 109973) 680083 - Fax : (00973) 680168 - P.O. Box : 43 - Manama البريد الإلكتروني: E-mail: moe.research@bahrain.gov.bh www.education.gov.bh

# **Appendix 2**

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## **Students' Acceptance of e-learning in Bahrain Secondary Schools**

## A survey

This survey is being carried out on behalf of the Department of Information Science at Loughborough University. The research investigates and measures students' acceptance of e-learning as the main tool in learning processes in Bahrain secondary schools.

All information provided will remain confidential; only the researcher has access to the completed surveys.

If you have any enquiries or comments relating to the survey please contact me by email at:

N.Zewayed@lboro.ac.uk

Please give your completed survey to the IT specialist in your school.

Many thanks for your time and co-operation. .

Nawal Zewayed Department of Information Science Loughbourgh University



#### E-learning King Hamad's Schools of Future Project ALL INFORMATION GIVEN WILL BE TREATED IN THE STRICTEST CONFIDENCE

### **General Information**

Please answer the following questions with one tick ( $\sqrt{}$ ) only for each question. You may provide any additional information where requested if you wish.

#### 1- Gender:

a-□ Male

b-□ Female

2- Age:

a-□ 15 Years

b-□ 16 Years

c-□ 17 Years

3- School Name:\_\_\_\_\_

### **Computer Experience**

- 4- When did you first start using computers?
  - a-□ This year

b-□ 1-2 years ago

c-□ 2-3 years ago

d-□ More than 3 years ago

5- Who encourages you to use the computer? (Please TICK all that apply)

a- $\Box$  Father

b-□ Mother

- c-□ Teacher
- d- $\Box$  Friends
- e- 
  Others, please specify\_\_\_\_\_
- 6- Do you have a computer at home?
  - a-□ Yes

b-□ No (GO TO QUESTION 9)

7- Do you have access to the Internet at home?

a-□ Yes

b-□ No

8- For what purpose do you use the computer at home? (Please TICK all that apply)

a- $\Box$  Internet

- b-□ E-mail
- $c\text{-}\square \ \ School \ work$
- d Games (entertainments)
- e-□ Other, please specify\_

Please indicate your preference by circling the number which best represents your opinion where:

- 1= Strongly Disagree
- 2= Disagree
- 3= Neutral
- 4= Agree 5= Strongly Agree

### N.B. Throughout this questionnaire 'Edunet' means the Educational Network.

9- Perceived Usefulness (PU)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
and at any place.	1	2	3	4	5	
b. Learning through Edunet saves me time and effort.	1	2	3	4	5	
c. Using Edunet makes it difficult for me to learn subject content.	1	2	3	4	5	
d. Using Edunet enables me to access many resources.	1	2	3	4	5	
e. Overall, I find Edunet useful in my learning.	1	2	3	4	5	

### 10- Perceived Ease of Use (EOU)

a. I find it easy to learn how to use Edunet	1	2	3	4	5
b. It is easy for me to become skilful in using Edunet	1	2	3	4	5
c. It is difficult for me to learn through the Edunet portal	1	2	3	4	5
<ul><li>d. I find Edunet flexible to interact with.</li></ul>	1	2	3	4	
e. Overall, I find Edunet easy to use.	1	2	3	4	5

## 11- Subjective Norm (SN)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. I would use Edunet even if no one I know was using it.	1	2	3	4	5
b. My teachers think that I should use Edunet in my future learning.	1	2	3	4	5
c. I would use Edunet if my friends used it.	1	2	3	4	5
d. My parents think that I should use Edunet in my future learning.	1	2	3	4	5
<ul> <li>12- Perceived Enjoyment (PE)</li> <li>a. The interaction with sounds, colours and pictures using Edunet is pleasant.</li> </ul>	1	2	3	4	5
b. Lessons in which Edunet is used are not pleasant.	1	2	3	4	5
c. I have fun using Edunet.	1	2	3	4	5
d. I think using Edunet is enjoyable.	1	2	3	4	5
13- Behavioral Intention (BI)					
a. I intend to use Edunet regularly this semester.	1	2	3	4	5
b Lintend to increase my use of Edunet	1	2	3	4	5

b. I intend to increase my use of Edunet in the future.	1	2	3	4	5
c. I strongly recommend other students to use Edunet.	1	2	3	4	5
d. I will frequently use the Edunet in the future.	1	2	3	4	5

### 14- Attitude (A)

Please place a tick (  $\sqrt{}$  ) in the box that best matches your opinion.

### a. The idea of using Edunet is:

Extremely Quite Neither	Quite	Extremely
Bad Bad	Good	Good

### b. The idea of using Edunet is:

Extremely	Quite	Neither	Quite	Extremely
Foolish	Foolish		Wise	Wise
F UUIISII	F UUIISII		vv ise	vv ise

#### c. My use of Edunet is....

Extremely	Quite	Neither	Quite	Extremely
Un enjoyable	Un enjoyable		Enjoyable	Enjoyable

### d. My use of Edunet is....

Extremely	Quite	Neither	Quite Necessary	Extremely
Unnecessary	Unnecessary		recessary	Necessary

#### e. My use of Edunet is....

Extremely Non- beneficial	Quite Non- beneficial	Neither	Quite Beneficial	Extremely Beneficial
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#### Usage (U)

15. On average, how frequently do you use Edunet? (Please TICK one)

- a-□ Less than once a month
- b- $\square$  Once a month
- c- $\Box$  A few times a month
- d- $\Box$  A few times a week
- e-□ About once a day
- f- $\square$  A few times a day

**16.** On average, how much time do you spend using Edunet every day? (Please TICK one)

a-□ Almost never
b-□ Less than ½ hour
c-□ From ½-1 hour
d-□ 1-2 hours
e-□ 2-3 hours

f- $\Box$  More than 3 hours

Please add any comments you wish to make regarding the subject of the study

Thank you for taking the time to complete this survey



# مدى قبول الطلبة للتعليم الالكتروني في المدارس الثانوية

يهدف هذا الاستبيان الى معرفة ارائك الشخصية في استخدام التعليم الالكتروني في المدارس الثانوية، وما مدى تقبلك لهذا النوع من التعليم، وما هي الصعوبات التى تواجهك عند استخدامها.

وسوف تستحدم المعلومات التي سيتم جمعها من هذا الاستبيان بعد معالجتها، في اجراء بحث لنيل درجة الدكتوراة. لذا ارجو التفضل بتعبئة الاستبيان المرفق بدقة ومن ثم تسليمه الى اخصائي تكنولوجيا المعلومات في مدرستك.

ومع شكري وتقديري الخالص لتعاونكم اود ان اؤكد لكم حرصي على المحافظة على سرية اجاباتكم لانها سوف تستخدم فقط للاغراض الاكاديمية.

الباحثة نوال جاسم زويد قسم علوم المعلومات جامعة لفبرا

# التعليم الالكتروني في مشروع جلالة الملك حمد لمدارس المستقبل

الطلاب والطالبات الكرام: تهدف هذه الاستبانة إلى معرفة رأيك في استخدام الشبكة التعليمية ''Edunet'' . تتألف الاستبانة من ستة عشر سؤالا موزعة على تسعة أقسام. يبدأ كل قسم بتعليمات يرجى قراءتها بدقة ومن ثم الاجابة بصراحة ودقة على الأسئلة، لأن إجاباتكم سوف تساهم في تطوير التعليم الالكتروني ضمن مشروع جلالة الملك حمد لمدارس المستقبل ولكم خالص الشكر و التقدير.

المعلومات التالية سوف تساعد الباحث على تصنيف الإجابات و إجراء المقارنات الإحصائية اللازمة، يرجى التكرم بالإجابة كتابة أو بوضع ( √ ) في المكان المناسب.

أولا: البيانات الشخصية (يرجى اختيار الخانة المناسبة)

1 - الجنس: أ- 🛛 ذكر ب- 🗅 أنثى 2 - العمر: أ- 🗆 15 عاما ب- 🗠 16 عاما ج- 🗆 17 عاما 3 - اسم المدرسة ......

ثانيا: الخبرة في استخدام الحاسب الآلي ( يرجى اختيار الخانة المناسبة)

4 - منذ متى تستخدم الحاسب الآلي؟
أ - □ هذه السنة فقط
ب - □ منذ 1-2 سنة
ج - □ منذ 2-3 سنوات
د - □ منذ أكثر من 3 سنوات

5 - من الذي شجعك على استخدام الحاسب الآلي؟ ( ممكن التأشير على أكثر من إجابة على هذا السؤال)

- أ □ الأب
   ب □ الأم
   ج □ المعلم
   د □ الأصدقاء
   ه □ آخرون (حددهم من فضلك)......
  - أ □ نعم
     ب □ لا (إذا أجبت بلا الرجاء الانتقال إلى السؤال رقم 9 )
    - 7- هل لديك خدمة الانترنت في المنزل؟ أ - 🛛 نعم ب - 🗆 لا

8- ما الغرض من استخدامك للحاسب الآلي في المنزل؟ ( ممكن التأشير على أكثر من إجابة على هذا السؤال)

- أ 🛛 الانترنت
- ب ۔ 🗆 البريد الالكتروني
- ج ۔ 🗆 الواجبات المدرسية
  - د 🗆 الألعاب المسلية
- ه 🛛 أغراض أخرى (حددها من فضلك) .....

عند إجابتك للأسئلة التالية يرجى وضع دائرة حول الرقم الذي يحدد مدى موافقتك أو عدم موافقتك على كل من العبارات الآتية:

01		H		ب <u>ت</u> دة	نا: فائدة الشبكة التعليمية "Edunet":	ثالث
أؤيد بشد	أويد	غير متأك	أعارض	أعارض	9- استخدام الشبكة التعليمية ''Edunet''	
5	4	3	2	1	تساعدني في الحصول على المعلومات في أي وقت و في أي مكان.	1
5	4	3	2	1	توفر عليّ الوقت والجهد في التعليم.	2
5	4	3	2	1	تصعب عليّ تعلم محتوى المادة.	3
5	4	3	2	1	تساعدني على الدخول على الكثير من المواقع التعليمية.	4
5	4	3	2	1	بشكل عام مفيد في العملية التعليمية	5

أؤيد بشدة	أؤيد	غير متأكد	أعارض	أعارض بشدة	ها: سهولة استخدام الشبكة التعليمية ''Edunet'': 10- بالنسبة لسهولة استخدام الشبكة ، فأعتقد أن:	<u>راب</u>
5	4	3	2	1	تعلم استخدام "Edunet" سهل بالنسبة لي.	1
5	4	3	2	1	اكتساب المهارة في استخدام "Edunet" سهل بالنسبة لي.	2
5	4	3	2	1	صعوبة التعلم من خلال الشبكة التعليمية " Edunet"	3
5	4	3	2	1	الشبكة التعليمية "Edunet" تتمتع بالمرونة في الاتصال.	4
5	4	3	2	1	شبكة "Edunet" بشكل عام سهلة الاستخدام.	5

01		k		يتبر	سا: المؤثرات الاجتماعية:	خام
أؤيد بشد	أويد	غير متأك	أعارض	أعارض	11- هناك بعض المؤثرات الاجتماعية، لذا:	
5	4	3	2	1	سأستخدم "Edunet" وان لم يستخدمها أحد.	1
5	4	3	2	1	سأستخدم "Edunet" لأن المدر سين ينصحوني بذلك.	2
5	4	3	2	1	سوف أستخدم "Edunet" إذا أستخدمه صديقي.	3
5	4	3	2	1	سأستخدم "Edunet" لأن و لي أمر ي ينصحني بذلك.	4

# سادسا: المتعة والتسلية في الشبكة التعليمية "Edunet":

أؤيد بشدة	أويد	غير متأكد	أعارض	أعارض بشدة	12- أعتقد أن:	
5	4	3	2	1	موقع الشبكة التعليمية ممتع لإحتوائه على المؤثرات السمعية والبصرية.	1
5	4	3	2	1	المادة التي يتم فيها استخدام "Edunet" غير ممتعه.	2
5	4	3	2	1	أشعر بالمتعة عند استخدام الشبكة التعليمية "Edunet" .	3
5	4	3	2	1	أعتقد أن استخدام الشبكة التعليمية " Edunet"ممتع بالنسبة لي.	4

أؤيد بشدة	أويد	غير متأكد	أعارض	أعارض بشدة	بعا: المبادرة في استخدام ''Edunet'' 13- بالنسبة للمبادرة في الاستخدام فإنني :	<u>ساب</u>
5	4	3	2	1	انوي استخدام "Edunet" بصفة مستمرة في هذا الفصل.	1
5	4	3	2	1	أنوي زيادة استخدام "Edunet" في المستقبل على نطاق أوسع.	2
5	4	3	2	1	أنصح الطلبة بشدة باستخدام "Edunet".	3
5	4	3	2	1	سوف أقوم بإستخدام "Edunet" بصفة مستمرة في المستقبل.	4

## ثامنا: الرغبة في استخدام "Edunet":

## 14- الرجاء وضع علامة ( √ ) في المكان الذي يعكس وجهة نظرك

## أ- إن فكرة استخدام الشبكة التعليمية "Edunet"

جيدة	أكد	غیر مت	سيبئة	سيئة جدا
				جيدة جدا

## ب- إن فكرة استخدام "Edunet"

ذكية	متأكد	تافهة غير	تافهة جدا ذكبة حدا

## ج- إستخدام "Edunet"

ممتع	ىتأكد	غير ه	غير ممتع	غیر ممتع أبدا ممتع جدا

### د. إستخدام "Edunet"

<i>ضروري</i>	متأكد	ي غير ه	ا غیر ضرور:	غير ضروري أبد ضروري جدا

### ه. إستخدام "Edunet":

فيد	أكد ه	غیر مت	غیر مفید	غیر مفید أبدا مفید حدا
				• *
				*** *** *** * ***

تاسعا: الاستخدام الفعلى للشبكة التعليمية "Edunet":

### 15. كم مرة تستخدم في المتوسط "Edunet"؟

- أ □ اقل من مرة في الشهر
   ب -□ مرة في الشهر
   ج -□ عدة مرات في الشهر
   د -□ عدة مرات في الأسبوع
   ه -□ مرة في اليوم
  - و ۔ 🗆 عدة مرات في اليوم

### **16. في المتوسط كم من الوقت تقضيه في استخدام ''Edunet'' يوميا ؟** (يرجى اختيار الإجابة المناسبة)

- أ 🗆 لا أستخدمه ابدا
- ب اقل من 1/2 ساعة
  - ج -□ 1/2 1 ساعة
    - د ـ 🗆 1 2 ساعتين
    - ه □ 2 3 ساعات
- و ۔ 🗆 أكثر من 3 ساعات

إذا لديك أي ملاحظات أو اقتراحات بشأن استخدام شبكة ''Edunet''، الرجاء تدوينها في السطور التالية:

شاكرة حسن تعاونكم

# **Appendix 3**

## **Semi-Structured Interviews**

## School Teachers First fieldwork stage

- **Q1**. What is your opinion regarding shifting from traditional teaching to e-learning?
- Q2. How would you describe students' use of e-learning in your class activities?
- **Q3.** How would you describe students' attitudes and motivation towards using e-leaning?
- Q4 Do you have students with negative attitudes toward e-learning in your class? How does it affect your class?
- **Q5** In your opinion, what are the main barriers and obstacles facing students' acceptance of e-learning in their learning process in your class activities?
- **Q6** What are the main problems facing teachers who use e-learning in their teaching processes?
- Q7 Are there any comments related to students accepting e-learning that you would like to add?

### Thank you for your time and participation

# المقابلات الشخصية للمدرسين

## الزيارة الميدانية الأولى

س1: ما هو رأيك حول التحول من التعليم التقليدي إلى التعلم الإلكتروني؟

2: كيف تصف استخدام الطلاب للتعلم الالكتروني في العملية التعليمية؟

س3: ما مدى تجاوب الطلاب وتحفيز هم نحو استخدام التعلم الإلكتروني؟

س4: هل لديك طلاب ذو نظرة سلبية تجاه التعلم الالكتروني؟ كيف يؤثر ذلك على العملية التعليمية ؟

س5: ما هي العوائق والعقبات الرئيسية التي تواجه الطلاب لقبول التعلم الالكتروني؟

س6: ما هي المشاكل الرئيسية التي تواجه المعلمين الذين يستخدمون التعلم الإلكتروني في العملية التعليمية ؟

س7: هل لديك أية اضافات تتعلق بقبول الطلاب للتعلم الإلكتروني؟

شكرا جزيلا على المشاركة

## **Semi-Structured Interviews**

## **School Teachers**

## Second fieldwork stage

- **Q1**. After one year of students' use of Edunet, how would you describe their use this year?
- Q2. In your opinion, what factors influence student's use of Edunet?
- Q3. To what extent do you think the Ministry of Education support online learning?
- **Q4.** In your opinion, what are the main obstacles affecting use e-learning in school?
- Q5. Are there any comments you would like to add?

### Thank you for your time and participation

## المقابلات الشخصية للمدرسين

## الزيارة الميدانية الثانية

س1: بعد عام واحد من استخدام الطلاب للتعلم الإلكتروني؟ كيف تصف استخدامهم هذا العام؟ س2: ما هي العوامل التي تؤثر على استخدام الطلاب للتعلم الإلكتروني؟ س3: ما مدى دعم وزارة التربية والتعليم للتعلم الإلكتروني؟ س4: ما هي العقبات الرئيسية التي تؤثر على استخدام التعلم الإلكتروني في المدرسة؟ س5: هل هل لديك أية معلومات تر غب في إضافتها؟

## شكرا جزيلا على المشاركة

# **Appendix 4**

# **Focus Groups**

# **Schools Students**

# **Topic: e-learning in class activities**

Issue 1: Use of e-learning in class activities

Issue 2: E-learning environment

Issue 3: Social Impact

Issue 4: Motivating factors

Issue 5: Barriers and obstacles

# المقابلات الشخصية لطلبة المدارس

- استخدام التعلم الإلكتروني في العملية التعليمية
  - ايئة التعلم الإلكتروني
  - المؤثرات الاجتماعية
- العوامل المحفزة في استخدام التعلم الإلكتروني
- المشاكل والعوائق التي تعيق استخدام التعلم الإلكتروني

## شكرا جزيلا على المشاركة

# Appendix 5

# The following table summarises the response rate from each school.

# **Research Sample**

Schools	Sample	No. of	% of	No. of	% of
		responses	Respondents	responses	Respondents
		(stage one)		(stage two)	
Al Hidaiya Al					
Khalifia	135	118	12.7	87	10.8
Secondary					
School					
(Boys)					
Ahmed Al	210	149	16.1	140	17.4
Omran					
Secondary					
School					
(Boys)					
Hamad Town	125	120	13.0	69	8.6
Intermediate					
Secondary					
School(Boys)	125	01	0.9	70	0.9
East Rifa	135	91	9.8	19	9.8
School (Boys)					
School (Boys)					
Al Istiqlal	165	120	13.0	112	13.9
Secondary					
Commercial					
School (Girls)					
Al-Hoora	115	83	8.9	92	11.5
Commercial					
School (Girls)					
Sitra Secondary	125	120	13.0	109	13.6
School (Girls)	_	-			
Saar Secondary	130	125	13.5	115	14.3
School (Girls)					
Total	1140	926	100	803	100

# Appendix 6 Technology Acceptance and TAM-based Studies (Arab Countries)

Name of study	Purpose	Countr	Technology	Research	Participant	Factors	Results
		У		methods	S	tested	
Ghorab (1997)	Examined bank managers' perceptions towards automation of their banking operations.	United Arab Emirate s	Computer systems	Questionnair es	47 bank managers	Perceived strengths, perceived weaknesses, perceived usefulness, perceived ease of use, actual usage and adopted level of technological sophistication	Perceived usefulness and perceived strengths are important factors that influence usage and adoption level of technological sophistication. System perceived weaknesses and user expectations were found to be unimportant in predicting either the system usage or adopted level of technological sophistication.
Rose and Straub (1998)	Studied IT diffusion in Arab region.	Jordan, Egypt, Saudi Arabia, Lebanon and Sudan		Questionnair es	274 workers	Perceived usefulness, perceived ease of use and system use	TAM transferred successfully to the Arab world and the research model explained 40% of the variance in the use of IT.
Selim (2003)	Investigated the acceptance of course websites as	United Arab Emirate	Course website	Questionnair es	403 undergraduat e students	Perceived usefulness, perceived	The proposed model had high explanatory power (83%) of the total variance in the course website

	a teaching and learning tool in higher education institutions	S				ease of use and usage	acceptance and usage which provided additional support for the use of the TAM within an academic setting and in Arab countries. Perceived usefulness and ease of use were key determinants in the acceptance and usage of the course website.
van Schaik, Barker and Moukadem (2005)	Investigated students' acceptance of virtual university server in Lebanon (VUSIL)	Lebanon	VUSIL	Questionnair es	110 students	Perceived usefulness, disorientation , perceived ease of use and intention to use VUSIL	Perceived usefulness had a direct effect on intention to use the system whereas perceived ease of use had indirect effects via perceived usefulness.
Charbaji, Al- Hajhouj and Beyruti (2006)	Examined the intentions of university teachers to use WebCT.	Lebanon and Saudi Arabia	WebCT	Questionnair es	87 teachers in public Lebanese university, 57 teachers in public Saudi University and 109 teachers in private universities in Lebanon	Perceived ease of use, affective, age, extent of using technology and intention to use	Findings showed that age, perceived ease of use and affective were found not significant. The availability of computer and Internet access at home was significant factor determining intention to use WebCT. Overall, university culture background remains important in determining teachers' usage of WebCT.
Abdalla (2007)	Evaluating e- Blackboard system employing TAM framework	UAE	E-blackboard system	Questionnair es	518 UAEU undergraduat e students	Perceived ease of use, perceived usefulness, students'	Findings revealed that perceived usefulness and perceived ease of use positively influences students' attitudes towards the system, which in turn determines technology's

						attitude and students'	effectiveness.
						behaviour	
Abbad, Morris and Al-Ayyoub (2008)	Investigated the main factors influencing students' adoption of e-learning in Jordanian universities.	Jordan	E-learning	Questionnair es	Undergraduat e students	Subjective norm, Internet experience, technical support, self- efficacy, and system interactivity	The research model explained 75% of the variance in students' intention to use the e-learning system. The tested model confirms the effect of self-efficacy on perceived ease of use, confirms the influence of perceived ease of use, perceived usefulness, subjective norm, Internet experience, self- efficacy, system interactivity, and technical support on students'
Al-Ammari and Hamad (2008)	Investigated factors affecting the acceptance and use of an e-learning system at the University of Bahrain.	Kingdo m of Bahrain	E-learning	Questionnair es	155 undergraduat e students	Perceived usefulness, perceived ease of use, computer self-efficacy, content quality, subjective norms and some cultural factors	Perceived ease of use and perceived usefulness were significantly correlated with the behavioural intention to use the e-learning system. Through perceived usefulness and perceived ease of use, content quality and computer self-efficacy had a positive indirect effect on the behavioural intention to use the e-learning system
Al-Gahtani (2008)	Investigated the applicability of the TAM model in the Arab culture	Saudi Arabia	Desktop computer applications	Questionnair es	722 workers	Perceived usefulness, perceived ease of use, attitude, age,	TAM held well in the Saudi setting, and that the research variables explained about 51% of the variance in intention to use. Gender and educational level moderated the

						gender and educational level	influence of perceived ease of use on attitudes whereas age moderated the influences of perceived usefulness and perceived ease of use on attitudes.
Kamhawi (2008)	Investigated the main factors that influence managers' acceptance of business process reengineering (BPR).	Kingdo m of Bahrain	Business Process Reengineerin g (BPR)	Questionnair es	104 managers from 14 different big Bahraini businesses	Perceived usefulness, behavioural intention, perceived ease of use, individual differences (demographic differences, cognitive style), BPR beliefs, organizational capabilities (project management, cross functional coordination, need for change, resources availability) and competitive pressures	Perceived usefulness and perceived ease of use are significant determinants of intention to use BPR which account for 61.6% of total variance. Project management and need for change variables are significant determinants of perceived usefulness whereas education, cognitive style, BPR beliefs, project management, need for change, and competitive pressures have significant effect on perceived ease of use.

Abbad, Morris & de Nahlik (2009)	Identified the main factors that affect students' adoption of an e-learning system.	Jordan	e-learning	Questionnair es	460 undergraduat e students	Perceived usefulness, perceived ease of use, subjective norms, Internet experience, system interactivity, self-efficacy and technical support	Students who use Internet frequently are more willing to use e-learning system. Overall, the research model explained 75% of the variability in Intention to use the system. Technical support has a direct effect on perceived usefulness and indirect effect on intention to use the system. Self- efficacy is the main determinant of perceived ease of use.
Abbad <i>et al.</i> (2009)	Identified the main factors that affect students' adoption of an e-learning system at the Arab Open University.	Jordan	eLearning system	Questionnair es	470 undergraduat e students	Subjective norms, Internet experience, system interactivity, self-efficacy, technical support, perceived ease of use, perceived usefulness, actual use	The study model explained 75% of the variance in intention to use and 21% of variance in actual use. Perceived usefulness and perceived ease of use partially mediate the relationship between external factors and intention to use. Self- efficacy had the strongest indirect effect upon students' intention to use e-learning system.
Almobarraz and Farag (2009)	Studied the perceptions of the students studying in the graduate program of	Saudi Arabia	e-learning	Questionnair es	13 doctoral students	Perceived usefulness, perceived ease of use and attitude	Students generally have positive attitude towards implementing the e-learning system in higher education. Usefulness is the main factor that motivates students to use

Rouibah and	Libraries and Information Sciences towards e- learning Identified main	Kuwait	Instant	Questionnair	609	Curiosity,	the system.
Hamdy (2009)	factors that influence IM usage and user satisfaction in Kuwait based on theory of flow, innovation diffusion theory and the TAM		Messaging (IM)	es	university students	compatibility, perceived usefulness, perceived ease of use, prior similar experience, usage and user satisfaction	substantial variance in perceived usefulness ( $R^2=46\%$ ), perceived ease of use ( $R^2=40\%$ ), curiosity ( $R^2=40\%$ ), usage magnitude ( $R^2=$ 17%), socialization ( $R^2=25\%$ ) and users' dissatisfaction ( $R^2=14$ ). Compatibility and prior similar experience had a direct effect on perceived ease of use. Compatibility and perceived ease of use had a direct effect on curiosity. Prior similar experience had a negative effect on curiosity. Perceived ease of use and compatibility had a direct effect on perceived usefulness. Curiosity had a strongest direct effect on usage magnitude.
Abbad (2010)	Identified the main factors affect students' intentions to adopt e-learning systems.	Jordan	Moodle- based e- learning management system	Group interviews	52 students at Arab Open University	Perceived ease of use, perceived usefulness, subjective norms, prior Internet experience, system	Self-efficacy is an important determinant of students' adoption of an e-learning system. Findings also show that subjective norms and technical support had an effect on students' intentions.

						interactivity, self-efficacy and technical support	
Ahmed (2010)	Investigated main factors that influenced university students' intention to use hybrid e-learning	United Arab Emirate s	Hybrid e- learning	Questionnair es	900 undergraduat e business students	Instructor characteristic, e-learning information technology infrastructure, organizational and technical support, learner acceptance and usage of hybrid e- learning.	The findings showed that instructor characteristic, IT infrastructure, organizational and technical support was significantly and directly impacted students' acceptance of hybrid e-learning courses. The research model explained 45% of the variance in the use of hybrid e- learning.
Al-Ammary (2010)	Investigate factors affecting the acceptance and use of computer by the elderly people	Kingdo m of Bahrain	Computer	Questionnair es	150 elderly people	Perceived usefulness, perceived ease of use, motivation, education and income, previous experience, computer anxiety, gender and subjective norm.	The findings confirmed the effect of perceived usefulness, perceived ease of use and subjective norm on behavioural intention. Previous experience, motivation, and computer anxiety are the most significant factors influenced acceptance and use of computer by the elderly people. Overall, the research model explained 63% of the variance in intention to use computer.

Al-hawari and Mouakket (2010)	Highlight the significance of TAM factors and some external factors on students' satisfaction and retention within the use of blackboard system context	United Arab Emirate s	Blackboard system	Questionnair es (paper)	340 undergraduat e university students	Perceived usefulness, perceived ease of use, enjoyment, design features, e- satisfaction and e- retention	Perceived usefulness has a direct and positive relationship with students' e-satisfaction and e- retention while perceived ease of use has only a direct relationship with students' e-retention. Design features and enjoyment have only a significant relationship with students' e-satisfaction. Overall, the proposed model explained 69% of the variance in e-retention.
Mouakket (2010)	Investigated the impact of computer self-efficacy and ERP systems design features on the utilization of ERP systems.	United Arab Emirate s	Enterprise Recourse Planning (ERP)	Questionnair es (paper)	344 employees	Perceived ease of use, perceived usefulness, computer self-efficacy and ERP systems design features	Findings revealed that employees' utilization of ERP systems influenced by both perceived ease of use and perceived usefulness. Computer self-efficacy positively and directly affects perceived ease of use, but has no effect on perceived usefulness. ERP design features have great impact on perceived usefulness and perceived ease of use, which in turn influence the utilization of the system.
Alenezi, Abdul Karim & Veloo (2010)	Investigated the role of enjoyment, computer anxiety, computer self- efficacy and Internet experience in influencing the	Saudi Arabia	e-learning	Questionnair es (paper)	408 undergraduat e students	Enjoyment, computer anxiety, perceived usefulness, perceived ease of use,	Results indicated that enjoyment, computer anxiety and computer self-efficacy were significantly influence students' intention to use e-learning.

computer self
efficacy,
internet
experience,
attitude and
behavioural
intention
## Appendix 7 Poster Competition

