Factors That Influence Saudi Secondary Teachers' Acceptance and Use of E-Learning Technologies

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A thesis submitted in partial fulfilment of the requirements of the University of Brighton for the degree of Doctor of Philosophy

2018

Declaration

I declare that the research contained in this thesis, unless otherwise formally indicated within the text, is the original work of the author. The thesis has not been previously submitted to this or any other university for a degree, and does not incorporate any material already submitted for a degree.

Signed

Dated

Acknowledgements

In the name of Allah, the Most Gracious, the Most Merciful

All praise due to Allah alone, I praise Him, seek His help and His forgiveness. I testify that there is no god but Allah and that Mohammed (Peace be upon him) is his messenger. Completing my PhD has been a period of intense learning for me, not only in the subject area, but also on a personal level. Writing this thesis has had a big impact on me and I am proud to have overcome the difficulties caused by my poor health and disabilities. I hope this will serve to inspire others with similar conditions to know that disability is no barrier to academic or other achievements. I would like to thank the people who have supported and helped me so much throughout this period.

To my Supervisors Dr Deshinder Gill and Dr Sue Greener for their academic support, encouragement, guidance and honest advice that enabled me to achieve a worthwhile outcome throughout my doctoral studies, their efforts are highly appreciated. Thank you Deshinder for keeping me so focussed and helping me with all the practical arrangements that this study entailed, and thank you Sue, for your invaluable comments and suggestions which gave me so much food for thought. My thanks also extend to the staff at the Doctoral School for all their support.

I want to thank my friend Maria for her support, and to everyone who participated in my study as without them this research would not have been possible.

To my family, I would like to acknowledge my first and most enduring teachers, my parents who always remembered me in their prayers and asked Allah to help me. Also to my brothers and sisters (Ahmed, Layla, Azizah, Ali, and Hanan), especially to Engineer Ali who helped me so much; thank you for your love and encouragement.

My deepest love and appreciation go to my beautiful wife Shagra and my lovely children (Alaa, Jassar, Abdullah, Linda) for their love, and patience and continued support throughout my studies.

Finally, to a former teacher and my aunt who passed away during this period and who I wish I could have thanked in person.

Abstract

As in many developing countries, the Saudi government is seeking to introduce modern technology into its educational system. However, digital technologies are not fully accepted and used in Saudi secondary schools, and this thesis was undertaken to understand why this is the case and to recommend more effective strategies to assist teachers to effectively use e-learning technologies and resources. The Unified Theory of Acceptance and Use of Technology (UTAUT) model has been widely used in the field of Information Systems to explain technology acceptance and use. However, studies that use the UTAUT to test technology acceptance in the field of learning have not fully explored developing countries, as most studies have been conducted in Europe and the USA. Furthermore, its use has been relatively limited in the field of education; and further exploration in this context would raise understanding of the value of the UTAUT theory. A proposed revised model with the additional factors of teachers' educational experience, education policy, attitudes towards using technology and teacher anxiety was designed for the Saudi secondary context to support fuller analysis of the acceptance and use of e-learning technologies by teachers; and to include their perceptions and practical and affective experiences.

The study uses mixed methods to investigate e-learning technology acceptance in secondary schools in a regional Saudi context characterized by remote mountainous areas, rural villages and urban areas. An online survey was conducted among 347 Saudi secondary school teachers in the Jazan area of Saudi Arabia, and subsequent interviews focused on areas highlighted by the results of the survey. The results revealed that performance and effort expectancy, attitudes, and education policy have positive effects on teachers' intention to incorporate e-learning technologies and that anxiety has a significant negative effect. These behavioural intentions, facilitating conditions and teachers' educational experience have positive effects on the actual use of e-learning technologies. The study also clarifies the state of e-learning in Saudi secondary schools and the role played by demographic variables, the school environment and teachers' digital literacy.

The study outcomes will both illuminate regional policy issues in e-learning technologies and advance the debate on conceptual understanding of technology acceptance in education by refining the UTAUT model to suit the context; leading to a deeper understanding of the factors which are barriers to accessing the advantages of e-learning technologies in the context of a developing country.

Abbreviations

ACTU- Attitudes towards Computer Use

ANOVA-One Way Analysis of Variance

AR – Augmented Reality

ATT- Teachers' Attitudes towards Using Technology

AX- Teacher Anxiety

BI-Behavioural Intention

CMS – Course Management System

CSF-Critical Success Factors

DLE- Digital Learning Environment

EE-Effort Expectancy

EFA-Exploratory Factor Analysis

EP-Education Policy

FC- Facilitating Conditions

ICT- Information and Communication Technology

IDT- Innovation Diffusion Theory

iEN- National Education Portal

IS-Information Systems

IT- Information Technology

ITU-Intention to Use

KFUPM- King Fahd University of Petroleum and Minerals

KSA-Kingdom of Saudi Arabia

LAN- Local Area Network

LRC- Learning Resource Centre

LTO-Long-Term Orientation

MOE- Ministry of Education

MOHE- Ministry of Higher Education

MM- Motivational Model

MPCU- Model of PC Utilisation

PC- Personal Computer

PE- Performance Expectancy

PEEC- Public Education Evaluation Committee

PEU- Perceived Ease of Use

PU- Perceived Usefulness

RSS- Rich Site Summary

SCT- Social Cognitive Theory

SI-Social Influence

SPSS- Statistical Package for the Social Sciences

STO- Short-Term Orientation

TAM- Technology Acceptance Model

TEE-Teachers' Educational Experience

TBP-Theory of Planned Behaviour

TCT- Teacher Competency Test

TPCK – Technological/ Pedagogical/Content/Knowledge Model

TRA- Theory of Reasoned Action

UB-Use Behaviour

UTAUT- Unified Theory of Acceptance and Use of Technology

Published Work

I have published the following papers:

Zalah, I. (2016) Acceptance and Use of e-Learning Technologies by Saudi Secondary Teachers, European Conference on e-Learning, Reading: 758-764. Academic Conferences International Limited (Oct)

Zalah, I, Greener, S & Gill, D (2017) Factors that Influence Saudi Secondary Teachers' Acceptance of e-Learning Technologies, 9th International Conference on Education and New Learning technologies. Barcelona. Spain (July): 5749-5759

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Chapter 1 Introduction

The rapid growth of information technology and the increasing dependence on it in every area of life has meant that it has become ever more important for citizens to acquire competence in this area if they are to fully participate in their society. It could therefore be argued that the right to information and education should include the right to be educated in the effective use of information technologies (Rendulić, 2013). Still today, populations are distinguished by dramatic economic, cultural, educational, and social differences; the circumstances of people are often based on place of birth and social background. It is estimated that over 800 million individuals still lack the basic skills of literacy, with fewer than 80% of 15-24 year olds in 32 countries being literate, whilst the usage of information and communication technologies is escalating. In spite of the enormous variety in livelihoods and environments, a unifying and unprecedented international media culture may contribute towards improving those difficulties and acts as a powerful agent of socialization along with the more traditional ones of school and family (World Youth Report, 2015).

Recently, the updating and sharing of knowledge have speeded up considerably because of the rapid development in information technology. The phenomenon of e-learning emerged in order to meet social development needs and the interests of the people, and involves the digital resources and technology that exist in the Internet. E–learning is a broad group of processes and applications that uses every obtainable electronic medium in order to deliver vocational training and education. The concept covers the use of mobile technologies, web-based learning and computer–based learning; and it includes digital collaboration and virtual classrooms. The demand for e-learning has grown and is expected to expand further as users increasingly come to rely on these technologies and the efficiency they provide (Nath et al, 2012).

As digital technology affords us the rapid transfer of information in real time, there is therefore a need to look at how information technology has transformed the education sector through the Internet. It is of importance to do this for secondary education as it is generally mandatory for all sections of the population as well as being the arena in which students learn skills that are to stand them in good stead for gaining employment or progressing to higher education. Although, digital literacy should ideally start at primary school, in Saudi Arabia, the focus is on providing digital resources at secondary level, for instance the Tatweer project provided equipment and resources to secondary schools as well as computer labs being provided (Ala-Mutka *et al.,* 2008). If secondary school teachers are to succeed in providing their students with an education that serves them well in modern society, then e-learning can be regarded as an important educational opportunity. Recent accomplishments in the field of communication technologies and computing have provided chances for learning that depend on the effective use of electronic methods. Using the Internet and several multimedia technologies in learning is considered a significant means to develop quality, efficiency, and accessibility of learning through providing easy access to information services and resources, in addition to distant collaboration and exchanges (Okiki, 2012). Online teaching began in the 1980s; and depended on the computer conferencing system invented by Murray Tur off. Computer-mediated communication (CMC) or computer conferencing allows asynchronous communication among users, who have the ability to communicate at any time, since messages from every participant are ordered, stored, and accessible on command. The New Jersey Institute of Technology in the USA was the first organization to provide teaching through computer conferencing, in what is called a Virtual Classroom; and a number of courses were provided partially or fully online (Ehrmann, 2005). Moreover, the British Open University was one of the first organizations to use online learning for off-campus students; providing the module *An Introduction to Information Technology: Social and Technological Issues* for more than 1500 students. A major breakthrough for e-learning appeared with the development of the World Wide Web, and the ensuing rapid expansion of the Internet into many universities, offices, and homes in developed countries (Bates, 2008).

Developing countries are, in their turn, seeking to introduce the new technologies into their education systems; and Saudi Arabia is no exception. Education has become essential not only for making Saudi individuals knowledgeable and literate, but also it is significant for the improvement of Saudi society; and considered by the government as a method of empowering the people. This education has included the skills to use the new technologies which have revolutionized every area of life, such as transportation, manufacturing, health services, housing, agriculture and education itself (Bhatia, 2011).

E-learning has allowed student populations to include more diverse groups; as technological innovation allows for more flexible educational delivery, students who are house-bound or in remote areas can access course materials. Nevertheless, there are several challenges arising from attempts to implement instructional technologies into education; for example, the infrastructure of that technology, users' competency, technology satisfaction, and faculty effort. There are several reasons that contribute to the failure of many online educational organizations such as the absence of good business strategy, competition, poor decisions, and the cost of the technology. Saadé (2003) points out that if e-learning universities are to be successful, they need to meet the challenges involved in getting their courses accepted and delivering them effectively.

Experience has shown that it is not enough to simply attempt to duplicate the classroom experience online; as this does not meet all student needs and can result in failure. The persistent frustration of university students in web-based education is a significant challenge in the field of online learning, and accounts in part for the research done in this field (Lynch & Lynch, 2003). With increasing dependence on the new technologies in the learning environment, defining the decisive factors in the acceptance and use of these technologies has become a significant issue (Hara & Kling, 2001). Understanding the intentions of teachers and the factors that affect their beliefs about e-learning can aid academic managers and administrators to generate instruments for encouraging and enabling teachers to become more accepting and adept in the e-learning environment. Consequently, it is essential to conduct research into the attitudes, perception, and the intention of users to use e-learning (Koohang& Durante, 2003).

1.1 The definition of e-learning

The origin of the term 'e-learning' is not entirely clear; but it is thought that the term originated in the 1980s at the same time as the development of online learning. There are several definitions of e-learning; however, all state that it is obtainable through the use of technological tools, which are web-distributed, web-based or web-capable. The concept of e-learning not only includes instructional means and content that are delivered by an Intranet, Internet, and CD-ROM, but also involves interactive TV, satellite broadcast, video and audio. However, even though technological features are involved in the term's definition, it can be seen that simply stating the technology utilized is inadequate as a descriptor. E-learning indicates some alteration in the experiences of people and it is believed that there is a need for including various levels of interactivity to make the definition actually pertinent in depicting the experience of learning (Moore *et al*, 2011). E-learning is generally indicated to be the international usage of information and communication technologies in the processes of learning and teaching. Several terms are utilized to depict this mode of learning and teaching; they involve web-based and network learning, distributed learning, virtual learning, and online learning. Basically, each of these terms refers to the processes of education that depend on the usage of information and communication technology in order to mediate the activities of synchronous or asynchronous learning and teaching. E-learning would include every educational activity that is performed by groups or individuals working offline or online, asynchronously or synchronously via standalone or networked computers and every electronic tool (Naidu, 2003). These different modalities or types of e-learning activity are illustrated in figure 1.1:

Individualized self-paced e-learning *online*	Individualized self-paced e-learning *offline*
Group-based e-learning *synchronously*	Group-based e-learning *asynchronously*

Figure 1.1 E-learning modalities (Naidu, 2003: 11)

Furthermore, e-learning is the use of internet technologies for providing solutions that tend to improve performance and knowledge. This definition has enlarged to involve internet and wireless technologies, in which these technologies are working with each other to concentrate on the processes of learning. So, the environment of e-learning has not only been specified as providing educational units to students, but also has a major aim to improve the effectiveness and quality of conventional teaching (Colace *et al*, 2014). This discussion of the practices and definition of e-learning concentrates on the connection between learning and teaching and information and communication technology. Certainly, e-learning contains distance education and educational technology which may contribute positively to the usage of information and communication technology for didactic purposes. However, distance education and educational technology alone cannot be equated to e-learning (Sangrà et al, 2012).

In the context of Saudi secondary education, e-learning technology refers to all the digital tools used to deliver lessons, such as Smart boards, projectors and computers as well as the digital resources such as videos, Internet resources or materials provided by the Ministry of Education via a Portal as well as the infrastructure that it depends on. E-learning is thus, the learning that is predicated on this e-learning technology.

1.1.1 E-learning Technology platforms and tools

Several e-learning tools and platforms that have the ability to present education and training to a great number of students with different educational levels and cultural backgrounds are now available in educational institutions. Nevertheless, e-learning has the possibility of failing in the processes of education through a miscalculation of what it is able to achieve; and the literature has revealed many limitations to such systems. However, there are also considerable advantages to e-learning systems, such as resources being instantly available to students, reducing the use of paper, and enabling the communication between students and lecturers (Aljawarneh *et al*, 2011).

Through the use of a database and content management system, using an e-learning system becomes easy for both instructors and students; and, in addition, they are highly reliable (Epignosis, 2015). Moreover, by using providers of the local internet services, the students and teachers will be close to the processes of e-learning, since they can communicate with each other at any time (Bates, 2008).

Moodle is an example of a VLE based on the TPCK (technological/ pedagogical/ content knowledge) model by Kotzer & Elran (2012), in which the three features of the knowledge of instructors, namely technological, pedagogical and content knowledge are converted into the aspects of design; as shown in figure 1.2. The technological design indicates the tools of technology employed and the environment they are modified for to suit particular demands. The content design indicates how it is integrated with the tools of technology and it involves the consideration of task design. Finally, the pedagogical design refers to the various users' interrelations; for example, students and teachers; in addition to the associated factors such as school environment (Kotzer & Elran, 2012).

The model below demonstrates the three aspects of educational technologies which use new technology to deliver educational content and allow communication between the teachers and their students as well as between students.

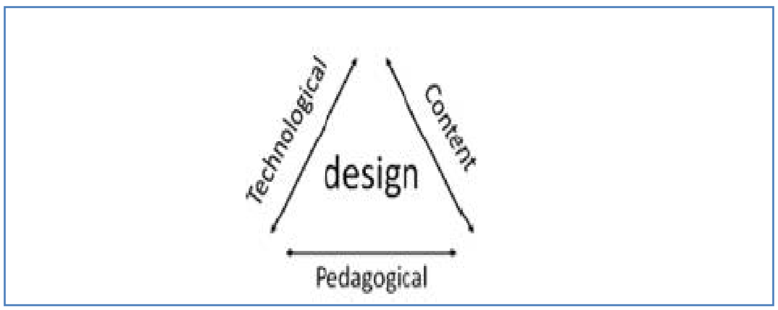


Figure 1.2 Design model (Kotzer & Elran 2012:124)

The benefits of such systems are also represented by its ability to use a rich combination of multimedia containing music, sound, images, computer software, and video. Moreover, they are able to save authentication documents and protect copyright; as well as being able to communicate with students at any time and any place all over the world (Hopkins, 2010)

The tools of social media have spread extensively; and many students utilize them regularly. These tools are represented in Twitter, blogs, LinkedIn, bulletin boards, YouTube, Wiki, and Facebook among others. These recent technologies are an attempt to accommodate the needs of Internet users, particularly the younger generations. There are a number of reasons for using social media, including relationship building, speed of feedback, direction communication, and social engagement (Liu, 2010). Many students have now spent their whole lives using and surrounded by cell phones, video cams, digital players and music, videogames, computers, and the other tools and toys of the digital era (Abdoli-sejzi *et. al.,* 2015). The tools of social media may be considered magnificent communication tools; and if utilized intelligently and incorporated into the processes of education, they may enhance students' technological skills for the purpose of learning, reduce organizations' costs and minimize the load on teachers for the technical support of students (Jovanovic & Chiong, 2012). Social networking sites aid in preserving relationships as individuals shift across various offline communities. There may well be issues about controlling these interactions, but in the environment of formal education, where social networks are intentionally utilized to support classroom teaching and learning it may be much easier to control this (Pimmer *et al*, 2012).

Web 3.0 is known as the semantic or intelligent web, and includes technologies such as augmented reality, 3D visualization, cloud computing, linked data, big data, and can turn the passive learner into an active one in the processes of learning. For instance, its machine readable technologies are designed to allow the user to access a more efficient way of getting information (Greener, 2015). Web 3.0 predication differs because of the disparity that will structure it. Web 3.0 is still in its early years; however, there are indicators that demonstrate that it will involve the technologies illustrated in figure 1.3. The development of the World Wide Web has created a huge virtual library of information; and learning to use and evaluate this information has become a part of modern education. E-learning 1.0 was interested in providing information to users; e-learning 2.0 is concerned with both offering information and allowing for interaction abilities and E-learning 3.0 has the properties of a rich 3D virtual learning environment as well as those of e-learning 1.0, and e-learning 2.0 (Dominic *et al*, 2014).

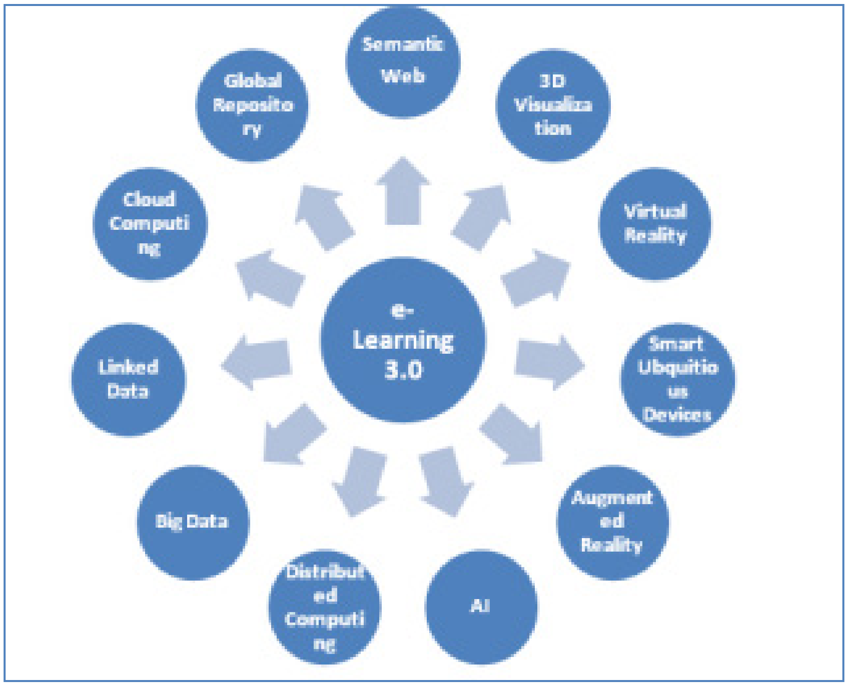


Figure 1.3 Technologies in E-learning 3.0 (Dominic et al, 2014)

In conclusion, the platforms and tools of e-learning are themselves considered as aiding in the processes of accepting technology. There are different tools of e-learning, and the usage of these different tools is based on the desires of users as well as their educational level.

1.1.2 E-learning (benefits and challenges)

It is important to mention in brief the main benefits of e-learning in order to present a context intended to illustrate why e-learning is vital for the improvement of learning processes, as well as the reasons why e-learning offers better-organized learning environments than those of conventional learning. E-learning quickly became acceptable in the processes of education since it offered many benefits to the major stakeholders in the environment of learning, that is to say teachers and students (Al-Harbi, 2010). These benefits involve better accessibility to information, improved content delivery, content standardization, personalized instruction, on-demand availability, accountability, convenience, interactivity, self-pacing, and confidence. Moreover, e-learning has the ability to deliver content constantly, reduces cost, and can be easily tracked (Almarabeh & Mohammad, 2013). The benefits of e-learning can be summarized as follows.

1.1.3 Presenting flexibility in the processes of learning delivery

Flexibility is considered one of the major advantages of e-learning. However, technology is one of several disruptive effects in education these days, since individuals live in a period where the exponential growth and data wealth is demanding institutions to alter learning and teaching. Moreover, there is a demand for preparing students for enhancing competition in the place of work. The Internet can thus be said to transform education from a knowledge-transfer model into an engaging, self-directed, active, and collaborative model that aids students improve their knowledge and enhances the skills demanded to succeed in society. E-learning removes the barriers of distance and time, making the processes of learning universal, and providing opportunities for individuals, countries, and companies; all of which can be accomplished by concentrating on learning, regardless of geographical location (Asiri *et al*, 2012). Dargham *et al,* (2012), suggest that the flexibility of e-learning and its ability to deliver teaching through virtual classrooms and distance learning packages make it particularly suitable for lifelong learning.

1.1.4 Enabling Communication and Interaction

E-learning has the ability to improve the patterns of conventional communication among students and between the students and teachers through generating a new environment. Moreover the relationship between teachers and students is not one-way; but rather about generating more interaction and collaboration between students as well as between students and teachers to develop their involvement and participation in the classroom. In addition, e-learning has the ability to be more elastic and frequently contains several technologies such as online discussion, video- conferencing, and audio-chatting that provide learners with many chances to interact with other students and teachers flexibly and efficiently (Al-Adwan & Smedley, 2012). The roles of students and teachers are transforming under the effect of this recent learning environment. Dargham *et al.* (2012) propose that students play a significant role in the environments of collaborative learning, since they participate in the discussions within groups as well as among the entire class, exchange their information and their opinions with the other students, and there is individual and shared responsibility for accomplishment in the processes of learning. Teachers and students are provided with chances to interact, collaborate, and use educational technologies. Furthermore, teachers play an important role in the processes of e-learning; not least in the process of course design which they may do individually or as collaborators, working with colleagues in order to generate various activities. In addition to developing the processes of instruction, they share information with students to accomplish the same purpose, which further develops the participation of students in the education process. Al-Homod & Shafi (2013) suggest that using technology to facilitate communication with and among students is thus an important role for teachers in both synchronous and asynchronous learning.

1.1.5 Delivering efficient learning

E-learning has the ability to generate meaningful and successful environments that inspire learners and provide influential tools for communication and interaction. Courses of e-learning utilizing stimulations generated by software; for example, Shockwave and Flash, have the ability to support the cognitive work of exploring concepts and ideas, and manipulating models (Khan, 2005). Furthermore, using the ample resources of multimedia improves the understanding of learners as well as enriching their experiences of education, such as in the use of augmented reality which is now being used in school field trips. For example, augmented reality (AR) is increasingly being used in school field trips**;** as an AR system allows for either the combining or the supplementing of real world objects with superimposed information or virtual objects (Bacca *et al.,* 2014).In addition, e-learning permits learners to organize knowledge and content to suit their learning styles and needs, which enhances the quality of their learning experience (Al-Harbi, 2010).

1.1.6 The challenges of e-learning

Although e-learning offers many benefits and can improve the quality of education and enhance the learning environments, there are a number of challenges that limit the utilization and exploration of these opportunities (Andersson, 2008). For instance, Kwofie & Henten (2011) indicated that e-learning demands academic and technical confidence and an ability to prioritise can be costly, requires motivation, social support, competency, technical skill, and a constant mechanical infrastructure. It therefore follows that e-learning involves the issues of accessibility, infrastructure of information and communication technology, efficiency and quality of e-learning, pedagogical consideration, and the perceived usefulness of the technology (Mapuva, 2009). Further factors involved in the implementation of e-learning are the motivation and the characteristics of learners, the features of teachers, the environment of e-learning, the quality of service and institution, the quality of system and infrastructure, and the quality of information and courses (Xaymoungkhoun *et al.* 2012).

There are a number of challenges that face the project and initiatives of e-learning, and these challenges may be classified as ethical, pedagogical, managerial, environmental, organizational, institutional, technological, and individual (human) challenges (Khan, 2005). Alkharang & Ghinea (2013) grouped the challenges of e-learning into three categories; namely, language issues, technical issues (data confidentiality, privacy, network and computer security, the infrastructure of technology, internet speed, and bandwidth), and management issues (the support and awareness of management). Abdelraheem (2006) suggested that the challenges that face e-learning in Arab countries are the infrastructure of information and communication technology, leadership, culture, the strategies of e-learning, the issues of copyright, teachers and learners, and local content. Al-Malki & Williams (2012) demonstrated that both teachers and students should be involved in the initiatives of e-learning in order to be successful. Andersson (2008) indicated that there are several challenges that face e-learning in developing countries and these can be classified as society, support, course, cost, institutions, technology, teacher, and students. Consequently, there is a necessity to examine these various issues in order to overcome the challenges posed by the implementation of e-learning. Nonetheless, to accomplish the goals and reap the benefits of e-learning initiatives it is vital to examine the factors that contribute positively to the success of e-learning, enhance the efficiency of e-learning within the setting of education and ultimately develop the educational quality of e-learning (Lee & Ng, 2009).

It can be seen from the above that there are several advantages to e-learning. In contrast, there are a number of challenges and these challenges hinder the acceptance of e-learning, and there need to be clear plans for dealing with these challenges.

1.2 Critical factors affecting e-learning

Critical success factors (CSFs) identify the major areas of performance, which are significant for institutions to achieve their targets. Leaders must absolutely understand and consider these major areas when setting goals and directing the prepared tasks and activities which are significant for achieving these goals. Thus, CSFs have the ability to provide a widespread direction for the whole organization to excel in its work. Consequently, with any initiative or activities that the institution undertakes it has to constantly make certain of an elevated performance in these major areas; or else, the institution may perhaps not have the ability to accomplish its goals and be unsuccessful in fulfilling its responsibilities (Caralli, 2004).

Jafari *et al.* (2006) defined CSFs as a structure for intentional planning and directing those responsible for e-learning by specifying those fundamentals that basically aid in accomplishing the objectives and goals successfully. Frimpon (2012) proposed CSFs as variables which are essential to success at the implementation stage; and suggested that institutions have to handle these factors very well to achieve successful implementation. From what is mentioned above, it is clear that CSFs are the features and variables that have to carefully be taken into account throughout the phase of planning to ensure the processes of goals accomplishment in e-learning. In order for this to be done effectively, it is also important to know by what means decision-makers can properly identify the factors and variables which are essential to successful implementation and to take into consideration the specific context in which implementation is taking place.

According to Musa & Othman (2012), CSFs in e- learning may be classified into many dimensions; for example, student characteristics, instructor characteristics, institutional support, ICT, and others. CSFs are the essential areas that every institution should consider in order to be successful. Selim (2007) identified the CSFs of e-learning as institutional support, information and communication technology, teachers, and students. Likewise, Frimpon (2012) indicated a number of CSFs that affect the deployment of e-learning; namely, the role of technology, institution role, faculty role, and student role. Conversely, Sun *et al.* (2008) focused on technical dimensions and factors as necessities for the success of e-learning; namely, environment, design and technology as well as course, instructor, and learner.

From the above, it can be said that CSFs are very important for accomplishing the aims and objectives of education. Thus, these factors have to be taken into account by stakeholders in order to get the highest benefit. However, the relative importance of factors such as the role of the faculty or student attitudes, depend on what is being focused on. When considering teachers' technology use and acceptance within a specific context such as Saudi secondary education, then it will be essential to identify those critical success factors that are most relevant.

1.2.1 Technology

The efficiencies of information technology and the quality of technology must be considered by organizations in order to accomplish successful implementation of e-learning (Malik, 2009). However, simply being provided with technology may not be enough; access to the new technologies, skills in using these technologies for specific pedagogical aims and attitudes to these new technologies are also important.

1.2.2 Student Characteristics

E-learning is very much connected with the usage of technology to provide flexibility and to enable and deliver communication and interaction between teachers and students as well as delivering efficient learning (Al-Harbi, 2010). Consequently, the implementation, growth and progress of e-learning will largely depend on the acceptance of this type of learning by students (Al-Fadhli, 2008). Selim (2007) also notes that student characteristics are very significant for the acceptance of e-learning tools and technologies and can radically determine whether e-learning is successfully implemented. Students' digital literacy skills are significant factors that affect the success of e-learning, as are their attitudes and motivation for using the technologies of e-learning. This refers to students in general; however, within the secondary context it is arguably the teacher who determines if and how e-learning technologies are deployed within the classroom and who also has the responsibility of showing students how to make use of them; for this reason, they are the focus of this study.

1.2.3 Teacher Characteristics

In the environment of e-learning, it is very important that teachers obtain a new group of roles and skills because of the newest technologies and the speed of their improvement and willingness to adopt these tools determines effectiveness. The skills they need amount to what has been termed ‘digital literacy’ and means more than just being able to use computers, as it involves skills such as being able to effectively use and also produce resources, retrieve and evaluate information from a wide range of sources and communicate with others to share information (UNESCO, 2011). Another teacher characteristic which has a bearing on the successful implementation of e-learning is teachers’ ability to communicate with students in an enthusiastic and friendly way and thus to generate an optimistic e-learning environment. This demonstrates that there is a strong relationship between the satisfaction of students and the performance of teachers and the interaction of students and teachers in the environment of distance learning (Ali & Ahmad, 2011).

1.2.4 Teachers' Educational Experience

According to Etherington (2008), the educational experiences of teachers are significant in the processes of e-learning at every educational level. At the level of primary education, the role of teachers appears through illustrating the significance of e-learning as an important contender in teaching young children. The experiences of teachers can positively affect young children by demonstrating how interactions between teachers and pupils contribute to learning and the role of sharing learning experiences with others. Bjekic et al. (2010), consider that secondary educational experiences are significant, as it is through this experience that teachers will have a group of abilities, skills, and knowledge, and motivation for the efficient realization of the activities of professional teaching. Thus, if teachers had a positive experience of educational technologies in their own education, this will arguably act as a model for their later behaviour as teachers and affect their perception of e-learning as part of their own pedagogy.

Nadelson *et al*. (2013) surveyed 52 pre-service teachers in the US to explore their intention to use Information and Communication Technology (ICT) in their teaching and how this related to their experience, confidence and perceptions of ICT as an educational tool. As expected, high levels of experience generally resulted in high levels of confidence and it was noted that confidence was boosted by experience of technologies (such as Smart phones) outside the context of education. However, this knowledge and confidence did not always result in teachers intending to use these technologies in their teaching if, for example they had not been specifically shown how to use Smart phones for teaching. The authors conclude:

"If we want teachers to use new technologies for instruction they will likely need to explicitly experience learning and teaching with the technology, which may need to be an integral part of their preparation programs or ongoing teacher professional development programs" (2013, p. 87).

There are many factors which influence the likelihood of teachers' integration of technologies into their practice, but the way that teachers were themselves taught must be an important factor (Deemer 2004; Miranda & Russell, 2011). Teachers' lack of confidence may not be so much due to a lack of knowledge about specific technologies, but about not having been given the opportunity to experience those technologies in the teaching of specific subject matter. Teacher training may not be doing this sufficiently well (Birch et al, 2008; Banas, 2010). Simply using a technology in everyday life is not enough to enable a teacher to know how to use it effectively in the classroom (Otero et al, 2005; Dexter et al, 2006).

1.2.5 Decision-makers in Education

The decisions taken which affect how e-learning is integrated in the Saudi education system are also crucial success factors. A study which surveyed 266 secondary teachers and interviewed 14 teachers, heads and ICT coordinators in Riyadh, identified that decision-makers in the Saudi government were key to ensuring the success of ICT implementation as they controlled the budget for resources and teacher-training, what this training consisted of and policies about teachers' workload, thus having it in their power to influence teachers' use of ICT (Oyaid, 2009)

Similarly, research into the attitudes and experiences of Saudi pre-service teachers (Robertson & Al-Zahrani, 2012), revealed the importance of decision-makers. Although education policy is strongly in favour of e-learning there is a disconnect between this proclaimed attitude and what actually happens in educational establishments, and the authors suggested that decision-makers needed to listen to what teachers were saying about their needs and concerns, and that new initiatives were required to address these and provide adequate training and support (ibid)

1.3 E-learning in Saudi Arabia

The population of Saudi Arabia is growing rapidly, and the government has agreed that a university or college education should be available to every citizen. Thus the Saudi government has made several attempts to improve the system of education in the last five years through building a greater number of universities and providing improvement initiatives. Consequently, the Ministry of Higher Education (MOHE) which creates, enforces and regulates the system of Higher Education has stipulated that e-learning is important for Saudi students. This especially so for those who are concerned in getting degrees from reputable international universities, as well as for those who do not have the ability to travel to a foreign country because of family, employment and financial obligations. For this reason, the Ministry of Education has attempted to introduce e-learning systems in line with 21st century developments (Alshwaier *et al.*, 2012).

Recently, distance learning or e-learning in Saudi Arabia has been much discussed; particularly, among young females who face several challenges in the process of continuing their education. At present, concentration on education in the Kingdom of Saudi Arabia is unprecedentedly high, particularly because of the government's higher education scholarship programme. Thus, the traditional methods of teaching and learning are considered not efficient for the society of Saudi. Particular groups of individuals, such as those who live away from university campuses, disabled and elderly people, employees with full time jobs, and a great number of females might consider it appropriate for continuing their education through e-learning which allows for distance learning rather than the traditional face-to-face mode. Definitely, for these classes of individuals, distance learning and e-learning are considered one of the affordable and effective methods for getting their education (Yamin, 2013). Many countries in the Middle East have provided and successfully run e-learning in the organization of business and the institutions of education. The education system of Saudi Arabia is under pressure to provide extra educational opportunities to improve the rate of literacy in the population. The system of practical e-learning presents an exceptional cost-effective resolution to these challenges. The Saudi Arabian government has launched a number of initiatives for the adoption and acceptance of e-learning. However, distance learning is still not well-accepted in Saudi Arabia. (Chanchary & Islam, 2011)

The Saudi Arabian government has realized that the technologies of information and communication in the Institutions of Higher Education would be a beneficial addition to the current system; and considers e-learning appropriate for Saudi Arabia. The Ministry of Education also believes this would be of benefit in secondary education. Nonetheless, the implementation of an e-learning system faces a number of challenges, and these challenges have to be defined before conducting any kind of investment in such a system (Jabli & Qahmash, 2013). King Abdullah has provided an innovative national plan intended to ease the adoption of information technology in every sector across the country (*ibid*). This plan calls for the implementing of educational distance learning and an e-learning system, intended to make higher education accessible to many individuals at a relatively cheap cost. By introducing an e-learning system, especially in the institutions of higher education, the government is seeking to change the traditional educational system of the Kingdom in order to accommodate recent forms of technologies that are appropriate for an educational system in a modern society (Jabli & Qahmash, 2013). According to Alshwaier *et al*. (2012), e-learning provides an important opportunity for a number of Saudi students who are concerned that they may be unable to access Higher Education and the highly-regarded global universities because of family, employment and financial obligations. E-learning is very successful in developed countries, since it offers students the flexibility and convenience of studying at their own cost, time, and pace. Nevertheless, it has a number of disadvantages; such as the initial high early cost, the constant cost of maintenance, the fact that some students need encouragement i.e. they are not self-motivators and the difficulties in suitably evaluating students' performance.

1.3.1 Previous studies on E-learning in Saudi Arabia

Both the literature and the researcher's experience have provided an insight into the reality and challenges involved in integrating e-learning into the education system of Saudi Arabia; and what steps have been taken by the Saudi government to guide the integration of the new technologies in several areas. The findings from the literature have been synthesized in Table 1.1 which outlines the context, sample, methods used and differences to the current study as well as a brief summary of the main findings. There remain however, gaps in the literature, which this section notes, as these will to some extent inform the nature of the research questions and the framework of the intended study. What little there is on teachers' acceptance and use of e-learning technologies in Saudi secondary and intermediate education is examined and summarised (see Table 1.1). Efforts have been made to update the literature produced in this field, but the list is not exhaustive.

Table 1.1 Use of e-learning Technologies in Saudi Arabia

Author(s)	Context/Sample	Methods	Differences to own study	Findings
Al-Rashed (2002)	652 male and female primary teachers	Survey and interviews	Primary**	Lack of skills, time, resources and training are barriers
BaralabeYushau (2006)	70 male KFUPM students	Survey	HE, single sex, **	E-learning program improves confidence in subject and computer skills.
Almaghlouth (2008)	131 secondary science teachers (male + female)	Survey	Single subject and single method*	Problems with inadequate equipment and limited access
Oyaid, A (2009)	266 Secondary teachers, head and ICT co-ordinator	Survey and 14 interviews	Uses socio-cultural theory rather than technology acceptance model as a framework	Decision-makers' taking teachers' needs into account is key to successful implementation of ICT
Al-Shehri (2010)	30 senior faculty members	Participant observation	HE, small sample,	Challenges to implementation of

Author(s)	Context/Sample	Methods	Differences to own study	Findings
		on two-week course	single method, *	e-learning: lack of vision and clear strategies; level of resources, infrastructure and user skills
Abuzaid (2010)	1 secondary school- 116 students	Survey and interviews	Students not teachers, *	Resources limited, difficulties with access and security
Alenezi *et al.*(2010)	402 university students	Survey	HE, Single method,*	Used TAM and showed that enjoyment, anxiety and self- efficacy were important factors.
Al Sulaimani (2010)	311 intermediate teachers and 6 policy-makers	Survey and interviews	Intermediate *	Lack of effective integration of technology into education; lack of resources and time to practice, ineffective training and women cannot attend external courses
Alwani & Soomro (2010)	176 male and female science teachers (elementary-high school)	Initial focus group and survey	Single subject*	Problems with infrastructure and lack of teacher experience in integrating subject and technology - Education policy needs review
Bingilmas (2010)	241 primary science teachers and 53 supervisors	Initial interviews (18) and survey	Primary*	Use of technology alone is not sufficient; poor training and no understanding of pedagogic use of ICT, lack of technical support and little student-centred learning

Author(s)	Context/Sample	Methods	Differences to own study	Findings
Algahtani (2011)	300 male university students	Survey and focus group	HE, single sex, *	Lack of finance for technical infrastructure and poor English proficiency were main barriers. Also students had positive attitudes but wanted specialist training in using resources
Gawad & Al Masaud (2011)	100 male staff and students at one university	survey	HE, single sex, single method, *	More finance for technical infrastructure and specialized courses on e-learning required.
Alotaibi (2011)	female science teachers	Survey	Single sex, single subject, one method *	Little use of technology and lack of basic skills.
Alkanani (2012)	intermediate male teachers	Survey	Intermediat e level, single sex and method	Inadequate training so teachers resistant to using technologies.
Alsahali (2012)	secondary female geography teachers	Survey	Single sex, subject and method.	Deficient training both in technical skills and pedagogic use of technologies
Almalki & Williams (2012)	Primary schools	Literature review	No empirical data	Lack of infrastructure. Strategies must involve teachers schools and external factors
Seliaman & Turki (2012)	55 male university students	Survey	HE, small sample, single sex, single method	Using TAM to look at acceptance of Tablets. No positive correlation between perceived usefulness and innovativeness

Author(s)	Context/Sample	Methods	Differences to own study	Findings
Alkhalaf *et. al.* (2012)	Faculty members at 2 universities- 30 male 8 female	Survey	HE, single method	Positive attitudes to technology but lack of skills
Robertson, M & Al-Zahrani, A (2012)	325 male pre-service teachers	Survey and 13 interviews	Pre-service and single sex	Disconnect between education policy and actual practice in preparing teachers for e-learning.
Jabli & Qamash (2013)	H.E. Institutions	Literature review	No empirical data	More empirical research required. Essential to understand actual experience of e-learning.
Nassuora (2013)	80 male and female university students	Survey	HE, single method	Using UTAUT for acceptance of m-learning found positive attitudes but lack of knowledge
Al-Mulhim (2013)	135 female primary teachers	Survey and observation of pilot training programme	Primary, single sex	Teachers' needs are an essential focus for successful implementation of e-learning
Hakami (2013)	One Tatweer Project male secondary school-students(231) and teachers (22)	Case study using interviews (4 teachers and 6 students), surveys, class observation and focus group	Single sex, one school.	Limited use of technology, further support and training needed. No Internet access in some teachers' homes. Positive attitudes but anxiety about student misuse, Technical failures and theft of equipment.
Alhareh (2014)	female learners	Literature review	No empirical data	E-learning can empower women as it gives access to resources and H.E.

Author(s)	Context/Sample	Methods	Differences to own study	Findings
Al-hurjan *et al.* (2014)	215 university students (111 female 104 male)	Survey	HE, single method	Using UTAUT explored acceptance of m-learning. Most important factors PE, EE and SI.
Alghamdi (2015)	82 secondary male teachers of Arabic 67 school principals	Survey, interviews and observation	Single subject and single sex	Need for more classroom technology, support from management, training in student-centred teaching and technical support
Gamdi & Samarji (2016)	214 faculty members at 2 universities	Survey	HE, single method	Obstacles: Lack of role models, training, resources technical support, infrastructure, educational design and no clear education policy strategy
Amasha &Alkhalaf (2016)	28 teachers (primary, intermediate and secondary)	Training course and test	Different method, small sample.	Teachers did not attend training through lack of time and workload. Training attend was thought ineffective

(*) Indicates study is over 5 years old (**) indicates study is over 10 years old

As shown in the table above, a number of these studies agreed upon the existence of common factors that prevent an optimal application of e-learning, such as lack of training opportunities, teaching designs, resources, and strategies to guide the educational institutions. It is apparent that most previous studies on e-learning and the use of information and communication technology in the Saudi teaching and learning process have focused on tertiary students and teaching staff. Many researchers are employees of higher education institutions, and those who had the opportunity to continue their higher education outside Saudi Arabia; accordingly, they may have been motivated to conduct research at their employing institutions, in spite of the fact that it is arguably pre-tertiary education, particularly the secondary one, that provides the basis to prepare a generation that is capable of using technology when joining the tertiary institutions. Also, Saudi universities have recently developed their e-learning systems, creating a vital need for studies to measure the effect of e-learning on the higher education institutions.

Many previous studies also confined themselves to the use of technology by males or females only, and only a few studies focused on both male and female users at the same time. This could be attributed to traditions and conventions based on the Islamic religion, which enforces segregation between the two genders at government workplaces and education institutions. Furthermore, many studies focused on technology acceptance by students rather than teachers. However, it is interesting to note that studies generally agreed on factors that can affect students' use of educational technology; often identifying the infrastructure and lack of equipment and tools that support the teaching and learning process, which would be the same for teaching staff.

There is still a shortage of studies on using e-learning, by both teachers and students at pre-tertiary level; and precious few studies that focus on secondary teachers' acceptance and use of e-learning; of these some concentrated on the teaching of a single subject or utilised just one method with which to gather data. This paucity of research at secondary level could be attributed to a lack of researchers among school employees or education decision-makers, who have insufficient opportunities to carry out research, while such opportunities are usually available to tertiary staff.

It is however interesting to look in more detail at the findings of studies that did investigate teachers' acceptance of e-learning technologies in Saudi secondary and intermediate schools. Lack of resources, technical support and professional development were highlighted as problems in the study by Almaghlouth (2008) about perceptions of science teachers in secondary schools about the use of information and communication technology in education and the learning process tools. The study took place in a number of secondary schools in the east of Saudi Arabia, with 131 male and female science teachers participating in the survey. The study showed that the technical equipment in schools was insufficient for use in the process of teaching and learning, as well as access to and use of them being very limited. In spite of this, teachers generally had faith in the importance of the use of technology and some made an effort to use it in their teaching.

Another study (Alwani & Soomro 2010) focused on the barriers that affect the use of IT by science teachers at a range of schools. The study investigate the infrastructure, resources and policies and personal beliefs; and concluded that most of the barriers were concentrated in problems with infrastructure and staff development, in addition to teachers' experiences related to the use of technology in teaching science. The authors believe that their findings illustrate the need to review education policy in terms of adequate funding and effective implementation of ICT. Similarly, Alotaibi's study of female science teachers in Hail City (2011), showed participants rarely used ICT in their teaching and demonstrated a lack of even basic skills in this area and Alkanani's investigation of male intermediate teachers of social subjects (2012) which showed that participants were resistant to using a range of technologies such as interactive Whiteboards and distance learning largely due to inadequate training. This situation was also found by Alsahli (2012), in a study which aimed to identify the educational technology training needs of female secondary teachers of geography in Jeddah. This study concluded that there was a deficiency in the training that teachers received in both technical skills and understanding the pedagogical use of educational technology.

The reasons for the inadequacy of training for teachers were touched on in studies such as those of Amasha & Alkhalaf (2016) who designed a training programme for 28 teachers from the Al-Qassim region, in Saudi Arabia, which aimed to use the integration between RSS 2.0 (Rich Site Summary) and the social network of Facebook as a way of teachers and students communicating. The researchers stated that the reason for the study was due to the acute shortage of teachers' skills in the use of Internet applications as a tool for teaching and learning. Using questionnaires, they found that teachers often did not attend training on the use of modern technology in teaching and learning due to lack of adequate time and administrative burdens. When they did attend, they did not find it beneficial as the place, time and environment was unsuitable. They urged that teachers needed to attend effective training programmes regularly and that modern technology, such as podcasting, was used during training. This indicated that teacher experience of being taught through the use of technologies is a factor in their acceptance of e-learning; and was echoed in a study by Al-Sulaimani (2010) about the importance of teachers integrating technology into the process of teaching science in Intermediate schools for boys and girls in Jeddah as well as the training needs of teachers. The survey had 311 teachers as participants, and the researcher also interviewed six policy-makers from the Ministry of Education. The study concluded that there is a lack of a good management of technical projects relating to the integration of technology in education, in addition to the lack of the necessary resources to do so. Time was an obstacle for teachers to attend training programmes in addition to the ineffectiveness of the courses, as well as cultural obstacles that prevent women from attending external courses. Although many previous studies had reported teachers' negative attitudes towards the use of technology and the policy makers thought that the science teachers would not have positive attitudes towards integrating ICT into their teaching 90 percent of teachers questioned believed in the role of technology in education and their need for more opportunities for professional development in this area.

Although inadequacy of infrastructure and equipment was mentioned as crucial to teachers’ technology acceptance by many studies, it was enlightening to consider Hakami’s study (2013) of a secondary school involved in Saudi Arabia’s Tatweer Project; which focused on teachers’ practices and students’ attitudes to the learning technologies. The study used interviews and questionnaires and revealed that many teachers made limited use of e-learning technologies, that their knowledge and perceptions of ICT affected usage and that there was a need for further support and training. The author comments that during the first stages of ICT integration, teacher and student skills are crucial to acceptance and use. Many teachers reported not being able to use email and most said that communication with students outside class time was unusual. The teachers’ knowledge and skills had been largely acquired through contact with these technologies in their own education, though many felt that this was still inadequate and they had to seek help from colleagues or learn by themselves through trial and error. The latter was further complicated by some teachers not having Internet access at home. Many ICT functions were never used in lesson preparation, which was mainly confined to accessing the Internet for pre-pared lessons or supporting materials. Although all teachers looked up information on the internet, six never used word-processing for materials. In spite of positive attitudes towards ICT making lessons more interesting, there were fears about not being able to monitor which websites the students were accessing, digital equipment being a distraction for students, technical failures and theft of equipment.

Hakami’s study highlights that even in secondary schools specifically targeted to be supplied with learning technologies, teacher attitudes, facilitating conditions, perceived ease of use and performance expectancy significantly shape technology acceptance and use. Furthermore, that many Saudi teachers acquire the knowledge, skills and perceptions of learning technologies through their own educational experience. Indeed, the researcher has noted in his informal discussions with secondary teachers that there is sometimes a sense that this new technology will not make for better education, and that these views are largely expressed by teachers who have themselves been taught using traditional methods and are entrenched in the use of these methods themselves.

An adherence to teacher-centred centred learning was also noted by Alghamdi (2015) in a study of the attitudes and practices of teachers of Arabic in Jeddah as well as the attitudes of school principals. This study revealed that, despite Ministry of Education policy to introduce ICT at secondary level, barriers still existed in the form of lack of digital learning tools in the classroom and technical support as well as pressure of time making it difficult for teachers to improve their digital skills. Current professional development in Saudi secondary education appears to still be focused on giving teachers technical skills rather than training on integrating e-learning into their pedagogy. Alghamdi also noted the importance of school managers’ encouragement and support of teachers improving their digital literacy and adopting the kinds of student-centred learning that digital learning technologies could facilitate. The study emphasised that there was a need to broaden research into secondary teachers’ adoption of digital learning technology to include teachers of all subjects and both genders and stressed the usefulness of using mixed methods to do this.

It would seem from these studies that Saudi teachers of a range of subjects at both Intermediate and Secondary levels are not making effective use of educational technology and that this situation has persisted for a number of years. Furthermore, that there are barriers for both male and female teachers to use educational technologies and that the main problems appear to be inadequate training programmes as well as problems with infrastructure, resources and technical support, despite the Ministry of Education's policy to implement these technologies into the Saudi educational system. It can thus be argued that Saudi Arabia has witnessed great improvements in establishing e-learning. The institutions of education in Saudi Arabia are interested in e-learning because of its great benefits. However, there are a number of challenges that hinder the acceptance of e-learning and the Saudi government has to find the solution for these challenges.

It seems that there is a need for a wider investigation of the factors that prevent teachers from using e-learning in the teaching and learning process whether in or outside classrooms, at the time the Ministry of Education shows an interest in applying the new technology to improve its education system (Ministry of Economy & Planning, 2010).In spite of the efforts and projects that have been initiated by the Ministry of Education, particularly at secondary schools, including certain technical supplies and improving the curricula, there have been no studies on the extent of teachers' acceptance of such new technology and its use in the teaching process at secondary schools that focus on both genders and use mixed methods for deeper understanding, thus, not sufficient identification of factors that affect the use of such technology, and not enough clarity to suggest a range of strategies to overcome barriers facing the teachers. Most of the studies, conducted in schools, focused on the lack of teachers training as one of the basic factors that hinder the use of technology without considering other factors such as teachers' tendencies and the expected benefits from using the technology.

Although teachers have new equipment, and some of them know how to use it on daily basis, there is still a shortage of its use in the teaching/learning process. This presents a challenge to teachers, particularly in this era. Therefore, to ensure success of the Ministry's relevant projects, there is a need to change teachers' beliefs and tendencies concerning the use of the technology (Lai *et al.*, 2002). Accordingly, there is a vital need to know the level of teachers' acceptance of this technology, combine it with the teaching/learning process within, and outside, the classrooms. Teachers' acceptance of e-learning technologies is perceived as a fundamental factor towards combining them with the teaching/learning process. Teachers' use of modern technology helps and encourages their students to use it, to search for information on the internet, and communicate with their peers and teachers outside the classrooms. Greener (2009), notes that teachers can act as role models for their students in developing useful e-learning behaviours; as well as needing the skills required for effective teaching, Greener found that good teachers were able to positively influence students' online learning experience; and that their own abilities and confidence in using e-learning technologies in front of their students will affect how well they do this. Accordingly, the teachers must acquire the necessary skills for professional development, and for achieving goals of the national projects that aim at combining technology with education.

Education service providers, and decision-makers have often not focused on teachers' technology abilities and their provision at schools, thus failing to understand teachers' tendencies and the factors affecting their use of technology in the classroom (Ghamatrasa, 2006), because teachers' positive tendencies can affect the amalgamation of technology with education. Therefore, we must combine the scientific theories with actual practices in classrooms, study factors affecting their tendencies, and then design appropriate strategies and plans. Projects related to combining technology with education, without considering teachers' tendencies towards using new technology, are often unsuccessful; and this is mostly happening to education projects in developing countries, such as Saudi Arabia, where the projects are executed without understanding teachers' tendencies towards using the information and communication technology in education. Therefore, introducing any new system, based on understanding factors that affect its adoption, would lead to its acceptance and success, and accordingly, careful studying and understanding of users' views towards the new system would lead to its continuation and success (Vitartas *et al.*, 2007).

The literature review also revealed that studies that use the UTAUT to test technology acceptance in the field of e-learning, do not cover developing countries, particularly the Arab countries, as compared to developed countries. Most of those studies were conducted in the USA and Europe (Fusilier & Durlabhji, 2005). This study aims to analyse the current situation of Saudi secondary teachers' attitudes to and use of e-learning technology with this tried and tested model of technology acceptance (see section 3.3), and to adapt it to the Saudi context in the light of what the literature to date has revealed about teachers' acceptance and use of e-learning technologies; in order to more deeply understand what is preventing or hindering the use of this technology in the teaching and learning process, and to understand the relationship between education policy and the use of technology within the school environment.

1.4 Statement of the Research Problem

As mentioned by Asiri*et al*. (2012), in order to transform teaching practices by integrating technology, instructors' opinions and beliefs about approaches such as e-learning must be investigated. Technology usage in the learning environment is more likely to improve when the pedagogical approach of the instructor is consistent with the given technology. The system of education in Saudi Arabia is very similar to the public domain, mostly involving the complete separation of staff and students by gender, so that educational institutions must provide separate staff and buildings for their female and male students. This places a substantial strain on available accommodation and resources, and e-learning and its various applications are considered ideal for resolution of these problems. As a result, a number of Saudi educational institutions are optimistic about introducing the tools of e-learning to present e-courses that will make the pedagogical process easier.

Blau & Hameiri (2010) noted the challenge faced by learning management systems in education, given that adherence to traditional styles of teaching tends to prevent the application of e-learning. Learning management systems are virtual learning environments, like Moodle or Blackboard that connect to administrative functions such as enrolments and the registration of student results. Any such initiative therefore requires a managed and organized environment, and this is generally to be achieved by means of a learning management system. Such systems can enhance teachers' ability to create, manage and administer online courses. However, they do not always take account of individual differences in the characteristics and personal needs of learners.

The technology acceptance model addresses issues related to the attitudes of users to the actual use of ICT resources; its major aim is to better predict and explain technology acceptance among users (Sharma & Chandel, 2013). As the system of e- learning has become a very significant component of the pedagogical process, there is a need to further improve learning tools and platforms such as Class Fronter and Blackboard so that students can use the technology more effectively to manage their learning process.

As mentioned by Almalki & Williams (2012), teachers are considered as the most important element in the adoption and the acceptance of technology. Teachers are an important element in the successful of acceptance and adoption of technology. As a result, the Saudi government is interested in the professional development of teachers as well as providing training courses for improving their skills. However, Saudi teachers in the main do not use e-learning technologies in the classroom.

The proposed study will involve evaluating the process of e-learning implementation in learning and teaching in Saudi Arabia and assessing the effect of information and communication technology on improving pedagogical processes. The aim is to identify barriers that prevent the use of e-learning processes that enhance the performance of both teachers and students in the classroom, and it is clear that the technology acceptance model is significant for the adoption of e-learning in educational institutions.

1.5 Significance of the Study

This project will construct a model of technology acceptance that can contribute to the effective implementation of e-learning systems in the secondary schools of Saudi Arabia. Given the present lack of studies of technology acceptance within the context of Saudi secondary education, this thesis will provide a new insight into the subject. The framework will be tested to check its applicability in the Saudi context. Moreover, policy makers and researchers in the field will be able to further apply the findings of this study to secondary schools and to assess the most meaningful ways of improving adoption of e-learning technologies. Additionally, this study will help to identify barriers to the implementation of e-learning, and to ascertain the best ways of overcoming these barriers.

It is envisaged that the results of this study will provide Saudi educators with a new understanding of how secondary school teachers use (or don't use) e-learning technologies in their teaching and their perceptions of it, as well as presenting teachers' views on current education policy in regard to their training needs and the resourcing of their schools. This is done with the aim of providing the Saudi Ministry of Education with new information pertaining to issues which need to be considered in addressing future educational policies regarding the use of e-learning technologies as well as providing researchers in the field with a theoretical model 'purpose built' for the Saudi context.

Most studies using the UTAUT model have been in the fields of information systems and technology or business and management and its use has been relatively limited in the fields of education, psychology, medicine and journalism. Studies in fields like education would raise understanding of the value of the UTAUT theory and further highlights its strengths and weaknesses (Williams *et al*, 2015).

As well as expanding studies of the UTAUT into other fields; Venkatesh & Zhang (2010) maintained that there is a need to expand the use of such studies in other countries. Accordingly, this study will test the framework in a Saudi context, particularly in the case of secondary teachers, and the way the framework's constructs affect teachers' acceptance and use of e-learning. Moreover, the study will identify factors that affect acceptance of the technology within the Saudi context that has particular religious and social features, which in turn have enormous influence on accepting and using e-learning technology.

The meta-analysis of technology acceptance studies using the UTAUT conducted by Williams *et al* in 2015 reviewed 174 papers on the subject. Notably, not a single paper was from an Arabic country or by an author with an Arabic background, although samples from Saudi Arabia were made use of in 5 of the studies. The authors noted that the most commonly used tool was the survey, and that this was done in as part of a cross-sectional study with only 18 longitudinal studies. They comment that “there remains ample scope for original research beyond the current cross-sectional survey dominance (p.468). Moreover the model has to date had “limited use in education” (p.467)

One of the most interesting aspects of the Williams *et al* review was its noting of 20 variables that were identified as influencing technology acceptance. Only two of these variables, performance expectancy and behavioural intention were deemed to have sufficient predictive ‘weight’ when the results of all the studies were analysed.

Thus, the studies point to a number of areas which require further research; notably that useful work could be done in further refining the UTAUT model in order to apply it to specific educational and cultural contexts and to take into account the practical and affective experiences of teachers when exploring their perceptions, acceptance and use of new e-learning technologies. Appropriate models and theories are also needed for specific cultural contexts, and few studies to date have analysed technology acceptance whilst taking both educational and cultural factors into consideration. Technology acceptance within the specific context of Saudi Arabia and its Secondary education has yet to be explored. Finally, that there is a gap between teachers’ stated intentions to use these technologies and their actual use of them which needs to be addressed.

1.6 Research Aims

The major aim of this study is to develop a conceptual framework for technology acceptance in the context of secondary schools in Saudi Arabia.

To achieve the aim of this study, the following objectives have been identified.

- Investigate the way that educational policy is reflected in Saudi teachers’ use of e-learning technology in their teaching
- Define the system of e-learning in Saudi Arabia and the extent of its use in pedagogical processes.
- Investigate the current use of e-learning technologies in teaching and learning in Saudi Arabia.

- Explore the factors that influence the use of e-learning technologies in teachers' practice.
- Develop a conceptual framework for e-learning technology acceptance in the context of secondary schools in Saudi Arabia.

1.7 Research Questions

The following questions will be addressed in this study:

- What are the processes of e-learning implementation and use in teaching in Saudi Arabian secondary education?
- What are the factors that influence the acceptance and use of e-learning technologies in teachers' practices in Saudi secondary education?

  This question thus devolves into a number of subsidiary questions that need to be investigated through the primary research, as follows:

- *To what extent and why do performance expectancy, effort expectancy, social influence, teacher attitudes, education policy and teacher anxiety explain variances in the behavioural intention to use e-learning technologies by Saudi secondary school teachers?*
- *To what extent and why do facilitating conditions, teachers' educational experience and behavioural intention explain variances in the use of e-learning technologies by Saudi secondary school teachers?*

- How can the Unified Theory of Acceptance and Use of Technology (UTAUT) model be used to better understand what Saudi secondary school teachers perceive they need to effectively adopt e-learning technologies?

1.8 Conclusion

This chapter has examined e-learning tools and their impact on education. The benefits and challenges of e-learning and how these related to the successful implementation of e-learning technologies were considered, both in general terms and then specifically in terms of the Saudi experience. The factors that might affect the acceptance and use of such technologies in the Saudi context were identified by looking at studies that had been conducted in Saudi Arabia. The need for further investigation into this area was also noted, especially the need to understand what affects teachers' acceptance of e-learning technologies at secondary level. Closer examination of studies using Venkatesh *et al*.'s Unified Theory of Acceptance and Use of Technology (2003) revealed that this framework had been used extensively to test acceptance in developed countries, but that more work was needed on its application to developing countries such as Saudi Arabia. Finally, the research problem was identified as were the aim, objectives and research questions. The latter specifically address the issues of the implementation and acceptance of e-learning technologies in Saudi Arabia and it is this context which is the focus of the following chapter.

Chapter 2 The Study Context: The Kingdom of Saudi Arabia

2.1 Background

The application of information and communication technologies has become linked to the delivery of modern education all over the world, such that it is practically impossible to receive or deliver formal education without it. There are now a great number of technologies for processing, retrieving, storing, gathering, presenting, transmitting and analysing information which have become essential in much of contemporary education. Accordingly, governments and their agencies tend to keep up-to-date with the current trends and demands concerning these educational processes; and educational establishments have radically changed their mode of operation. The use of chalk and dusters in seminar rooms has become entirely extinct in a number of educational settings and replaced by interactive whiteboards driven by learning management system, projectors, and computers. This medium of electronic learning indicates that the use of digital technologies has gradually become the recognized practice with an extensive range of positive results (Gyambrah, 2007).

The potential of e-learning to influence the processes of education in the developing countries is considerable. Defining the real influence that e-learning programmes have on schools, students and their countries is, nevertheless, complex. Due to the diversity and newness of these programmes and the complexity of factors influencing results, measuring the influence of e-learning is a rising science. Nevertheless, a number of effects can be distinguished in examining the influences of e-learning on society, the economy, teaching, and lastly on students. The use of technology has the ability to encourage learning, predominantly in underachieving students. Instructors indicate that tutorials in the use of e-learning technologies in many subjects like science and maths considerably enhance the performance of students. Moreover, these technologies can be used to improve student skills such as writing and they have the potential to transform the classroom into a learner-centred environment. Instructors have indicated that there is an increase in self-esteem, confidence, and motivation in the environments of e-learning. The economic influence of e-learning has the ability to be investigated by clarifying the influence of e-learning and the developments in education on employment and the workforce; and development in education certainly influences economic development (Olson *et al,* 2011)

Thus, information and communication technology is considered as a powerful force in driving educational, social and economic reforms. Developing countries in particular cannot afford to not implement information and communication technology if they are to strive and compete in the international economy. The economic health of any country, developing or developed, rich or poor, is based largely on the quality and extent of education it provides for its workforce. The reform of education is happening all over the world and one aspect of this is the integration and introduction of information and communication into the system of education. Any successful integration of information and communication technology into the classroom deserves careful design and planning and is based mainly on the way policy makers appreciate and understand the processes of such incorporation. Accordingly, policy makers have to follow guidelines in order to achieve the successful integration of information and communication technology into the classroom (Jhurree, 2005).

In the modern digital society, the transformation of education is facing a number of difficulties in changing from the conventional ways of learning and instruction toward more modern ways. In addition, it requires a change in the teacher's role from conventional knowledge spreader to roles like delegator and facilitator. This change demands that teachers face their new duties and tasks more flexibly and have to prepare for their current roles and duties (Chang, 2010).

Therefore, education through technology is the process of utilizing information and communication technology to make learning easy and enhance performance throughout applying suitable technological resources and processes. Education through technology brings basic transformations to the way learning and teaching happens in schools. Effective use of information and communication technology in schools has to enable serious role changes for teachers. In order to implement connectivity, online tools, curriculum packages, and greater access in education, it is crucial to cultivate and support the new roles of teachers in the context of school transformation processes (Clark, 2001).

The acceptance of e-learning technologies is identified as the willingness of users to employ technology in educational tasks and settings. Recently, the researchers on acceptance have become concerned to understand the factors affecting the adoption of technologies in different settings. The issues of technology acceptance have occupied a fundamental location in the literature about educational technology. This is mostly because of the developing interest in incorporating technology into classroom settings to promote learning in addition to improving the problem-solving skills of students. Policy makers have considered the integration of technology as a vital part of educational reforms, whilst considering teachers as the main vehicles for applying information and communication technology in education, since they will be using these technologies in their classrooms. The level of technology acceptance for teachers, consequently, is one of the main determinants of successful implementation; since it is impossible to improve educational technology projects without the instructors' acceptance of technology (Aypay et al., 2012). In most of the studies of acceptance, the researchers have tended to understand and define the forces that form the acceptance of users as influencing the implementation and design processes and to explore the rejection or resistance to using this technology (Teo, 2011).

2.2 The Kingdom of Saudi Arabia

The Kingdom of Saudi Arabia was established by King Abdul-Aziz Bin Saud in 1902, with Riyadh as its capital city see figure 2.1. It is one of the most rapidly developing countries in the Middle East and is divided into thirteen administrative divisions, with very varied topography comprising mountainous areas and plains as well as desert areas (Central Department of Statistics and Information, 2014).

Figure 2.1 Map of Saudi Arabia - Central Department of Statistics and Information (2014)

Because of these differing terrains, the climate in Saudi Arabia varies from one region to another. In general, the climate is hot, with an average temperature of 35.5 ºC in summer and 24 ºC in winter (MOFA, 2014). The Kingdom's geography and climate variations present challenges for the Saudi government in the provision of basic services like education, electricity and health to its citizens, as many remote and mountainous areas are difficult to access. The Ministry of Education has faced some difficult challenges in seeking to provide educational opportunities for residents of those areas (Al-Ghonaim, 2005).

Saudi Arabia is often thought of as a wealthy country; however, this is not synonymous with being a developed country. The UN classifies it as a 'developing country' under the category of 'fuel-exporting' (UN, 2017). In terms of digital development, it is the stated aim of Crown Prince Mohammed bin Salman's Vision 2030 to develop Saudi Arabia's digital infrastructure so that by 2030 cities will have 90% broadband coverage and towns 66% (Saudi Embassy, 2017). This study has however found that there are still major problems with infrastructure; which means that schools, especially those in more remote areas, find it difficult to deliver e-learning and that many school pupils are unable to access digital resources at home.

2.2.1 The Situation in Jazan

Jazan is one of the administrative regions of the Kingdom of Saudi Arabia, located in the south-west of the Kingdom overlooking the Red Sea. The area includes a number of governorates and administrative centres located in the eastern sections of the mountainous and western coastal highlands, which are characterised by environmental and climatic diversity. The area is estimated at 13,457 square km, with an estimated population of about 1.37 million inhabitants, which is the most densely populated area in Saudi Arabia. (Emirate Province of Jazan, 2017)

Due to the challenging geographical terrain in the Jazan region, it has been difficult to provide public school buildings in all areas; as some areas are hard and difficult to access. As a result, the Ministry of Education had to rely on finding rented premises to locate schools. An important objective of the Ministry today is to remove rented buildings and replace them with government buildings (MOE, 2015).

In recent years, due to the war with Yemen, the Ministry of Education has decided to close some of the schools on the border and to transfer all students and teachers to other schools, where most of them can only use the school in the afternoon. This has been very disruptive in terms of time arrangements and parents having to take time off work to deliver their children to school in the afternoon. This move has also caused some technical problems as some of the schools that have been relocated are technically unprepared for the increase in staff and student numbers, in addition to having limited technical resources.

Although Saudi education policy aims to be implemented uniformly nationwide, the Jazan area has particular features that have relevance to this study. Its geography and the current political situation impact on the way the Jazan education department provides technological facilities in its schools as well as the infrastructure that is needed to successfully deliver e-learning in this geographically diverse area.

2.3 The Beginning of Education in the Kingdom

According to Albalawi (2013), formal education in Saudi Arabia commenced in the 1930s when King Abdulaziz bin Abdulrahman Al-Saud initiated a widespread programme to establish schools throughout the Kingdom. As mentioned by Chanchary & Islam (2011), unrestricted access to the Internet in Saudi Arabia was permitted in 1997 and, within a few years, internet usage had increased rapidly. After several years of unrestricted internet access, the Saudi Government introduced censorship. In the last statistical report by the Saudi Communications and Information Technology Commission, out of a population of 31.7 million there are an estimated 24 million Internet users (76%)(CITC, 2017)

2.4 The Education System

The educational system of Saudi Arabia is under some pressure to augment educational opportunities to enhance the rate of literacy and to raise the general standard of education. As more than 50% of the population in Saudi Arabia is under the age of twenty, the country's educational institutions have had to cope with increasing student numbers, and they lack the capacity to keep up with enrolment demands. The system of e-learning however, promises to be a significant and cost-efficient solution to meeting these challenges.

The organization of the Ministry of Education is considered a new age in the improvement of modern education, and was set up in 1953 as part of the Council of Ministers. The first Minister of Education was appointed by the late king Fahd Ibn Abdulaziz, who guided unprecedented modernization and expansion of educational resources in the Ministry of Education. A great number of schools were opened and public education expanded throughout the whole country. Because of the rapid growth of education in Saudi Arabia, the Ministry of Education found that there was a need to generate 'school districts' in various regions in the whole country to aid the Ministry in fulfilling a number of its responsibilities. In 1958, The Kingdom of Saudi Arabia as well as the Arab League agreed on a consistent educational system that offered a 6 year elementary/primary, 3 year intermediate and 3 year secondary programme, with a separate higher education programme (Ministry of Higher Education Saudi Arabia, 2006). The plans of national development confirmed an essential philosophy for the successful modernization of the Kingdom of Saudi Arabia; the philosophy depended on two main principles: firstly, to improve the required human resources in the course of training and education, and secondly to build an inclusive economic infrastructure. Education has thus become a highly significant factor in Saudi Arabia's plans for national development both socially and economically (Turay, 2009).

2.5 Education Stages

The educational stages in Saudi Arabia consist of a number of levels; the first stage is the 2-year pre-elementary level, in which girls and boys are prepared for elementary education. The enrolment age for pupils at this stage is five years old in preliminary schools and four years in nursery schools. The second stage is the elementary level, which is obligatory in the Kingdom of Saudi Arabia, and is considered as the basis for the improvement of a general educational programme and enrols pupils at the age of six years old. The school year consists of two semesters, and each semester comprises 15 weeks of classes and an examination period of two weeks. The schedule of daily elementary school is six lessons of 45 minutes, and there are separate schools for girls and boys. The intermediate level is started after the elementary level and students at this level are between twelve and fourteen years old. The intermediate school year also involves two semesters, each one consisting of 15 weeks of classes and a two-week period of examination. At this level, English is considered a required subject and it is also an obligatory subject at secondary school (Ministry of Higher Education, 2006). The secondary level is for students between fifteen and nineteen years old. Each student at this level learns the general curricula for the first year and then for the other two years they choose one of the major subjects, such as *Shari'ah* and Arabic Studies, Natural Science, and Administration and Social Science. The students who get high grade-point averages in physical science and mathematics in the tenth grade are registered in the Natural Science programme. The school year involves two semesters each consisting of twenty weeks and a two-week period of examination. Lessons at this level are forty-five minutes long and students work towards their secondary school certificate. Students have to achieve subject examinations, as well as the required credits, with grades not less than 50% of the highest score. The students who achieve this are eligible to progress to higher education, although some may choose to start work. In 1975, the Ministry of Higher Education became a separate entity from the Ministry of Education (The General

Administration for Eradication of Illiteracy Programs, 2008). However, these ministries have since re-merged.

The Ministry of Education statistics clearly demonstrate the high growth rate in numbers of students, schools and teachers in the Kingdom in recent years (MOE, 2014), as shown by Table 2.1 below:

Table 2.1 Educational development in Saudi Arabia 2007–2013 (Ministry of Education, 2014)

	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2016/2017
Students	4717275	4736963	4777641	4837831	4968978	5014995	5694658
Schools	25902	26268	26421	26640	27583	27851	35812
Teachers	436526	417459	440634	453221	472433	495194	519950

To sum up, public education system in the Kingdom of Saudi Arabia is divided into four stages: Nursery (Kindergarten), Primary, Intermediate and Secondary. Students attend between 26 and 36 taught 45-minute periods a week, depending on their stage. The upper limit for teachers is 24 periods per week. Additional tasks that include the daily supervision of students often prevent teachers from preparing their lessons during the school day.

2.6 The secondary stage

The secondary stage is the most critical stage for acquiring digital skills in the public education system because it must equip the potential undergraduate student with all the skills necessary for university study, including the use of Information and Communication Technology (ICT) within the education process as well as preparing students for employment. For this reason, the Ministry of Education introduced Computer Studies into the secondary curriculum in 2006. At first, this was for one period per week, increasing to two periods in 2007, when King Abdullah initiated a scheme to improve the curriculum by using experts who worked together to identify best practice and integrate ICT more fully into education (Tatweer, 2014).

The Saudi Ministry of Education advocates the use of e-learning and the need to integrate ICT in education. Their planning indicates a fundamental commitment to exploiting the advantages of e-learning in modern Saudi education. However, a number of factors still impact negatively on the participation of students in online courses, including Internet experience, computer self-efficacy, computer anxiety and enjoyment (Alenezi*et al.*, 2010).

According to Alharbi & Drew (2014), the use of ICT implies a very significant transformation in learning that generates a new educational form, now known as e-learning, or the premeditated use of ICT in learning and teaching. Learning management systems are among the information and communication tools available to the education sector, and these are considered to be a major contributor to successful learning outcomes. Saudi institutions have begun to modify their educational strategies to adopt technologies that will support the accomplishment of these pedagogical objectives.

2.7 Technology in the Saudi Education System

In 1985 information and communication technology was introduced into secondary schools in the form of a course consisting of Computer Science, Systems Programming and Programming in BASIC as well as the use of information systems (see Figure 2.2). The programme's success led the Saudi Ministry of Education to provide computer studies as an obligatory educational subject with two classes per week in 1991; at first in every secondary school for boys and subsequently into girls' schools. Since 1999, computer science is taught as Computer Application, Information Age, Information Systems, and Information Technology. For mastering this subject, there are several training courses provided for both students and teachers. The first stage in the use of computers in Saudi schools was preliminary training and the second stage witnessed the integration of computers into the learning and teaching of a number of subjects, because of the commitment of the Ministry of Education for improving the information and communications infrastructure as well as its employment in learning and education (Oyaid, 2009). From this, it can be seen that a number of steps have been taken which could arguably make it easier for Saudi secondary teachers to integrate e-learning into their practice.

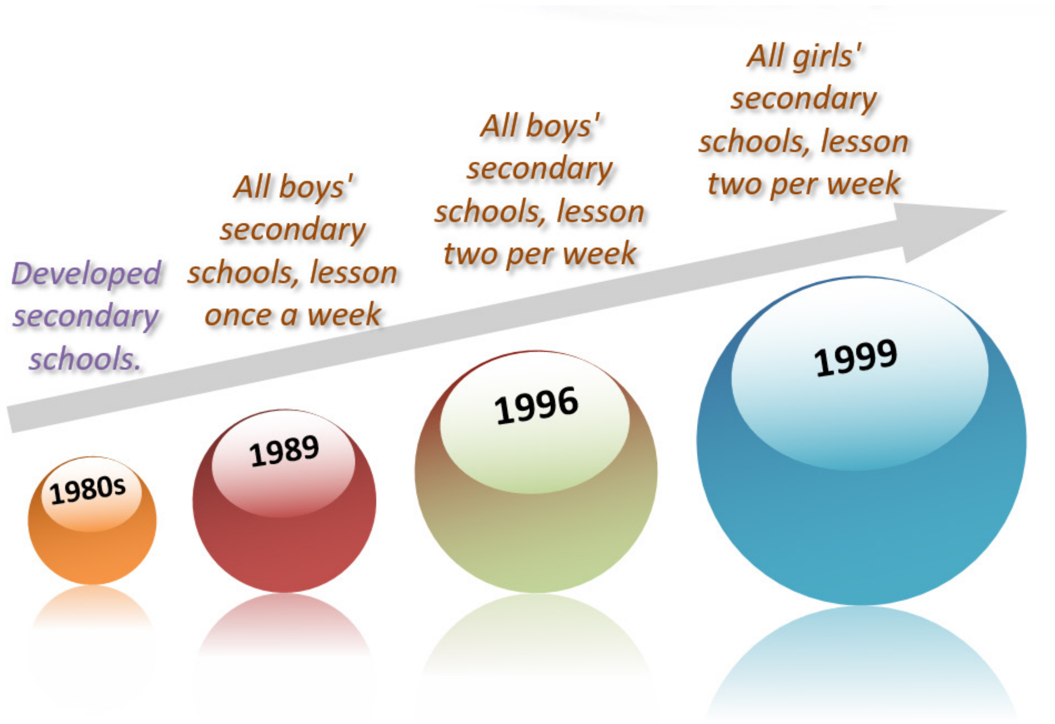


Figure 2.2 IT in secondary schools (computer studies) (MOE, 2015)

The commitment of the Ministry of Education is exemplified throughout several projects, for instance the development of school libraries into Learning Resources Centres (LRCs) which involves having sources of information both in non-print and print forms and integrating information and communication technology into the processes of teaching and learning to create richer learning environments. To date, 8,164 LRCs have been established. The introduction of computer labs, where students are able to have hands-on experience of the technology, was another Ministry of Education initiative (MOE, 2015)

The following table shows the number of Learning Resource Centres (LRCs) that have been installed at all educational levels in the Kingdom of Saudi Arabia.

Table 2.2 Learning Resource Centres in Saudi schools (Ministry of Education, 2015)

	Primary	**Intermediate**	**Secondary**	**Total**
Learning Resource Centres (LRC)	**3627**	**2158**	**2378**	**8164**

In addition, these 'Smart classrooms' are equipped with many technological and communications tools, including a Smart blackboard, projectors, computer labs and Internet services. The following table shows the number of computer labs that have been installed in intermediate and secondary schools (boys and girls) during the past five years.

2.8 Computer Labs

The Saudi ICT educational policy also includes the setting up of ICT clubs under the supervision of the Ministry of Education. Twenty-five after-school clubs started providing their services in 1996 and were dependent on the computer labs in secondary schools. Because they make use of schools' latest technology and existing computers, this will keep down the cost of establishing new computer labs. Such community use of personal computer (PC) labs also has the advantage of helping to raise awareness of information and communication technology among community members, through providing courses to enhance the technological competences of teachers, inexpensive training courses, and giving young people the opportunity to spend their free time in profitable activities. The ICT clubs thus play a significant role in developing the awareness of technology among teachers, students, and the community by giving access to computers outside the school day; and help in conquering the inequity of access to computers among students (Almalki & Williams, 2012).

Table 2.3 Computer Labs in Saudi Schools (Ministry of Education, 2014)

Category	11 PC	15 PC	17 PC	20 PC	21 PC	25 PC	31 PC	Total
Secondary School	325	390	182	400	1257	1186	180	**3920**
Intermediate School	300	530	2200	400	770	900	0	**5100**

Teachers and students are also supplied with laptops, and some large rooms are equipped for remote training courses for teachers, linking them via the Internet with the Ministry of Education. That phase of the programme focused on the development of schools as high quality learning environments for both teachers and learners as a key element in the educational system. The aim was to provide them with the necessary skills to be able to contribute to building the society, as well as learning the skills necessary for social partnership (Oxford Business Group, 2014).

2.9 The Ministry of Education Projects

Several technical projects for the development of the education system have been initiated by the Ministry of Education:

2.9.1 A National Project

Saudi Arabia has implemented a national project with the aim of encouraging the use of computers as an instructive technology. Every Educational Directorate District and Saudi school is linked by means of a wide rea network covering local area networks throughout the Kingdom of Saudi Arabia. Furthermore, these schools' net projects offer every educator, parent, teacher and student a huge number of services and sources of information, as the net content and services for schools involve educational references, subject curricula, teachers' guides, electronic books, course syllabuses, services for users with special needs, teacher training, interactive multimedia, web design tools for schools, school management systems, chat rooms, e-mail, Internet links, announcements, magazines for students and teachers, the training of students, student sites, educational statistics and the skills of information and communication technology (Almalki & Williams, 2012). Mostly, the applications and content are in Arabic. The first stage of the net project for schools offered one million students the requirements for information and communication technology with one PC for every ten students. One of the prime objectives of the project is to enhance teacher potential through the use of IT in each educational activity (Albugami & Ahmed, 2015).

2.9.2 The King Abdullah Project for Education Development

The King Abdullah Project for Education Development is considered one of the most significant projects to improve the quality of education in the history of the KSA. This project aims to improve curricula, enhance teachers' awareness of technology, generate educational leadership, improve the educational environment and improve non-academic activities (Ministry of Education, 2015).

2.9.3 The Tatweer Project

The Government of the Kingdom of Saudi Arabia's interest in reforming its educational system resulted in the establishment of the King Abdullah Project for Education Reform in 2007 (ICRD, 2014). The Tatweer Project (The King Abdullah Project) is a project that aims to reform the system of education in the Kingdom of Saudi Arabia, and enhance the quality of learning and teaching, particularly in state schools to meet the social and economic needs of the country in the 21st century (Tatweer, 2010). Fifty secondary schools were chosen from twenty-five educational districts to participate in this project. The participating schools were called Smart Schools, and offered similar equipment and information and communication technology. In addition, each class was provided with a projector, wireless internet connection, Smart-board and laptops for teachers and students. Furthermore, each school was connected to the administration centre in Riyadh, the KSA's capital.

The stated vision of this project is to develop the attitudes of learners to the outcomes of learning through providing a superior learning environment to equip learners with the skills of learning, to reproduce positive practices and attitudes, build a knowledge society, improve communication and social skills, problem-solving skills and leadership skills and construct a community partnership (Hakami, 2013). The Ministry of Education has adapted libraries to accommodate electronic learning resources and encourage the use of ICT in the education process for the benefit of both teachers and students (Algahtani, 2007). Many schools and teachers are now using this technology, although this is not being done universally by every teacher or in every school (see Table 1.1).

2.9.4 Public Education Evaluation Commission (PEEC)

The Public Education Evaluation Commission (PEEC) was founded in 2013. The PEEC is responsible for the evaluation of private and public schools in the Kingdom of Saudi Arabia; and issues rules, regulations, licenses, and standards necessary for the evaluation processes. It is administered by the Governor of the Commission who leads a Board of Directors selected from all educational bodies and authorities, and includes specialists and representatives from the private sector.

The Public Education Evaluation Commission (PEEC), along with improvements in infrastructure, curriculum development, training and scholarships aim to promote investment in Saudi citizens through education (Public Education Evaluation Commission, 2016).

The evaluation process is based on establishing formal interaction between the PEEC and those who direct state education as well as creating the appropriate legislation. This is in line with state policy to encourage the growth of Saudi Arabia's intellectual capital and implement sustainable development.

2.9.5 Professional Standards for Teachers

Having professional standards for teachers is a means of ensuring high quality standards in education. They are designed by the government of Saudi Arabia to support teachers to improve their performance in order to raise the achievement levels of their students, and thus produce a more knowledgeable, skilled and qualified workforce.

These standards apply to teachers from the time they are trained in colleges of education and as part of their professional development. This initiative builds on international best practice and has partnerships with international institutions to verify that standards are compatible with those that are internationally recognised.

The establishment of professional standards promotes all teachers sharing a common educational culture and language. They provide a benchmark for teachers to self-evaluate their professional performance and motivate them to develop professionally.

There are several strategies to enable teachers to attain high professional standards; including: providing sufficient teaching practice and the support of experienced colleagues for teachers in training; in-service training, appraisal, peer observations and self-evaluation.

2.9.6 The National Centre for Assessment in Higher Education

The Teacher Competency Test (TCT) is designed to measure if candidates who apply for teaching work have the required knowledge and skills. There are two tests, one general and one specialized, each lasting one and half hours. The former covers the general educational fields that are common to all disciplines of teaching; and teachers are tested on their general basic knowledge, if they know how to teach, support learning and understand their professional responsibilities. The specialized test is on the teacher's specialist subject.

Candidates can re-sit the test and see their results online or via SMS. The TCT ensures that applicants have reached the minimum standards required for the teaching profession; including the knowledge and skills that cover the basic aspects of the profession. The results of this test are used for several purposes such as the processes of selecting teaching staff for performing the various educational functions specified by the different specialist authorities in the Ministry of Education.

2.9.7 The National Education Portal - iEN

Saudi Arabia has already made great strides in implementing changes aimed at modernising its society, its policy makers recognise that changes in general and state education are a key to this. One initiative has been to provide a national education portal to providing services and solutions through e-learning for all students in Saudi Arabia and their teachers and parents.

The National Education Portal (iEN) contains over 720 books and 12,000 activities so far and plans to launch new services. Students can download articles as a PDF file and browse through a reader programme; surf electronic lessons; use interactive learning videos, games and stories (National Education Portal (iEN), 2016).

Recently, the Ministry of Education has encouraged teachers to use the National Education Portal (iEN) to download textbooks and textbook activities in addition to follow-up lessons registered through the site. This is in line with the Ministry's plans that included not having to print more textbooks in the future. In addition, the Ministry of Education directs teachers to encourage students to use the National Education portal (iEN) and to create an account on it.

2.10 Teacher Preparation in Saudi Arabia

The Saudi education system demands a 'highly qualified' teacher in each classroom. Moreover, it is indicated that education policies, the quality of teachers and the improvement of student achievement have been priorities nationwide (Buddin & Zamarro, 2009). There is an increasing concern among researchers, policymakers, and educators to understand what makes some teachers more effective than others, specifically in view of current concentration on the accountability of education at national, state, and local levels. Arguably there is no simple relationship between teachers' qualifications and/or their subject-matter expertise and the academic achievements of their students (Guarino *et al.* 2006). Similarly, the relationship between teacher preparation and acceptance and use of e-learning technologies may be complex; but it is important to understand how teachers are prepared for work and what they are contractually expected to do in Saudi secondary education.

Students wishing to enter teaching enrol on a four-year course at the Saudi Education College for Educational Specialties (which offers specialism in Physical Education, Art Education, and Special Education). Graduates with a bachelor's degree have to study at a College of Education for a further one year to gain an education diploma and are qualified for teaching at high schools after passing employment tests in teachers' competences (Ministry of Education, 2015). According to statistics from the Saudi Ministry of Civil Service, the numbers of teachers was 531, 325 which represents 37.36% of the total state employees (Ministry of Civil Service, 2015). The Saudi government is highly committed to the professional development of teachers as they see this as the key to enhancing education in Saudi Arabia; and they see education as key to the progress of Saudi society.

By law, teachers are expected to keep precise attendance records for pupils in their charge, which show both lateness and absences. In several schools, the conventional register kept by teachers, has been replaced by digital record keeping. Teachers are also required to keep systematic evaluation records of student progress, including the results of examinations and tests; to prepare sufficiently for everyday teaching assignments, plan work for the year or the semester in every subject showing logical progress and development, and produce lesson plans indicating aims and objectives (Feiman-Nemser, 2001). Furthermore, lesson plans should include methods of presentation and student class and homework assignments (Barnett House, 2013).

2.11 Education Policies in the Kingdom

Teachers' use of information and communication technology is affected by their awareness of computers; nevertheless, it is demonstrated that their use and perception of this technology in the process of teaching is also affected by educational polices, particularly those concerning ICT; as well as the way policies affect the implementation, planning, and introduction of information technology. The introduction of ICT into education is principally a policy concern; as shown by the fact that countries all over the world have tried to implement the use of computers in their schools through nationwide directed initiatives from the beginning of 1980s (Vavouraki 2004). Educational policy sets the strategic objectives, value commitments, and operational structures and instruments at institutional, local, regional, and national levels. There are three major elements of these educational policies; namely, Mandate, which sets goals for the education system; Capacity, which determines the obtainable resources needed to achieve these goals; and Governance, which outlines why and by whom these ends will be accomplished and how they will be prioritized using indicators, targets, advice, guidelines and documents.

In Saudi Arabia, educational policy consists of a group of approaches and rudiments that are set by the state to organize education into its various types and levels to achieve objectives in line with recent available capabilities and circumstances in order to serve the common objectives of the state. Furthermore, the Saudi Ministry of Education gives broad guidelines about how students must be taught about their religion and God, to base their behaviour on these beliefs, satisfy society's needs, and fulfil the goals of the nation (Oyaid, 2009).

2.12 Technology Equipment used in Schools

The system of information and communication technology involves software, hardware, communication technology like the internet and the individuals who utilize them. The improved usage of information and communication technology in the Kingdom of Saudi

Arabia is attainable through integrating information and communication technology into the classrooms. Typically educational technology projects consist of upgrading equipment (software and hardware) or installing networks. Nevertheless, purchasing all the equipment necessary for supporting the integration of information and communication technology demands a great amount of money. Consequently, a strategy for enhancing the infrastructure of information and communication technology is very significant; as the infrastructure has the potential to improve internet access in schools as well as facilitating e-learning. In addition, the construction of information and communication technology labs in schools enhances the usage of these technologies. This equipment will aid students getting more attractive visual aids to learning in addition to assisting them to become familiar with information and communication technology and improve their learning skills (Almalki& Williams, 2012).

2.13 Conclusion

The background to the Saudi educational system has been briefly described in this chapter along with an overview of the structure of that system. Recent statistics were employed to illustrate the current state of Saudi education and in particular how schools have been resourced with e-learning technologies and what initiatives have been undertaken by the Saudi Ministry of Education in this area. The measures taken for the evaluation of both the institutions and the teachers they employ have been explained as were the current state of teacher training and the policies of the Ministry of Education in regards to the introduction of e-learning technologies and the provision of support and encouragement for their use. The provision of suitably trained teachers and the relevant equipment are important factors in the successful implementation of e-learning, and these are taken into account in the following chapter that reviews the literature of technology acceptance both in general and in relation to the educational context. This information will shed some light on the extent to which the Saudi government's policy to implement e-learning has been successful and some of the barriers that persist in hindering the process.

Chapter 3 Literature Review on Acceptance and Use of Technology

3.1 Introduction

This literature review will focus on new learning technologies and how these are accepted by users in education. Models of technology acceptance will be considered, starting with Davies' Technology Acceptance Model (TAM) and the other models on which Venkatesh, V., Morris, M., Davis, G. and Davis, F., (2003) based their Unified Theory of the Acceptance and Use of Technology (UTAUT), as well as how this model is to be revised and applied to the Saudi context.

The field of technology acceptance is a relatively new one; however, while constructs within the conceptual framework remain constant, for example Performance Expectancy always refers to individuals' perceptions about the gains to be had in using the technology to perform their tasks; the contexts to which the conceptual framework is applied are fluid. For this reason, literature that defines and explains constructs within conceptual frameworks remains current whilst the results of individual studies need to be approached with caution as the impact of specific factors may change over time. For example, this study has noted that Bellaj *et al* (2015) researching in Saudi Arabia found that the impact of Effort Expectancy i.e. the extent to which the technology is perceived as easy to use, is reduced with experienced users whereas the impact of Performance Expectancy increases. Furthermore, the results obtained in a specific context may not be generalised to a very different context and it is for this reason that results from meta-analyses are addressed when discussing the impact of various factors and that, where possible, results obtained from studies conducted in Saudi Arabia and secondary education are particularly focused on.

3.2 The Concept of Acceptance

The usage of information technology systems has the possibility to transform the nature of learning environments as well as the means to encourage the processes of student learning through various learning modes. Information technology systems permit information to be presented, updated, accessed and stored in different electronic formats as evidence or records of students' accomplishments and learning (Venkatesh *et al*., 2003). There are a number of standards for a successful information system. These standards include lifelong support, the architecture of a forceful incorporated technology and ease of use, transportability and standards. As a result, various information technology systems provide changeable levels of ease of control and robustness, according to how the appearance and flow of content is organised. Nevertheless, the processes of implementing information technology systems are not only expensive, but also may result in students' low acceptance and adoption of information technology system. User acceptance and user friendliness of information technology systems are thus two challenging demands to satisfy, since users can rapidly become distracted and discard applications that cause confusion for them (Bandyopadhyay, 2008).

To increase the acceptance level of students, educators and administrators, systems have to define a broad variety of student purpose, intentions, and preference for the usage of information technology system and should acquire the ability to incorporate these factors into the processes of improvement (Tarhini *et al.,* 2013). Acceptance behaviour among potential users remains decisive for the adoption of e-learning systems. In different contexts and populations, the Technology Acceptance Model (TAM) (Davis *et al.,* 1989) has been productively utilized to examine the intent of users to make decisions about implementing technology systems, and the TAM may be of use in predicting acceptance of e-learning by users. To develop the learning experience of students, teachers must be equipped with a range of skills and an understanding of the implications of using technology. They need to be able to design online courses that enable engagement with the processes of education, preserving students' motivation and developing their learning skills (Lee *et al.,* 2013). TAM identifies the behavioural intention of individuals to use and accept a particular technology as determined by two constructs: Perceived Ease of Use (PEU) and Perceived Usefulness (PU) (Davis *et al,* 1989).

According to Šumak *et al.* (2011), the rapid advance of technology in all areas in recent years means that acceptance and use by organizations and individuals has become an important factor when judging whether it can be successfully applied within any enterprise. This needs to be properly understood from the outset, as acceptance by the target group can affect later use (Davis *et al.,* 1992) and is the main criterion for its success and for increasing demand (Park, 2009). It follows that understanding the factors that affect acceptance of e-learning by users will be important in improving the implementation and use of e-learning (Al-Harbi, 2011). However, this is not always easy; indeed, one of the most challenging research questions in the area of information systems is to understand why individuals choose to accept or reject new technologies (Henderson & Divett, 2003).

It is clear from the above that without finding a number of advantages for a particular technology, there will be no acceptance of this technology, since every user searches for the best; thus, when users find a new technology easier and more useful compared to the previous technology, they will accept and then adopt it. In order to understand the issues surrounding the acceptance and use of e-learning technologies by Saudi Secondary teachers, this study uses an adaptation of the Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh *et al*. in 2003 which is explored below.

3.3 The Unified Theory of Acceptance and Use of Technology (UTAUT)

The ongoing battle to assure technology users' acceptance is a continuing issue for management. Thus, there has been a rise in research into technology adoption. This considerable level of action has witnessed the use of various theories and techniques to investigate a number of technologies and systems in various contexts. This has meant that researchers have had to pick and choose relevant elements from among a great diversity of competing theories and models. In an attempt to resolve this, Venkatesh *et al.* (2003) created a combined model which focuses jointly on innovation and user acceptance; this theory is the unified theory of acceptance and use of technology (UTAUT) (Venkatesh *et al.*, 2003).

The UTAUT theory proposes that four factors: namely, facilitating conditions, social influence, effort expectancy, and performance expectancy are straight determinants of behavioural intention and ultimately behaviour and these elements are influenced by age, gender, voluntariness, and experiences of use (Williams *et al.,* 2015). The major section of this model contains what are supposed to be the main determinants of intention to utilize and accept a recent technology; and comprises facilitating conditions, social influence, effort expectancy, and performance expectancy (Simeonova *et al.*, 2010) (See figure.3.1)

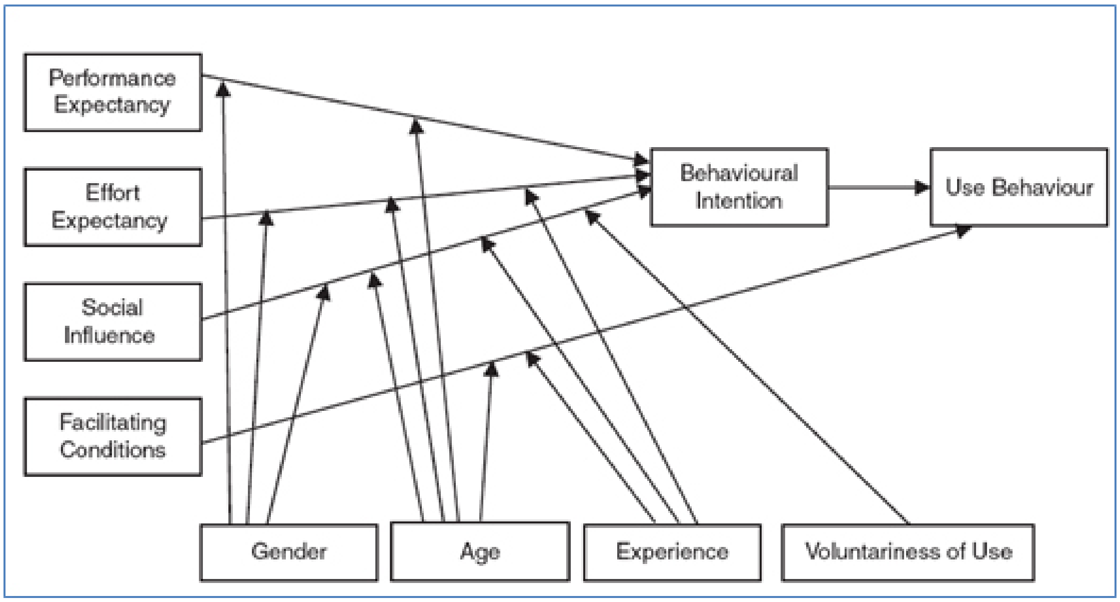


Figure 3.1 Unified theory of acceptance and use of technology (Venkatesh et al., 2003 p.447)

This theory was formed by the integration and review of eight main models and theories, which will be discussed in more detail below. These theories and models are Social Cognitive Theory (SCT), Innovation Diffusion Theory (IDT), the Model of PC Utilization, a combined TBP/TAM, the Theory of Planned Behaviour (TPB), the Motivational Model, the Technology Acceptance Model (TAM), and Reasoned Action (TRA) (Venkatesh *et al*., 2003). These models and theories are utilized successfully and extensively by the previous studies of innovation or technology acceptance and adoption within many disciplines involving, management, social psychology, marketing, and information system (Venkatesh *et al.*, 2003).

3.3.1 The Eight Preceding Models that the UTAUT is based on

In order to fully understand how the UTAUT was created, an overview of the preceding models is given in figure 3.2 below.

Figure 3.2 The eight preceding models that (UTAUT) is based on (Venkatesh *et al*., 2003)

The following table shows in greater detail the elements of each theory that go to make up the constructs of the UTAUT model as well as Venkatesh *et al's* definition of each construct.

Table 3. 1 Origin of UTAUT Core Constructs

Core Constructs	Definition	Constructs and Theories	References
Performance Expectancy	*"The degree to which an individual believes that using the system will help him or her attain gains in job performance"* Venkatesh, Morris, Davis, and Davis (2003)	Perceived usefulness (TAM/TAM2 and C-TAM-TPB)	Davis (1989)
		Extrinsic motivation (MM)	Davis, Bagozzi, and Warshaw (1992)
		Job-fit (MPCU)	Thompson, Higgins, and Howell (1991)
		Relative advantage (IDT)	Moore and Benbasat (1991)

Core Constructs	Definition	Constructs and Theories	References
		Outcome expectations (SCT)	Compeau and Higgins (1995)
Effort Expectancy	*"The degree of ease associated with the use of the system"* Venkatesh, Morris, Davis, and Davis (2003)	Perceived ease of use (TAM)	Davis (1989)
		Complexity (MPCU)	Thompson *et al*. (1991)
		Ease of use (IDT)	Moore and Benbasat (1991)
Social Influence	*"The degree to which an individual perceives that important others believe he or she should use the new system"* Venkatesh, Morris, Davis, and Davis (2003)	Subjective norm (TRA, TAM/TAM2, TPB and C-TAM-TPB)	Ajzen (1991),Davis (1989),Fishbein and Ajzen(1975), Taylor and Todd (1995)
		Social factors (MPCU)	Thompson et al. (1991)
		Image (IDT)	Moore and Benbasat (1991)
Facilitating Conditions	*"The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system"* Venkatesh, Morris, Davis, and Davis (2003)	Perceived behavioural control (TPB and C-TAM-TPB)	Ajzen (1991), Taylor and Todd (1995).
		Facilitating conditions (MPCU)	Thompson et al., 1991
		Compatibility (IDT)	Moore and Benbasat (1991)

The authors evaluated these theories according to their differences, similarities, and capabilities to clarify individuals' acceptance of new technologies. These models and theories were then tested and compared using USA organizations; and the outcomes revealed that the various theories and models accounted for 17% to 53% of the discrepancy in individuals' acceptance and use of technology. Based on these outcomes, a combined model, namely the UTAUT, was proposed; and this model was to give a more comprehensive explanation of technology acceptance and use.

A review of these theories suggested that acceptance is very significant factor for the successful implementation of technology. The Unified Theory of Acceptance and Use of Technology proposed that when the users are presented with a new technology, there are several factors that can influence their decision about when and how to use this new technology, mostly based on the perceived advantages of the new technology. It proposes two major factors that affect the acceptance of technology, which are ease of use and the usefulness of technology and suggests that when there is acceptance, there will be adoption of that technology. The definitions of factors in the UTAUT given by Venkatesh *et al.* appear in Table 3.1 above and these factors will be more closely explored in the section on the conceptual framework of this study.

It should be noted that in spite of the UTAUT being "able to account for 70% of the variance… in usage intention – a substantial improvement over any of the original 8 models and their extensions" (Venkatesh *et al.*, 2003 p.467); the authors believed that the model had limitations. The model was tested on four US organisations which meant that the sample was limited in size and context. Similarly, the sample to be used in this study will be limited to Secondary teachers in the Jazan area of Saudi Arabia – a limitation which will be further discussed in the Methodology chapter. Venkatesh *et al* also comment that "choosing the highest loading items resulted in some of the models not being represented in some of the core constructs" (2003 p.468). As many of these constructs will be used in the conceptual model for this study, it is to be noted that these limitations will also apply, but that other, more context-specific constructs will also be utilized. Finally, the authors identified that factors such as "computer literacy and social or cultural background, among others needed further research" (2003 p.469) which is what this study will seek to address.

3.4 The UTAUT in Practice

The UTAUT has been broadly utilized in the research of technology diffusion and adoption as an academic lens by the researchers who are concerned in conducting empirical studies of user behaviour and intention. Since its establishment, the UTAUT has been utilized to explore the acceptance of several technologies including the Internet, hospital information systems, tax payment systems and mobile technologies. These studies have focused on various aspects such as voluntariness, gender, age, experience, education, and income; and concentrated on several different groups of user, such as general users, professionals and students (Taiwo & Downe, 2013).

The UTAUT has also been used in an educational context. For example it was used by Jambulingam (2013) to identify behavioural intention among tertiary students to adopt mobile technology. In this study, each aspect of the UTAUT was linked to the research hypothesis. It was suggested that the model could be adapted to include pedagogy and affordability as useful constructs; and the learning system's usability aspects must be assessed in conjunction with their influence on the pedagogical setting and the learning behaviour to which they relate (Stephan *et al.,* 2009). It has also been demonstrated that the successful use of technology in e-learning depends on the attitudes of teachers toward the use of technology (Babić, 2012).

The model has also been applied to the study of technology acceptance in a Middle Eastern context, as for example by Nassuora (2012) in Saudi Arabia and by Akbar (2013) in Qatar. The latter found that the UTAUT was applicable to an educational setting but 'might need a few modifications to fit the context'. Very significant efforts to improve the processes of learning by use of educational technology continue around the world. However, successful implementation clearly depends on diffusion and acceptance, making technology acceptance a matter of some importance in the practice and research of education. The UTAUT is widely accepted as a major theory; however, it is also possible to adapt it in order to apply it to specific educational contexts.

3.5 Acceptance of E-learning

This section gives an overview of individual studies and meta-analysis of the acceptance of new learning technologies with a view to identifying the central issues that pertain to an explanation of acceptance and use of these new technologies within education, and where the knowledge gaps still exist.

Hu, Clarke & Ma (2003) looked at technology acceptance among 130 Hong Kong teachers. They were surveyed before and after a 4 week training course in using Power Point. The authors point out that as a user group, 'teachers are relatively independent and have autonomy over their teaching activities, including technology choice and use' (p.288). Furthermore, teachers often have heavy workloads and time constraints that make it difficult to take time to practice with new technology.

The authors found that perceived ease of use and usefulness were the most important factors in determining technology acceptance. When measuring technology acceptance, the authors use ‘behavioural intention’ as their dependent variable, because they believe there is a strong causal link between intention and actual behaviour. It is of course much easier to measure intention as it simply requires the researcher to ask teachers what they intend to do. Measuring actual use is more difficult, but it could be argued that people often do not carry out what they say they intend to do. This is further discussed in Section 3.8.5.

Pynoo *et al.* (2011) addressed this in their study of Belgian secondary teachers’ acceptance of a Digital Learning Environment (DLE). They believe that looking at technology acceptance among teachers is particularly important as teachers often have a central role in forming students’ attitudes. They measured technology acceptance both by asking teachers about their intentions and by measuring their use of the DLE by looking at the system’s log. They found that behavioural intention did indicate actual use in this case. However, they noted that behavioural intention is not the same as behavioural expectation which takes into account factors that might interfere with actual use. Although this study is relatively unusual in using actual use as a measure of technology acceptance, the authors note that it is often difficult to do this and it is not recommended for use with relatively inexperienced subjects who are still learning to use the technology. The study found that teachers’ actual use of technology depended mainly on its perceived usefulness for their lessons as well as pressure from their superiors. The authors concluded that if technology is to be actually used then it may be necessary for schools to enforce its use.

Some authors have found that some technology acceptance models do not fully explain technology acceptance as they lack a cultural dimension. Sánchez-Franco *et al.* (2009) explored the impact of cultural background on technology acceptance in university lecturers contrasting those from a ‘Nordic’ and ‘Mediterranean’ background. They focused on two of Hofstede’s cultural dimensions- individualism and uncertainty avoidance, and examined the relationship of these factors to technology acceptance.

The authors concluded that cultures that were individualistic and had low uncertainty avoidance might be more likely to adopt technology they perceived as useful. Saudi Arabia, however, scores low on individualism and uncertainty avoidance. One interpretation of this score is that Saudis are not innovative and need a lot of encouragement and support in order to take risks such as introducing new tools into their pedagogy. The authors do concede that within a culture there will be individual differences and that this means, for example, that not all Saudi teachers will have the same degree of individualism or uncertainty avoidance. Signorinia *et al.* (2009), comment that every social interaction, involving those in the learning setting of higher education, is culturally affected. Intercultural relations are regarded as intrinsically conflicting and involve intercultural contact in the environment of education as an element of these possible conflicts. Hofstede recognized four cultural dimensions; these dimensions are uncertainty avoidance (UAI), masculinity (MAS), individualism (IDV), and power distance (PDI). Moreover, Hofstede utilized 'constructed scaled indices' in order to rank every nation inside the dimension thereby establishing a typology of national cultural differences. This led Hofstede to argue that every dimension formed behaviours in various social settings including education. Later, Hofstede added another dimension, namely long-term orientation (LTO) and short-term orientation (STO) towards time in order to avoid cultural bias.

Teo *et al.* (2009) used Davis' technology acceptance model (TAM) to explore and compare technology acceptance in 495 Singaporean and Malaysian pre-service teachers. They found differences in intention to use the technology (ITU) and attitudes towards computer use (ATCU); with Malaysian teachers having more positive attitudes. The authors explain this by suggesting that this was because they felt more in control over using the technology, whereas Singaporean teachers felt that its use was obligatory. ACTU had a stronger effect on ITU than Davis originally suggested. One implication of this study include is that training in the use of e-learning tools may need to be ongoing, as this technology changes and teachers are increasingly faced with students who may be adept at using new technologies and may expect teachers to use technology as part of teaching. Sugar, Crawley & Fine (2004) found that teachers do feel insecure about using technology if they think that their students know more than they do.

In order to successfully implement e-learning technology, teachers not only have to accept it, but continue to use it in their classrooms. Bhattacherjee's Continuance Theory (2001) is based on the idea that after using a tool for some time, the user forms ideas about how useful that tool actually is and whether their initial expectations of it have been confirmed. This, in turn, affects their level of satisfaction and explains the users' willingness to continue using the tool. Sørebø *et al.* (2009) believe that it is the continued use of e-learning tools that is key and used self-determination theory (Gagné & Deci, 2005) to explain teachers' motivations to continue using e-learning technology. They surveyed teachers and focused on their attitudes and use of learning management systems such as Blackboard, Moodle and Fronter.

Self-determination theory looks at intrinsic motivation i.e. the interest and enjoyment a teacher feels in using the tool; and extrinsic motivation where the teacher is motivated by rewards or wanting to feel they are doing an activity that is approved of. Teachers are more likely to be motivated if three basic psychological needs are fulfilled – the need to feel connected to others (relatedness), to feel effective (competence) and to regulate their own behaviour (autonomy). Sørebø *et al.* (2009) found that perceived competence had the strongest influence on intrinsic motivation and thus that training and support was crucial to implementing e-learning technology. This should be done both at the initial stages to give teachers basic competence and continually to improve this competence. It is also important to give teachers realistic expectation of what the technology can do and to emphasise that these tools do not just serve the interests of students but also enhance the teacher's professional skills.

Liaw *et al.* (2007) wanted to develop guidelines for implementing an effective e-learning environment. They distinguished three aspects of user perceptions: affective (perceived enjoyment), cognitive (perceived self-efficacy and usefulness of the tools) and behavioural (intention to use). Thus, how much a user enjoys the technology and how useful and easy-to-use they think it is will influence intention to use it. The authors note that e-learning is a revolution in education; however, it not only makes education more accessible but gives teachers and students 'formidable challenges' (p.1079). In order to develop an effective e-learning environment the authors recommend the following strategies: implementing highly autonomous learning and vivid multimedia instruction; enhancing teacher-learner communication and improving learner effectiveness. They end by saying that more research is needed on how this should be achieved.

Šumak *et al.* (2011) conducted a meta-analysis of 42 independent papers of technology acceptance in e-learning. They note that at that time the TAM was the most commonly used model and type of user and type of technology the most significant factors to explain the causal relationships in the model. The authors' analysis suggest that in 2011 there was only a "small presence of studies that have used UTAUT as a ground theory; therefore, future research needs to include studies that will evaluate this state-of-the art theory in the field of e-learning acceptance" (p.2076). It is also suggested that further research needs to be carried out into the moderating effect of factors such as cultural type on technology acceptance.

3.6 Teachers' Acceptance of Technology

Many studies have shown that teachers are not using educational technology effectively, in spite of evidence which strongly suggests that these tools have the power to transform both teaching and learning (Lim &Khine, 2006). Bayhan *et al.* (2002), suggest that the main reasons that 81.8% of teachers in their sample did not use computers in the classroom, was inadequate professional development and the resultant lack of confidence. Jones (2004) and Scrimshaw (2004) also found these factors to be important along with a lack of knowledge about the advantages of using e-learning tools and inadequate technical support.

If teachers are to use e-learning to tools effectively, they need to be able to appreciate exactly the pedagogic role of these tools and to keep up with innovations (Zhao *et al.,* 2001). Thus, their attitudes and perceptions are key in determining whether they will use these tools effectively in their practice as well as how adept they are at using them; (Paraskeva *et al.,* 2008) how complex the technology is (Thong *et al.,* 2002) and the facilitating conditions in their educational environment (Ngai *et al.,* 2007). All such factors have to be taken into account when assessing teachers' technology acceptance.

Thus part of the role of teachers is to encourage students to utilize e-learning through their education process through clarifying the advantages of e-learning such as decreasing the cost of travelling, the availability of educational content at any time and the ease of interaction between the learners and teachers and the learners themselves.

Teacher acceptance can also vary according to other factors, as was demonstrated by a recent study of 673 male and female primary and secondary teachers in South Asia which found that teachers were generally positive about using technology; but that males rated higher for their perceived ease of use (Teo, 2014). This indicates that demographic factors may have a bearing on teachers' acceptance of new technologies. There is also some indication that acceptance can vary by subject taught, as shown in another study of 62 teachers in Hong Kong tested teachers' acceptance before and after a 10 month trial with mobile devices. The teachers were divided into two groups, the first comprising maths and science teachers and the second teachers of language and humanities. Anxiety was reduced after the trial but there was no significant change in attitudes. Language and humanities teachers' scores for perceived ease of use and usefulness were not as significantly affected as the scores for maths and science teachers. The authors concluded that training needs to be subject-specific and that any increase in workload produced by expecting teachers to adopt new technologies need to be taken into account (Chiu & Churchill, 2016).

These findings were echoed by a study of 228 primary and secondary teachers in the Czech Republic who took an on-line course in using new technologies in education. Questionnaires were issued to participants on completion of the course. The factors which positively affected acceptance were: looking forward to doing the course, studying independently, using the video materials available and being able to work unaided. The authors concluded that training needs to be voluntary, as teachers can resent being forced to train, especially if they have heavy workloads. Motivating teachers to train and accept new technologies means making them aware of how these can enhance and change their teaching, rather than just acquiring new digital skills (Hrtonova *et al,* 2015).

Teacher acceptance of learning technologies may also be influenced by the socio-cultural context in which it takes place. In Saudi Arabia, 165 female faculty members at King Abdulaziz University were surveyed (Al Farani, 2015). The author was interested to know how two factors – resistance to change and perceived social culture-affected acceptance of m-learning; and found that resistance to change negatively affected both intention to use and actual use of the technologies and that this was more significant for older participants. Perceived social culture also strongly predicted intention to use and current use, in other words, participants most strongly affected by traditional Saudi culture were less likely to adopt m-learning technologies. Such participants expressed concerns that students could misuse devices, especially those containing a camera (*ibid).*

3.7 Conceptual Framework

3.7.1 Introduction

This study is based on the UTAUT model; however, most studies that make use of this model do not apply it to public education. Through studying this model, it is observed that there is a need to modify and add a number of elements while applying this model to the Saudi context. Once this has been done, this model can be applied to public secondary education, in order to more effectively explain the factors that explain technology acceptance and the barriers to it.

In his study on e-government in Qatar, Al-Shafi (2009) concludes that successful implementation of an e-system requires a high level of commitment on the part of decision makers to sustain implementation and that proper funding is crucial to facilitate the infrastructure that is to support it. He identifies that committed leadership, legislation, such as that relating to data protection and the need to focus on the real needs of users are essential to success. These factors will need to be explored in this study when exploring how decision-makers are approaching the implementation of new technologies in the Saudi secondary system and the role of education policy in technology acceptance.

In her study of technology acceptance among university students, also in Qatar, Akbar (2013) notes that in order to make proper use of the UTAUT model, it is essential to consider the cultural context of the study and to have a large enough sample to adequately test the influence of each factor. She also suggests that attitudes towards using technology, self-efficacy and anxiety about using technology were important in the context she studied; these points will be taken into account when creating the theoretical framework for the current study.

Al-Shafi (2009) also examines the role played by technology acceptance in the process of implementation and in particular the contribution of the UTAUT model and its underpinning theories in explaining technology acceptance and how its constructs can be applied to the specific context of e-government in Qatar. He considers how the impact each construct is to be measured, for example, performance expectancy is to be measured by looking at the perceptions of users about the benefits of e-government technology in terms of saving time, money, effort, facilitating communication with the government and improving quality by providing citizens with an equal basis for this communication. Thus it can be seen that constructs within the UTAUT can usefully be related to specific contexts in order to refine investigation of how it impacts on technology acceptance and use. Al-Shafi also examines how the demographic variables of gender, age and educational level directly affect use of the technologies involved in e-government in Qatar. Nassuora (2012) also adapts the UTAUT model to study acceptance of m-learning technologies in Saudi university students. He concludes that attitude is a very important factor and positive attitudes to m-learning technologies correlate positively to intention to use; and also that it is vital to have an educational policy that supports the implementation of m-learning technologies. In this study, the factors that specifically relate to the Saudi secondary context will be identified and used to adapt the UTAUT model.

3.7.2 The Revised UTAUT model and its elements

Based on a review of the literature and the preliminary exploration of the field in Saudi Arabia, a revised model of the UTAUT is proposed for the purposes of this study. Each of the constructs will be defined and a rationale of its inclusion will be given.

The following figure 3.3 illustrates the UTAUT model and its major and minor elements:

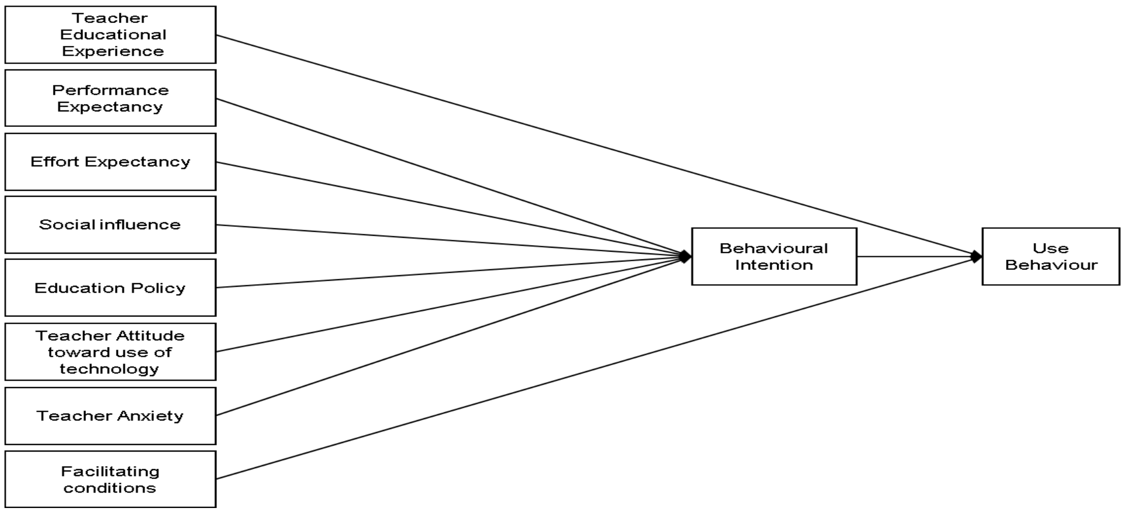


Figure 3.3 UTAUT model revised for the purposes of this study

3.8 The Major Elements of the Revised UTAUT

Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Education Policy, Teacher Educational Experience, Teacher Attitudes and Teacher Anxiety are the major elements of the revised UTAUT model.

3.8.1 Performance Expectancy

As mentioned by Venkatesh *et al.* (2012), Performance Expectancy (PE) is the extent to which the use of a particular technology is perceived as offering a number of advantages to the users throughout the process of performing particular activities. Performance Expectancy is has consistently proved to be the most significant forecaster of behavioural intention. According to Alotaibi & Wald (2014), Performance Expectancy is thus the extent to which individuals thought that using the system would benefit their performance of tasks. As such, it is a strong forecaster of intention in both mandatory and voluntary settings. Thus, PE is one of the most significant factors in determining the level of acceptance, because users usually look to predicting the degree of benefit to be gained from a particular technology.

The Performance Expectancy construct is formed from the combination of five factors from previous models; consisting of outcome expectations, relative advantages (innovation diffusion theory), job fit (PC utilization model), external motivation (motivational model), and perceived usefulness (technology acceptance models) (Raman *et al.*, 2012). Performance Expectancy replicates perceived usefulness associated with the usage of technology, which suggests that when users gain several advantages from using the technology, the efficiency and performance of that technology will be accepted. Consequently, Performance Expectancy will influence the satisfaction of user and their intention to persist with use (Alwahaishi & Snášel, 2013). According to Bere (2014), PE is a good predictor of intention to utilize information technology; and it can be applied to an educational context. Learners will perceive e-learning as precious if it allows them to accomplish their learning aims and objectives with more flexibility and speed or even enhances learning.

Pullen *et al.* (2015), in their study of how pre-service teachers in Malaysia used digital technologies in their learning, found that Performance Expectancy was one of the factors that significantly determined behavioural intention to use digital technology for learning. In a wider study of technology acceptance, Momani & Abualkishik (2014) reviewed eleven models utilised in studies of e- learning. They found that elements used by the UTAUT model were most widely used in these studies; and that, of these, PE was the most influential factor. The literature generally concurs that performance expectancy is a significant predictor of behavioural intention to accept and use digital educational technology.

Consequently, in this research, Performance Expectancy was explored in order to answer the question: To what extent and why does performance expectancy explain variances in the behavioural intention to use e-learning technologies by Saudi secondary teachers?

3.8.2 Effort Expectancy

Venkatesh *et al.* define Effort Expectancy (EE) as “the degree of ease associated with the use of the system” (2003 p.450). Effort Expectancy is considered a very significant factor because it aids users in the process of assessing the extent to which efforts are demanded for the usage of particular technology (AlAwadhi & Morris, 2008). According to Lowenthal (2010), in an educational context, EE is identified as the degree to which users believe that an e-learning system is easy to use. Pynoo *et al.* (2011) suggest that EE is related to technology acceptance constructs concerned with perceptions about how easy it is to use particular technologies, such as the TAM's perceived ease of use.

If individual users have to make an enormous effort to competently utilize an e-learning system they will not feel satisfied; consequently, Effort Expectancy will affect the satisfaction levels of users. Moreover, users may stop their usage if e-learning system suppliers do not offer them a system they experience as easy to use. Furthermore, it is indicated that the influence of perceived ease of use has the same effect as EE when it comes to the satisfaction of users and persistence of usage (Alwahaishi & Snášel, 2013).

According to Ghalandari (2012), Effort Expectancy is the degree of convenience perceived for the usage of a system; and is semantically akin to constructs in other theories and models; notably, complexity (Innovation Diffusion Theory and PC Utilization Model), and perceived ease of use (Technology Acceptance Model). Khechine *et al.* (2014), point out that EE is the second independent variable in the UTAUT; and may become an issue for users once they realize the challenges involved in using a particular technology. Technologies that are perceived as easy to use are more likely to inspire users to adopt them.

Tosuntas *et al.* (2015) surveyed 158 secondary teachers in Turkey about their use of interactive whiteboards in order to examine the relationship between elements in the UTAUT model. Their findings support those of Moran *et al.* (2010); Wong*et al.,* 2012, Teo *et al.* (2012), Venkatesh *et al.* (2003) Wang & Shih (2009) and Wong*et al.* (2013) in that Effort Expectancy had a positive effect on behavioural intention to use the boards. Generally, teachers say that they are more likely to make use of equipment that they find easy to use and this has implications for schools finding solutions to hard and software difficulties that teachers may encounter.

It should be noted, however, that the impact of EE is fluid, as Bellaaj *et al.* (2015) discovered in their study of student acceptance of a virtual learning system at the University of Tabuk in Saudi Arabia. Their study revealed that EE does have a positive impact of behavioural intention but that decreases with experience, whereas the reverse is true of Performance Expectancy. Thus, as users become more knowledgeable and confident about using systems they are less worried about how easy it is to use. Nevertheless, the literature reveals that Effort Expectancy is important in determining whether users intend to make use of digital technology.

Consequently, in this research, effort expectancy was explored in order to answer the question: To what extent and why does effort expectancy explain variances in the behavioural intention to use e-learning technologies by Saudi secondary teachers?

3.8.3 Social Influence

Social Influence (SI) is defined by Venkatesh et al as “the degree to which an individual perceives that important others believe he or she should use the new system” (2003 p.451).Social influence is identified as the impact that the views of significant others about the technologies in question exert on the user. Significant others can include family, peers, bosses or subordinates. Social influence is described as a subjective norm in C-TAM-TPB, TPB/DTPB, TAM2, TRA, part of someone’s image in IDT, and social factors in MPCU. Bere (2014), notes that all these constructs have in common the idea that the attitudes of others influence behaviour. SI is thus an important factor in terms of using e-learning tools; as it has been shown to influence the commitment of individuals to utilize an information system and is very significant in specifying usage behaviour and acceptance by new adopters of technology (Riad *et al.* 2013). Social Influence along with computer/internet self-efficacy, relevance, awareness, satisfaction, actual use, perceived usefulness, and ease of use extensively correlate with the acceptance of e-learning. It is anticipated that the SI will be moderated by experience, voluntariness, age, and gender (Venkatesh *et al.* 2012).

In the context of education, Social Influence has an important influence on the behavioural intention of teachers to utilize e-learning technologies; and the behavioural intention of teachers is considered an influential predictor for the usage of e-learning system (Adegbite & Downe, 2005).

In their review of twenty studies, 12 of which were in an educational context, and which used the UTAUT model, Attuquayefio & Addo (2014) found that the effect of SI varied both across and within countries. A further review of the literature yielded examples of this: Kocaleva *et al.* (2015) surveyed teaching staff at all 13 faculties in the University of Goce Delev in Macedonia and found that SI was a very significant factor in determining behavioural intention. Staff there generally agreed that significant others in the workplace both wanted them to use e-learning (75%) and that the management supported them in this (80%).Conversely, the meta-analysis of 174 studies by Williams *et al.* (2015) found that, although it came close, Social Influence did not sufficiently meet the requirements to be regarded as a reliable predictor of technology acceptance and use. Given the varied results for this element of the UTAUT model, its impact needs to be assessed in the Saudi secondary context.

Thus, in this research, SI was explored in order to answer the question: To what extent and why does Social Influence explain variances in the behavioural intention to use e-learning technologies by Saudi secondary teachers?

3.8.4 Facilitating Conditions

Facilitating conditions (FC) are defined as 'the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system' (Venkatesh *et al.,* 2003 p. 453). Facilitating conditions join constructs from four various models, which are: compatibility from IDT, facilitating conditions from MPCU, and perceived behavioural control from C-TAM-TPB and TPB/ DTPB (Bhatiasevi, 2015).In the context of information systems, support provided for PC users can be considered as an aspect of FC as it can affect the utilization of the system (Venkatesh *et al.,* 2003).

School environment, digital content, infrastructure, and equipment are considered facilitating conditions that affect the usage of technology in the learning environment. School environment includes the emotional, academic, and social contexts of school and how this is perceived by the community, staff, and teachers. The whole climate is affected by a wide range of factors ranging from disciplinary procedures to the quality of instruction by teachers and student morale. A school environment that is positive creates the most favourable setting for learning and teaching. Moreover, it is indicated that school could be a supportive environment for teachers, both academically and emotionally, especially in the case of crisis or transition (Blum, 2005). In order to support digital content, the school's infrastructure arguably needs an international Internet bandwidth, secure internet servers and reliable production of electricity in addition to the digital content's accessibility (Dutta & Bilbao-Osorio, 2012). Content should be involved in school's local area network (LAN) rather than just being on the internet. In addition, it is demonstrated that a digital library on a server on LAN would be a precious advantage, as it is able to store each kind of digital content. This enables teachers to take advantage of accessing the programmes with ease (Phau & Teah, 2009).

In their study of technology acceptance among academic staff at Aljouf University in Saudi Arabia, Alkhasawneh & Alnazy (2015) found that FC related positively to behavioural intention in that staff members who perceived there to be a good organisational and technical infrastructure to support the system were more likely to say they would use it. However, there was no significant difference between male and female staff or among the different age groups in their sample. The authors concluded that the impact of the moderating factors of gender and age lessened as technology becomes more generally used by both genders and all ages, especially in an academic group such as university teachers who are likely to be familiar with it. However, in a very different context, Khechine *et al.* looked at acceptance of the use of webinars among students at Laval University in Canada. They reported that although Facilitating Conditions directly impacted on the students' intention to use the webinars, gender was not significant. Interestingly, age seemed to make a difference in that older students were more concerned about Facilitating Conditions and were more likely to stress the importance of support, whereas in younger students, Performance Expectancy had a bigger impact on intention to use. The authors suggest that the age of users could be taken into account when assessing the needs of users.

According to Venkatesh *et al*. (2003), the UTAUT model does not show the impact of Facilitating Conditions on Behavioural Intention as it is assumed not to be significant when including Performance Expectancy and Effort Expectancy. Thomas *et al*. (2013) cite some studies that confirm this point (Al-Gahtani *et al*., 2007; Wang &

Shih, 2009; Im *et al*. 2011 and Nassuora, 2012), but mention that Jairak *et al*. (2009) note a positive effect of Facilitating Conditions on Behavioural Intention. Although the UTAUT model suggests that Facilitating Conditions do not affect Behavioural Intention, FC could well become a key predictor of Behavioural Intention whenever there are constraints on resources.

Thus, in this study Facilitating Conditions was explored in order to answer the question: To what extent and why do Facilitating Conditions explain variances in the use of e-learning technologies by Saudi secondary teachers?

3.8.5 Behavioural Intention and Use Behaviour

Behavioural Intention (BI) is defined as the subjective probability that users will carry out the behaviour in question; thus it is supposed that Behavioural Intention will significantly affect the usage of technology (AlAwadhi & Morris, 2008; Riad *et al,* 2013) Behavioural Intention is assumed to be influenced by attitudes toward the usage and the direct and indirect influences of perceived ease of use and perceived usefulness. Both perceived ease of use and perceived usefulness mutually influence the attitudes towards technology usage, at the same time as perceived ease of use directly affects the perceived usefulness. However, the reverse cannot be assumed to be the case since perceived usefulness is about job outcome, while perceived ease of use acts independently as it can be argued that a technology it will not be utilized if the teachers believe it is too complicated to use, irrespective of any belief about its possible usefulness (Teo, 2011).

Behavioural Intention is considered the most significant determinant of the behaviour of individuals, and the intention of teachers to carry out behaviour is a mixture of subjective norms and attitude towards performance (Al-Qeisi, 2009). Moghavvemi *et al*. (2013) point out that the UTAUT model does not assess the factors involved in the relationship between Behavioural Intention and actual use Indeed, there is a difference between teachers stating that they intend to use e-learning technologies and actually doing so. The study by Azjen *et al* study reveals that there is a strong possibility that people "overestimate the likelihood that they will engage in a socially desirable behaviour". They suggest overcoming this difficulty by using a 'corrective entreaty' which explains the importance of correctly assessing BI (2004, p.1119). In this research the 'corrective entreaty' can be said to be the covering letter which urges participants to say what they really mean. Also, the interviews can check on the relationship between Behavioural Intention and actual use.

In the original UTAUT model, all the factors affect Behavioural Intention with only Facilitating Conditions directly affecting actual use. The revised model used in this study will also look at the effect of teacher dimensions (See fig. 3.3) on whether teachers who say they intend to use e-learning technologies actually do so. In this way it will be possible to explore the variables that intervene between intention and use and to see the extent to which intention affects use. As Venkatesh *et al* pointed out in their initial study in 2003: "little to no research has addressed the link between user acceptance and individual or organizational usage outcomes" (p.470).

Thus, in this research, Behavioural Intention was explored in order to answer the question: To what extent and why does Behavioural Intention explain variances in the use of e-learning technologies by Saudi secondary teachers?

3.9 Suggested Elements for the Proposed Revised UTAUT Appropriate for Saudi Society

It is proposed to add a number of elements to the UTAUT model (see fig. 3.3), as the literature and experience of the researcher has identified that these elements appear appropriate to the Saudi context. The revised model is designed to allow for a fuller analysis of the acceptance and use of new educational technologies by Saudi secondary teachers and to answer the research questions.

3.9.1 Education Policy

Education Policy (EP) is considered one of the most significant aspects of a government's agenda across the world, and because of the great interest in education, most governments concentrate on education policy outcomes as well as its implications for social citizenship and economic prosperity. Education policy deals with cultural, technical, political, and organizational issues and this includes policies about the implementation of information and communication technology. Like other countries in the world, Saudi Arabia regulates and initiates a strategy for the acceptance and adoption of new technology in its educational system (see Chapter 2), in order to cope with recent economic, cultural, and social challenges of a borderless digital world (Bell & Stevenson, 2006). Haddad & Demsky (1995) suggest that there are several steps that should be followed when forming efficient information technology policies, taking into account that technology is improving much more rapidly than the practices of business and law. In the sphere of education, there will need to be policies about computer networks, acceptable computer usage, dissemination and electronic content creation, course copyright, encryption and transaction logging. These policies should deal with important issues such as fair-use, ethics, sensitive data privacy, electronic communications etiquette, encryption and security, access for the disabled, the management of passwords, and access to the Internet and intranet. According to Madge (2011), there are a number of major issues that should be considered when formulating educational policies; these issues are represented by the communication and technical infrastructure, the supporting public and legal policies, reasonable accessibility to the electronic resources, privacy and security of centralized information, resource archives, digital devices and data, the integration of interoperable systems and a campaign for citizen awareness with uncomplicated interfaces.

Training is an aspect of Education Policy and includes the improvement and promotion of information and communication technologies in learning and teaching. Such training policies can involve the improvement of e-learning resources and the facilitation of private-public partnerships in order to mobilize resources for supporting the e-learning initiatives. They can also promote the establishment of an incorporated of e-learning curriculum in order to support information and communication technology in education and encourage virtual institutions and distance education. Policies regarding Secondary education can facilitate the dissemination of skills and knowledge throughout the platforms of e-learning; endorse the improvement of content in order to deal with the instructive needs of teachers and let teachers take proper advantage of information and communication technologies. If these are considered important educational tools, then policies can grant teachers the opportunity of sharing e-learning resources among the different institutions and integrate these resources with the other available resources

(Khan, 2014). The improvement of the curriculum, as well as teacher training both at pre-service and in-service level are central to the efforts of government to accomplish the policy objectives that concern the acceptance of e-learning; and this can be achieved through addressing the needs of teachers (Hennessy *et al*, 2010).

Humans are considered to be one of the most significant factors in the information technology system, in that they can make the system work more effectively. Consequently, the teachers' role in the environment of e-learning is very central, and indicates that the teachers' importance in that environment may be rising. In view of this, education policy is also important in terms of how it views the role of the teacher vis-a-vis e-learning. Teachers have to intensify their work, become familiar with the concepts and tools of this new environment and know how to make best use of the benefits it can offer. If this is done, teachers can make important contributions to the e-learning environment, especially when they want to teach courses through the system of e-learning (Yengina *et al*, 2010). Donnelly & McSweeney (2008), suggest that teachers' efforts need to be considered in terms of preparation, since this involves process modelling and defines the major issues in the system of e-learning i.e. the efficient usage of technology in the teaching process. A second aspect is the teacher's management of the system, which affects the students' learning process and contributes to their acceptance of the e-learning system.

According to Bjekic *et al.* (2010), teachers can develop the ability to construct their own teaching in the environments of e-learning in terms of method as well as content. Active learning is one of the methods that are used by teachers, in which the students should be active throughout the learning process and participate fully; and this can be accomplished when the students are effectively engaged in the learning process. This learning strategy proposes that students must be right at the heart of learning. Because the system of e-learning includes self-regulated activities, the efficient learning strategies might be very beneficial because the students are responsible for their own learning. These strategies make students participate more in the teaching and learning process than if they were simply the passive recipients of lectures. Osepashvili (2008) believes that there are a number of methods that can be utilized by teachers to motivate students and to make them feel more involved in lessons. One such is giving students effective and regular feedback which is one of the most significant aspects of any type of communication, particularly in the processes of learning. When designing and implementing learning activities, teachers need to be aware of the importance of offering good feedback, especially in e-learning situations where there is an absence of face-to-face interaction. Consequently, teachers have to be familiarized with the significance of feedback and the most effective ways it can be given.

Rules and regulation are considered one of the most significant methods and instruments that are used by governments to influence the behaviour of individuals in the education sector. These rules and regulations are important in the process of implementing an e-learning system, and serve both private and public concerns. They can be used to encourage individual responsibility, generate common political and economic values. Moreover, these rules and regulations can help teachers make effective use of an e-learning system by enabling them to understand the system and use it productively for the benefit of their students. It has been suggested that there are a number of rules that should be followed for making an e-learning system acceptable among teachers; such as how to best present educational material online, the manner and the level to which teachers are resourced, how teachers and students can communicate, how teachers are to be managed, the operational flexibility that teachers have and the regulations that involve teacher registration (International Council for Open and Distance Education, 2013). Harley & Lawrence (2012) suggest that regulation of the content and quality of e-learning system are frequently is carried out by many governments; these regulations are important in that they illustrate the responsibilities and the rights of teachers.

The competence and qualifications of teachers are the abilities, skills, knowledge, and motivational disposition that offer the efficient realization of the activities of teaching and Education Policy describes what is expected of teachers in this area. The competences of teacher involve three major competences: Firstly, educational competencies that demonstrate the system of motivation dispositions, abilities and skills for realizing their educational roles. Secondly, course content competencies or programme competencies, which are the skills and knowledge to improved abilities and create course content for teaching students and providing them with skills and knowledge, Thirdly, communication competences which are the motivation, disposition, skills, and knowledge need for effectively carrying out the social interactions of teaching and realizing the goals of that communication. In order to achieve the predicted results of using an e-learning system, the teachers have to implement effective models of multimedia teaching (Bjekic *et al*, 2010). According to Education and Culture DG (2011), e-learning teaching and e-learning education are mostly dependent on several professional establishing technological standards for teachers. Some standards involve the general competences and qualifications of teachers in the application of information and communication technology; other standards refer to particular e-competences for particular e-learning systems. There are three major dimensions to the information and communication technology competences of teachers; these dimensions are the knowledge of teachers about using the activities of learning in teaching, teachers' competence in the most significant skills for utilizing software and hardware (ICT readiness), and the teachers' knowledge of the didactical-pedagogical elements of the information and communication technologies.

It can be seen that Education Policy comprises many aspects and that in relation to this study, the issues of training, the role of teachers and rules and regulations are of importance as well as policies about the more technical aspects of the implementation of e-learning.

For this reason, in this research, Education Policy was explored in order to answer the question: To what extent and why does Education Policy explain variances in the behavioural intention to use e-learning technologies by Saudi secondary teachers?

3.9.2 Teachers' Educational Experience

According to Donnelly & McSweeney (2008), Teacher Educational Experience (TEE) is very significant for the acceptance of an e-learning system as well as planning for it, as teachers can acquire an understanding of what it is like to learn by using a range of educational technologies. This can be augmented by the creation of thoughtful training which examines the techniques for supporting e-learning systems and encourages teachers to involve their educational experiences to help their own students to accept and adopt e-learning system. This notion is supported by Giannakos & Vlamos, 2013) whose study demonstrated that learners' prior experience influences their behavioural intentions to use an educational webcast. The authors suggest that in view of this, hands-on training is essential for those with little or no experience. The study by Pullen *et al* (2015) of pre-service teachers' use of digital technologies also pinpoints how a teacher's own experience of learning influences technology acceptance. According to Alexander (2001), educational experience may be very important in providing teachers with the confidence to use e-learning technologies in their classrooms. Teachers may draw on their own experiences of being taught through these technologies in order to overcome any challenges involved in using e-learning tools.

The initial interviews revealed that only teachers who had recently qualified had had any experience of being taught using e-learning technologies. Indeed Robertson & Al-Zahrani (2012, p.3) note that "effective integration of technology in Saudi pre-service teacher education seems to lag behind other developments in the country. There is too little teacher preparation and training in terms of ICTs". However, digital technology is widely used by Saudis at home and teachers may be using it to educate themselves.

Thus, in this research, Teacher Educational Experience was explored in order to answer the question: To what extent and why does Teacher Educational Experience explain variances in the use of e-learning technologies by Saudi secondary teachers?

3.9.3 Teachers' Attitudes towards Using Technology

Recently, there has been a lot of research into the use of information and communication technology in the field of education. This usage has spread around all over the world, and also particularly in the Arab world. However, teachers have different attitudes toward the usage of technology in education; some agreeing with the use of ICT whilst others have misgivings. Some teachers have these negative attitudes for several reasons: such as lack of confidence and skills in using the technology, the lack of educational training courses that support teachers to use information and communication technology, and the lack of efficient pedagogical and technical support. Understanding attitudes and their influence on teachers is crucial; and an exploration of teachers' attitudes will allow a better understanding of the extent to which they accept e-learning systems (Awan, 2011). It has been suggested that teachers need to go through a number of psychological stages during the application of new technologies and that teachers' concerns about these new technologies should be taken into account. There are three stages in the concerns that follow the introduction of a new technology: the stage that concerns the self, the stage concerned with task implementation and management, and the stage that takes into account the effects of using technology on students (Shirvani, 2014).

One of the greatest social changes that the modern era has witnessed is arguably that made by information and communication technology, notably, the Internet, which can transport an enormous range of data instantly and easily into homes, workplaces and educational establishments, so deserve to be considered one of the top innovations of the last twenty five years. The Internet can function as great library that can be used remotely and save time. However, some of people have challenged the role of this changing technology and are resistant to using this technology in general and the Internet specifically (Koksal, 2013). Therefore, instructional technologists are very significant for fostering and implementing the acceptance and adoption of innovative devices and programme to enhance the processes of teaching and learning. Undeniably, instructional technology and its aim to improve teaching have developed more rapidly than its utilization and acceptance in the classroom; and teacher resistance is considered one of the factors that influence the acceptance of e-learning. Thus, understanding teachers' resistance to change will be very significant in an analysis of technology acceptance (Parlakkılıç, 2014).

Therefore, in this research, Teachers' Attitudes Towards use of Technology (ATT) was explored in order to answer the question: To what extent and why do Teachers' Attitudes towards Technology explain variances in the behavioural intention to use e-learning technologies by Saudi secondary teachers?

3.9.4 Teacher Anxiety

Computer anxiety has been variously described as the emotion that people feel when confronted with the possibility of having to use computers. These emotions can range from unease to fear. (Alenezi *et al,* 2010) In their study, Celik & Yesilyurt (2013) refined the definition and made use of a 'computer anxiety scale' which comprised of four distinct factors: "affective anxiety toward computers; fear of damaging computers; fear of learning to use computers and sense of confidence toward computers" (2013 p. 152).

Teachers with long experience in the use of computers have greater confidence in their ability in using these devices efficiently. The competence of teachers is directly connected to their confidence to utilize technological devices in the classroom and especially to the perceived competence of their students; and is considered one of the most important factors that aid in the development of higher confidence in the use of information and communication technology. Moreover, the greater degree of confidence among teachers is connected to the loss of fear of technological devices such as computers (Buabeng-Andoh, 2012). According to Hennessy et al. (2010), the confidence of teachers toward the usage of information and communication technology can be enhanced through programmes that improve confidence in teachers, the regular use of personal computers, a project partner and evaluative activities. A well-built initial pedagogical and technical training, based on relevant curriculum activities that gradually build knowledge and skills in information and communication technology is essential. Furthermore, a commitment by the community, students, and school to encourage the teachers, and affirmative feedback from parents, students, school principals, and peers are instrumental in building confidence.

Teachers' self-efficacy is defined as the beliefs that teachers have about their capability to carry out a diversity of teaching tasks. The self-efficacy of teachers concerning the usage of technology in the classroom strongly affects the integration of that technology into the practices of their teaching. Consequently, the self-efficacy of teachers is considered an important factor in the acceptance of e-learning. Teachers competent at using information and communication technology are expected to have less anxiety about using that technology in their teaching. The self-efficacy of teachers in turn has an influence on the anxiety levels that they feel while utilizing those technologies; and also affects their level of enjoyment as well as their feeling of control while in the processes of utilizing information and communication technology in the classroom (Fathema *et al,* 2015). According to Buabeng-Andoh (2012), there are several factors that can influence the self-efficacy of teachers; these factors involve the specific thoughts that teachers have about their ability to utilize information and communication technology as a tool for instruction, the teachers' philosophy on teaching, their experiences with computers, their past workshop and training concerning the usage of information and communication technology in teaching and the level of assistance needed from others. Gulbahar & Guven (2008), note that teachers with high level of self-efficacy tend to carry on in a situation of failure, use new approaches for teaching, and enhance the achievements of students as well as having more motivated students. When information and communication technology is integrated into the educational context, it requires teachers who consider technology as an efficient method to facilitate the processes of students' learning and perceive it as helpful means to support their education.

In her study of technology acceptance among Qatari university students, Akbar (2013) measured the effect of Self-Efficacy and Anxiety, noting that, along with Attitude, these factors had been excluded by Venkatesh *et al* (2003) from the UTAUT model after reviewing the 8 models that formed its basis. Although she did not find that Anxiety was significant, Self-Efficacy was, in the students' first term. Arguably students who are comfortable with using technology will not necessarily be anxious and worries about performance diminish with practice and familiarity. For many Saudi teachers however, using e-learning is a relatively new potential aspect of their teaching; and it is this lack of familiarity that can cause anxiety. Furthermore, students at an American university in Qatar will presumably have the facilitating conditions that allow them proper use as well as having the time to do so.

Teacher Anxiety (AX) was a factor that the researcher encountered in the initial interviews when teachers explained that had worries about using computers which ranged from security issues to fears that they would damage equipment in some way or lose face with their students. Teachers faced with students who they perceive to be more adept at using technology have reported feeling anxious (BECTA, 2004).

Therefore, in this research, Teachers' Anxiety towards using e-learning technology was explored in order to answer the question: To what extent and why does Teachers' Anxiety about technology explain variances in the behavioural intention to use e-learning technologies by Saudi secondary teachers?

3.10 Conclusion

This chapter has reviewed previous studies concerning the subject of this thesis. These highlight how a feature of modern society has been the development and growth of information technology; resulting in considerable dependence on IT and a concomitant need for citizens to develop the relevant competences and knowledge. The e-learning platform, namely digital resources and technology that exist in the internet network, emerged in order to meet these needs. Researchers vary somewhat in their definitions of e-learning.

The advantages of using e-learning were clarified in this chapter, and these benefits include better accessibility to information, improved content delivery, content standardization, personalized instruction, on-demand availability, accountability, developed convenience, interactivity, self-pacing, and confidence. Moreover, e-learning has the ability to deliver content constantly, and can ultimately reduce cost. Moreover, the studies mention other advantages of e-learning such as flexibility and efficiency in the delivery of learning and the facilitation of communication and interaction. It would therefore appear that this kind of learning will be more beneficial for students compared to traditional methods of learning.

This chapter has also examined the challenges that affect e-learning and hinder its acceptance. These challenges are that e-learning demands academic and technical confidence; can be costly and requires motivation, social support, competency, technical skill, and a constant and effective mechanical infrastructure. In addition, issues of accessibility, the infrastructure of information and communication technology, the efficiency and quality of e-learning, pedagogical consideration are also considered possible barriers to the acceptance of e-learning. Critical factors which need to be addressed for the successful implementation of e-learning, such as proper planning, design and institutional support have also been reviewed.

Some of the tools of e-learning, such as Course Management Systems, Blackboard, WebCT, WebBoard, MOODLE, Blackboard, and social media were examined to highlight their pedagogical functions and how they can transform the learning environment and encourage student participation in learning. In order for teachers to be able to make full use of the benefits these tools offer, educational policies about resources and appropriate training need to be in place if these technologies are to be accepted.

The Unified Theory of Acceptance and Use of Technology (UTAUT) and the eight preceding models on which it is based have been examined with a view to adapting the UTAUT to a specific context, namely Saudi secondary education. The study of technology acceptance in the Saudi education system has been largely restricted to an exploration of Higher Education; and there needs to be further research into the current situation in Saudi Secondary schools. A review of the literature, both in terms of technology acceptance theory generally and in terms of the current situation with regards to the implementation of e-learning technologies in Saudi Arabia has identified the need to apply a refined version of the UTAUT to explore the attitudes and needs of Saudi secondary teachers for effective application of these technologies, this study aims to fill this knowledge gap.

Chapter 4 Methodology

4.1 Introduction

In the previous chapter, the relevant literature revealed gaps in the field, notably those related to the acceptance of e-learning technologies by secondary school teachers in the Jazan area of Saudi Arabia. This chapter outlines how the gaps in the literature are identified in this study; it also describes the methodology of this research. First, a brief review of the positivist, interpretivist and critical realist approaches is conducted to explain the theory that underpins the study and forms the basis of its conceptual framework. This is followed by an explanation of the choice of a mixed-method approach for this research, which is essentially pragmatist i.e. one which is based on accepting what works and rejecting what is impractical (IEP, 2016). The mixed-methods design of the empirical research methodology that serves as a framework for conducting this study is described. The justifications for the methods chosen are in accordance with those generally given in the field of Information Systems (IS) as the research study focuses on models developed in the IS field. Finally, the general research protocols for the process of data collection and analysis are discussed.

4.2 Research Philosophy

The field of Information Systems is not connected to a particular theoretical perspective; consequently, researchers are able to select an appropriate method from a number of research strategies and approaches. Each of these focuses on a different approach to research, as well as providing different perspectives on the nature of knowledge.

Researchers' assumptions about reality and knowledge will affect how they carry out research; in other words, the research methods they use to address their research questions reflect their philosophy (Collis and Hussey, 2003). Although positivism and interpretivism have dominated IS research, critical realism is gaining favour as an alternative approach (Tsang, 2014). This approach tempers positivism, allowing the research to take into account how a phenomenon is experienced by the group that is the focus of interest, in this case, Saudi secondary school teachers.

As the aim of this study is to answer questions rather than to test hypotheses, the positivist approach does not sufficiently address the research objectives. Generally, positivist studies attempt to develop an analytical understanding of a particular phenomenon when quantifiable measures of variables are required to see whether hypotheses about particular phenomena are supported by data obtained from a sample of the population under investigation**.** The positivist approach is interested in factual, scientific knowledge and propositions that are logically consistent, falsifiable, have explanatory power and survive over time (Easterby-Smith *et al.*, 2008). Generalisations can then be made on this basis (Robson, 2002). Thus, the positivist approach aims to discovering predictive laws, and their reliability increases with the size of the sample (Tsang, 2014).

The positivist approach also has limitations, especially when the study is concerned with phenomena in the social, rather than the natural, world. Often, this approach is often not particularly suited to explaining aspects of experience from the point of view of the actors involved (Hirscheim, 1992). This is the case in the present study, as it seeks to understand the experiences and attitudes of Saudi teachers towards digital educational technology. However, if the study is to be able to explain barriers to the acceptance and use of this technology, it is important to be able to quantify certain information, such as how many teachers have access to the internet in their classrooms. Thus, the study requires a blend of philosophical approaches as explained below.

Interpretive studies emphasise becoming familiar with particular phenomena through exploring the meanings that individuals allocate to them. Furthermore, interpretive methods in IS research aim to understand the context of the IS, and they are likely to be used to explore how the IS affects and is affected by that context. Unlike the positivist approach, interpretivism does not see reality as existing independently of people and social events. In the field of information technology, this approach is therefore used to make sense of how research participants conceptualise and understand phenomena rather than to support hypotheses or make generalisations (Oates, 2006).

The critical research approach overlaps with and builds on interpretivism in that it emphasises the importance of gathering qualitative data (Pozzebon, 2004). Critical realist research assumes that social reality is produced and reproduced by individuals in specific settings. Although individuals have the ability to transform their economic and social circumstances, critical researchers recognise that their capability to do so is limited by different forms of political, cultural and social domination. One purpose of critical realist research is to provide social critique, where the alienating and restrictive conditions of the status quo are brought to light (Straub *et al.,* 2005); in the study of IS, this approach is used to explore the power relations that exist in the context under investigation (Oates, 2006).

The current study is informed by the critical realist approach in that it acknowledges that education policy and social influence are important factors in understanding technology acceptance in the Saudi secondary education context. Although making sense of Saudi teachers' perceptions of digital educational technologies is vital in the current study, and it is important to understand the factors –including power relations – that shape them; this is not enough to explain technology acceptance and use, as there is an objective reality which has shaped these perceptions.

Critical realism differs from positivism and interpretivism in that it attempts to look at reality in another way. It considers reality as objective but makes a distinction between the empirical domain, which refers to observed events, and actual domain, which refers to what actually happens regardless of whether it is observed. In other words, critical realism represents the view that there is a world existing independently of our knowledge of it; however, this world can only be known through particular descriptions. It is not purely focussed on law-seeking (nomothetic) processes, like the natural sciences, nor is it just about documenting something unique (idiographic) (Tsang, 2014; Sayer, 2000). Rather, critical realist studies attempt to explain events rather than predicting them by proposing theories about the structures and mechanisms that produce observable events.

Explanations rather than predictions are what are being sought by this study, which is exploratory in nature and is intended to develop conceptual thinking to explain technology acceptance phenomena in a specific context. Furthermore, one could argue that information that is gathered by asking the participants for it represents not so much objective truth as what participants are choosing to disclose to the researcher. At the same time, an objective reality is generating this information. For these reasons, a critical realist philosophy is most suitable for this study. Critical realism provides a robust framework for gaining a better understanding of phenomena in IS studies because it aims to explain these phenomena while acknowledging the importance of how they are experienced by the subjects under study. Thus, what is of central importance is that all types of objects of knowledge – whether physical, social or conceptual –can be adequately examined and substantive theory can be developed (Venkatesh *et al*., 2013).

The critical realist approach does not entail using any particular method of empirical research but rather encourages whatever methods are most suited to the research questions. Therefore, this can be described as a pragmatic approach. There are many versions of pragmatism, but its focus is generally on solutions to problems and finding what works. Therefore, this approach uses the research problem as a starting point, and many techniques address this in a number of ways. Pragmatists see no problem in using both qualitative and quantitative data; however, they acknowledge that it is necessary to provide a rationale for the specific methodology and that research always occurs in a particular context (Creswell, 2014). Furthermore, the 'paradigm should not be an obstacle to conducting mixed methods research in I.S.' and 'researchers should be able mix and match their paradigmatic views and still conduct rigorous mixed methods research' (Venkatesh *et al*, 2013, p.17). This approach is best suited to this exploratory study, as mixed methods will allow the researcher to gather data that will build a strong conceptual framework.

In the context of this research, questionnaire-based quantitative research and interview-based qualitative research has been selected. This mixed-methods approach can be seen as combining incompatible paradigms, as positivism and post-positivism are associated with quantitative methods, interpretivism and constructivism are associated with qualitative methods (Creswell, 2014). There are arguably three ways of resolving this apparent conflict. Firstly, a researcher may ignore the problem, which is referred to as a-paradigmism; this is not really a solution, as a researcher choosing not to say what paradigm underlies his or her research does not mean that no paradigm is present.

Secondly, there is a single paradigm approach, where it is necessary to ensure that whatever paradigm is chosen does not limit the topic or the research methods. Finally, there is the option of mixing the paradigms in what is called a multi-paradigm approach (Creswell, 2014). This third approach is what is used for the present research; this necessitates careful discussion of how the paradigms are operating within the research design.

In this study, mixed-methods research thus incorporates outcomes and draws inferences by using both qualitative and quantitative methods in a particular study, with a number of researchers using a wide variety of methods in the same study, for instance, observation, interviews, and surveys (Hall, 2013; Bergmann, 2011; Fidel, 2008).

4.3 Selecting an Appropriate Research Design

Researchers in the field of IS can select from a range of research approaches, as no one approach is linked to this field (Galliers, 1994). The present study requires the statistical measurement of demographic variables, such as teachers' ages and educational backgrounds, to determine whether and how these variables affect technology acceptance in terms of e-learning tools, as well as to measure teachers' attitudes to these technologies and address the research questions. This information will be acquired through an online survey.

The survey highlights which areas of the study necessitate further exploration of the experiences and attitudes of Saudi teachers to e-learning technologies. Although the survey asks questions related to all of the constructs used in the theoretical model, as well as acquiring general information about the participants and their experience with using e-learning technology, these answers will only address the 'what'. To find out the 'why' more in-depth questioning is needed; a qualitative approach is adopted to accomplish this. Other advantages of this approach are that the researcher can check the participants' understanding of the questions and interviewees have the opportunity to raise issues that the researcher may not have considered.

As answers are self-reported, however, they can be liable to problems, such as inaccurate reporting of behaviour. For example, teachers may have distorted views of how much they use particular technologies. Moreover, survey responses can be open to interpretation; for example, if a participant indicates ‘neutral’ on a Likert scale question, the exact meaning of this response is open to debate. It has been suggested that it may be better to exclude the neutral point and make participants come down on one side or the other; however, preventing the respondent from staying neutral, could reduce the reliability of the scale, as the results will not necessarily be true (Bucci-Page, 2003). Including semi-structured interviews will go some way to addressing these issues, providing an opportunity to strengthen the understanding of the survey data and possibly to explore new areas.

As explained above, purely quantitative and qualitative approaches both have their limitations; however, a mixed-methods design goes some way towards mitigating these limitations and taking advantage of the strengths of each approach (Creswell, 2015).This study therefore aims to integrate both the quantitative data obtained from the survey and the qualitative data obtained from the interview inquiry. Recently, the mixed approach has come of age, and researchers have been more willing to utilise several approaches to collect and analyse data, as they consider that collecting both qualitative and quantitative data will provide the best understanding of the research problem. In addition, researchers who use the mixed approach tend to create an aim for their ‘mixing’ –a justification for mixing qualitative and quantitative data in a particular study (Creswell, 2014). This study aims to integrate the two types of data by using an explanatory–sequential research design, as more fully described below in Section 4.4.2.

A review of the literature was used to delineate a refined theoretical model of technology acceptance on which to base the questionnaire, as well as a thematic analysis of the semi-structured interviews. There is general agreement that the choice of a mixed-methods approach should be driven by the research questions, as well as the research objectives and context (Venkatesh *et al.*, 2013). Thus, addressing the research questions determines which approach should be used in terms of whether quantitative or qualitative data are needed.

The introductory chapter presented the research questions that drive this research and provided a rationale for these questions. Here, the questions are revisited in terms of the methodology that is appropriate for each one.

1. **What are the processes of e-learning implementation and use in teaching in Saudi Arabian secondary education?**
   This topic was initially approached by the researcher through both talking to Saudi teachers informally and observing the situation in Saudi Arabian secondary education for qualitative data. General quantitative data, mainly information from the Saudi Ministry of Education, was acquired by reviewing the literature on the subject. This informed the design of the questionnaire, where the questions were re-formulated into a series of survey items that would yield quantitative information. The Phase Two interviews will be able to gather more details about how and why tools are actually used in the teaching and learning process.
2. **What are the factors that influence the acceptance and use of e-learning technologies in teachers' practices in Saudi secondary education?**
   Having identified a number of factors that affect the use of technology through reviewing the literature on technology acceptance; and those factors that could be applied to the specific context were selected. The preliminary informal interviews that were conducted as a preparatory step for the primary research also yielded a number of factors that were specific to the Saudi secondary school context, and these were also included. Quantitative information was required, as the question implies that the factors should be measured to ascertain whether they have an influence; this is done by identifying research questions to be tested by the survey (see below). The subsequent interviews are designed to generate qualitative data to shed light on what this 'influence' comprises, as well as possibly revealing other factors not covered by the survey.

   This question thus devolves into a number of subsidiary questions that need to be investigated through the primary research, as follows:

- *To what extent and why do Performance Expectancy, Effort Expectancy, Social Influence, Teacher Attitudes, Education Policy and Teacher Anxiety explain variances in the behavioural intention to use e-learning technologies by Saudi secondary school teachers?*
- *To what extent and why do Facilitating Conditions, Teachers' Educational Experience and Behavioural Intention explain variances in the use of e-learning technologies amongst Saudi secondary school teachers?*

3. **How can the Unified Theory of Acceptance and Use of Technology (UTAUT) model be used to better understand what Saudi secondary school teachers perceive they need to effectively adopt e-learning technologies?**
   Having modified and tested the proposed, revised UTAUT model (as explained in Chapter 3) the results of the survey will generate quantitative data to reveal which factors appear to be significant and which do not. Interview data are analysed to further explain this. The model can be revised again if necessary in the light of these findings.

In studies where existing information on the topic is scant, such as the present research, the use of mixed methods 'will be a powerful mechanism to interject context into a research inquiry' (Venkatesh *et al*., 2013. p.36). In a non-Western context, this approach is more likely to 'unearth factors that are not typically common in a developed country' (Venkatesh et al., 2013. p.36).

4.4 Stages of the Research

In this study, the problem has been identified through a series of research questions that are to be addressed using a mixed-methods approach which allows the researcher to move from problem identification to conclusions. The research thus consists of a preliminary phase where the research is designed, followed by Phase One which consists of an online survey of Saudi secondary teachers and Phase Two where a sample of those teachers are interviewed The form of this explanatory-sequential approach is explored below.

4.4.1 The Preliminary Phase

As stated above, the preliminary phase consisted of reviewing the literature; referring to the researcher's own experience working in the Saudi secondary school sector and a series of informal discussions that were conducted with secondary school teachers in Jazan. Such preliminary activity is important, even though it can add cost and time to the research, because it is a way of discovering how the target population actually perceives and talks about the subject under investigation. In this way, researcher bias can be mitigated (Alrashed, 2002; Al-Qahtani *et al*., 2000).

The teachers consulted in this phase were all from different schools, taught different subjects and had various lengths of service. The ten teachers interviewed were all known to the researcher, which meant that the three women agreed to be interviewed; this was done face-to-face in the case of a relative and over the phone for the other two. Knowing the teachers made it easy to approach them and ask if they would be willing to have a conversation about their experience and attitudes towards e-learning technologies. The interviews were informal for all ten teachers, and the researcher took notes.

Using the interview notes, the researcher identified a number of recurring themes, as follows: training issues (not practical), facilitating conditions (not enough digital resources, only one learning centre that had to be booked in advance), worries about making mistakes in front of students and having to put too much effort into changing tried and tested ways of teaching when the workload was already quite high. None of the participants perceived that there was any encouragement to use the technologies; some said they had to provide their own equipment, such as computers. This information, along with the results obtained from the review the few studies on technology acceptance in the Saudi educational context, gave rise to revisiting the UTAUT model and proposing additional elements that may better explain the acceptance and use of digital educational technologies in this context (see fig. 4.1).

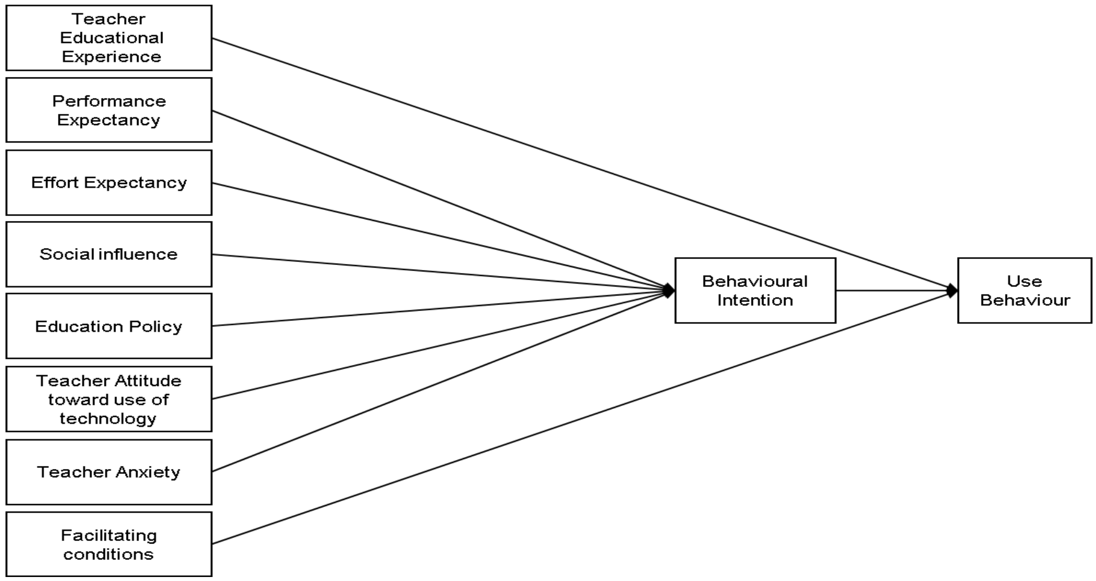


Figure 4.1 Proposed UTAUT model revised for the purposes of this study

Some of the concerns raised by the teachers interviewed informally were linked to elements already present in the UTAUT model, such as Facilitating Conditions; others, such as teachers' experience of the training offered, led to the inclusion of Educational Policy as an element. The concerns about how they may appear in front of their students led to the inclusion of Teacher Anxiety as an element of the revised UTAUT model that is proposed as a basis for the empirical investigation**.**

4.4.2 The Explanatory-Sequential Design

One way of categorising mixed methods research is by sequence, type of data collection and purpose; this yields different approaches to mixed-methods research design. The design that is chosen will determine how the datasets generated by the different methods are to be integrated (Creswell, 2015). The 'explanatory sequential' design refers to the quantitative study being followed by qualitative research (see Fig. 4.2).The results from the first phase are used to structure the second phase in terms of who should be recruited to participate and what should they be asked. In this approach, the results of Phase Two lend depth and further explanation to the data collected in Phase One (Creswell, 2014).

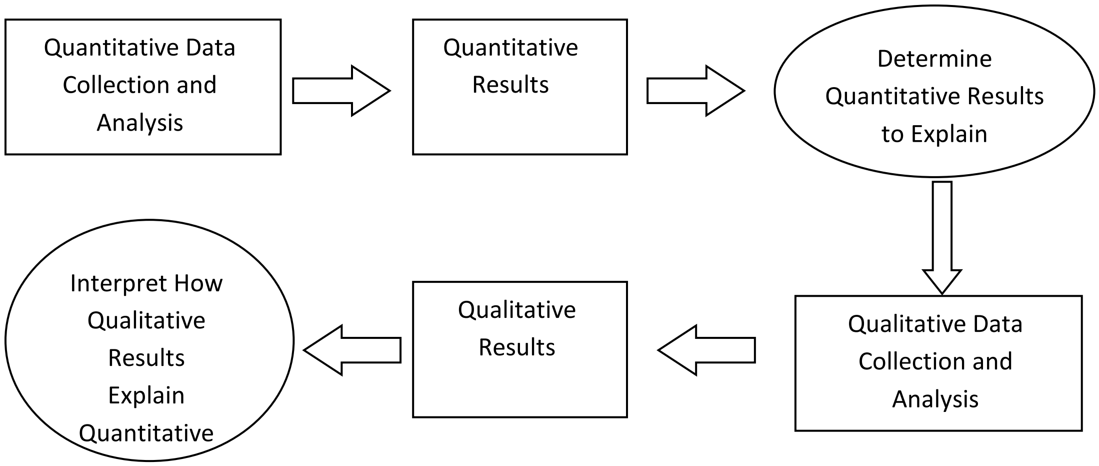


Figure 4.2 The Explanatory–Sequential Design (Based on Creswell, 2015)

This explanatory–sequential design is used in this study, although it also includes a preliminary phase where general themes have been identified by the researcher through informal interviews with Saudi teachers, the researcher's own experience and the literature in the field. This preliminary phase has allowed the researcher to develop a theoretical model that would most effectively allow for the exploration of digital educational technology acceptance and use, as well as the barriers to such acceptance and use in the study's context. (The resultant revised UTAUT model was discussed more fully in Chapter 3).

The explanatory–sequential design was chosen for this study because the researcher primarily wanted to gather quantitative information about the experiences and attitudes of Saudi secondary teachers in Jazan. According to this design, quantitative, numerical data are gathered and explored so that factors that appear to have a significant effect on technology acceptance and use of digital educational technologies can be identified and further explored in the semi-structured interviews to explain why these factors are significant and clarify any questions about the results. Therefore, the quantitative data give a general picture of the research problem, whilst the qualitative data generated in Phase Two refine and explain those results. Data collection in this mixed-methods approach is thus carried out in two stages, and participants in Phase Two are drawn from the participant pool for Phase One (Creswell et al.,2003). Indeed, in this study, survey participants are asked to indicate if they are willing to be interviewed so that their availability is ensured. Although most questions in Phase One are closed-ended, the questions in Phase Two need to be largely open-ended to allow interviewees to expand on the topic. In addition, even though Phase One has shaped the interview protocol; interviewees need to be allowed to bring up other related themes that they feel are important.

This is an advantage of this mixed method approach as the questions in Phase One are those identified as important by the researcher in order to answer the research questions; however, areas of the phenomenon may not have been considered. If these omissions are not brought out by the pilot study, then allowing interviewees the leeway to bring up related topics they were not directly questioned about is a way to ensure these will be revealed. As well as data from the two phases being interpreted, there also needs to be a consideration of how the qualitative data expands and explains the quantitative data and how these two sets of data can be integrated.

The data generated in the Phase One survey allows for a more systematic and reliable analysis of variables than would a large amount of qualitative data; in addition, this approach generates results that can be expressed in statistical terms, thereby facilitating generalisations to be made. If the sample is large enough, making up around 10% of the total target population (Krejcie & Morgan, 1970), and the survey is both valid and reliable, then this can be achieved. The qualitative approach, in contrast, is usually used to explain specific social phenomena in some depth (Hancock, 2002). The mixed approach improves confidence in the results and ensures that the findings are truthful and rational, as well as both revealing in-depth information about the phenomenon and offering results that can be generalised to the whole population under study (Bryman, 2002).

The data yielded by the survey and the interviews must be properly integrated to best answer the research questions in relation to the theoretical model of technology acceptance. The approach is both pragmatic – as it is amenable to making use of both quantitative and qualitative data – and makes use of critical realism, because it accepts that although there is an objective reality concerning the extent to which Saudi secondary school teachers accept and use digital education technologies, it is only possible to observe part of that reality; to understand the phenomenon, the researcher needs to explore it at the level of the individual teachers' experience, as well as the experience of teachers as a group and the effect of the underlying social structures and institutions.

4.5 Study Population and Sampling

When conducting mixed methods research, it is important to determine the optimum sample sizes for both the quantitative and qualitative phases. The selected sample size needs to be justified (Field, 2013). As this study involves an explanatory–sequential design (see Section 4.4.2), the use of nested samples was considered appropriate. This involves using a selection of participants who completed the Phase One survey and volunteered to be interviewed for the Phase Two semi-structured interviews (Collins *et al.,* 2007).

4.5.1 The Survey Sample

A target population includes all individuals who possess particular features of relevance to the researcher. There may be dissimilarities between the total target population and the sample, but as researchers cannot usually examine each person in the total population because it would be time-consuming and expensive, sampling is required. A population involves all objects, events and individuals that the researcher wants to focus on; that is, it involves each suitable case that forms part of the recognised whole (Yount, 2006).

According to Landreneau & Creek (2005), a sample is defined as the subset of the population selected by the researcher as participants of the research study and intended to represent the target population. If the target population is large, as in the case of Saudi teachers, then only an organisation such as a government would have the authority and resources to reach them all. However, as the sample selected does not contain everyone in the target population, as it would in a complete enumeration or census, that sample may be demonstrated to be inaccurate or unreliable. This may occur if the sample is biased or simply too small (Fridah, 2002).

The target population for this study is secondary school teachers in the Jazan area of Saudi Arabia; participants are drawn from a total of 168 high schools in the area –91 boys' schools and 77 girls' schools. The features of this area have already been discussed (see Chapter 2). However, it is important to note that since the Saudi Ministry of Education standardises teaching for the whole of Saudi Arabia, the secondary system in Jazan will be the same as for the KSA as a whole.
According to Ministry of Education statistics, there were 2,988 secondary school teachers in 2015–16 (See Table 4.1 below).

Table 4.1 Numbers of Secondary School Teachers in Jazan (2016) Taken from Saudi Ministry of Education Statistics

Secondary Schools	Male Teachers	Female teachers
168	1477	1511

To recruit participants for the Phase One survey, the researcher contacted the Regional Director of Education for Jazan in order to obtain permission to conduct the survey and to pass on the link to secondary teachers (See Appendix D for letter giving permission). This was a necessary step, as the researcher had no access to information that could have been used as a sampling frame, such as lists of teachers' emails or mobile numbers; in any event, it would have been unethical to access such lists.
The researcher requested a random systematic sample that involved selecting participants from the sampling frame at set regular intervals. In this case, every seventh teacher on the randomly generated list was contacted. This meant that 14% of all teachers were selected to be sent the link, and this would exceed the number required for the sample size to be significant. As the survey was conducted online, and the great majority of teachers did not have to be contacted in person either for the distribution or collection of the questionnaire, the use of a random systematic sample covering the entire region was appropriate (Saunders *et al*., 2009).

The survey asked respondents pertinent questions to determine whether the sample included both male and female members of teaching staff of different ages, work experience, qualifications, organisation sizes and domains of expertise.

4.5.2 The Survey Sample Size

To determine a significant sample size for the survey, the researcher used the 'small sample technique' recommended by the US National Education Association for research in the field of educational and psychological measurement. This technique involves the use of a formula to calculate a significant sample size for empirical studies such as surveys (Krejcie & Morgan, 1970). Accordingly, as the total target population of secondary teachers in Jazan is 2988, the recommended size for the survey sample is 341 (recommended for a population of 3,000). As the response rate is not expected to be 100%, the actual number of teachers contacted must exceed 341. In effect, 420 links to the online questionnaire were distributed. As the target population is a group that would be interested in the subject of the survey (their own teaching practices), and as the cover letter explains the importance of the study in terms finding ways to improve conditions for teachers, the researcher hoped that the response rate would be quite high. Furthermore, reminders were sent out 3 weeks after the link was distributed, which further increased the response rate. At the end of the survey period, the total number of completed responses was 347.

4.5.3 The Interview Sample

The right sample size for the qualitative phase of research is a disputed matter. However, there should be a good compromise between having a large enough to obtain enough relevant data but ensuring that it is not so large as to make it impossible to gain an in-depth understanding of the issues due to an overabundance of data (Teddlie & Yu, 2007). A study by Guest *et al*. (2006) in a healthcare context revealed that 12 interviewees were enough to yield relevant data and to be sufficiently representative; these authors also found that the basic meta-themes were revealed in the first six interviews. Accordingly, 30 interviewees (sixteen female and fourteen male teachers) were selected for the semi-structured interviews in Jazan from those survey participants who had provided contact details as an indication that they were willing to be interviewed.

The sample of interviewees is therefore selected from the sampling frame of all survey participants consenting to be interviewed. The researcher included a request for interviewees on the last page of the questionnaire, such that respondents who were willing could provide their email addresses to the researcher directly. As the interview sample is taken from teachers who have volunteered to be interviewed, it should be noted that such self-selection means that the final sample can be biased, as the volunteers may be those respondents who feel strongly about the topic or simply have more time than those who have not volunteered. However, the purpose of the interviews is to explore the issues of e-learning technology acceptance in more depth than revealed in the Phase One study rather than to make generalisations, and the purposive selection targets specific individuals.

The final sample is therefore a stratified purposive sample depending on the participants' levels of acceptance and use of digital educational technologies, their educational experience, anxiety about using these technologies and perceptions of educational policy as identified by the proposed revised UTAUT model.

4.6 Data Collection for Phase One

In this phase, researchers try to gather the data that is significant for accomplishing the aims and objectives of the study while using a number of tools and strategies. Data are the raw materials from which an evaluation can be created, and planning a strategy for data collection is crucial to obtain useful, reliable and consistent information.

It is through an evaluation of data that have been systematically collected that it is possible to determine whether the aims and objectives of the research have been reached (Suhonen, 2009). The data we are concerned with here are the primary data, which are unique to this study. However, the means by which these data are collected have been informed by secondary data that can support the primary data (Hox & Boeije, 2005).

4.6.1 Phase One –The Quantitative Data

Questionnaires are the most common method used to collect quantitative data about the characteristics of a human target population; they allow information to be gathered that describes, compares and/or explains experiences and attitudes. They are most appropriate for use with a relatively large number of participants who can give information that is not available elsewhere and where generalisations from the results about the wider target population are required (Rea & Parker, 2005). Thus, questionnaires are appropriate in the present study, as the literature does not reveal information about technology acceptance of e-learning tools by Saudi secondary school teachers in Jazan, and a relatively large sample is used. It should be noted, however, that there are limitations to using questionnaires; in this case, one of the main limitations is that the researcher is not on hand to explain questions to participants or check the accuracy of responses. Although open-ended questions lend a qualitative element to a questionnaire, which may otherwise be a rather simplistic description of a complex reality, these require need more time for analysis. In addition, respondents may not always complete their answers, answer dishonestly or simply misunderstand the question; moreover, there may be costs involved in using computer software for analysis (Gay *et al.,* 2009).

Nevertheless, this research tool was selected for this study because it would generate the quantitative information required to find answers to the research questions and provide results that can be tabulated. There are also advantages in that respondents will not be influenced by the presence of the researcher, and the questionnaire can be sent electronically to remote areas in an instant. This means that the survey can be conducted from the UK with participants in Jazan, Saudi Arabia. The information acquired is complemented by qualitative data obtained from interviews.

In this study, the questionnaire is selected as the research instrument for the first phase of data collection for the following reasons: quantifiable information is required, questionnaires can collect the respondents' opinions in a structured way and the literature reveals that key studies using the UTAUT model have used questionnaires, yielding a valuable resource from which this study can draw. Indeed, a meta-analysis of 174 studies using the UTAUT model showed that 155 of them used surveys as their method of acquiring data (Williams *et al.*, 2015). Moreover, the questionnaire instrument seeks to gain data about teachers' current experiences in Saudi schools in terms of the provision and use of e-learning technologies.

Although the construction of a questionnaire appears to be simple, it is a complex and taxing process; the questions and other items must be carefully formulated and chosen, and the aims of the research have to be constantly considered. It is also important to be aware that surveys can be descriptive and indicate what proportion of a particular population reports doing or thinking about something. Such surveys do not explain phenomena but only describe them. Analytic surveys attempt to find causal relationships between variables, but care needs to be taken, as attributing cause is by no means always straightforward. We cannot assume that there is a causal relationship simply because factors occur together (Djagegjj, 2005; Oppenheim, 1992).

A questionnaire is relatively simple to regulate, as each participant receives the same questions in the same form; for this reason, the data are relatively easy to quantify and tabulate. This does not mean, however, that every participant will interpret the questions or react to them in the same way.

Questionnaires can be conducted anonymously and completed at the convenience of the respondent; these factors enhance the participants' ability to respond to the questions truthfully and accurately because they are not inhibited by the presence of the researcher (Acharya, 2010). In the case of this study, this is especially important, as the sample contains both male and female participants; as the researcher is male, questioning a large number of females directly is not possible (see also Ethical Considerations, Section 4.9). However, because the researcher is not present, it is also easier for people to lie or answer inaccurately on questionnaires, not to mention that it is harder to spot such lies. In relation to inaccurate responses, the participants are teachers answering questions about their own experience and practice; thus, it is very unlikely that there will be any uninformed responses, which would reduce data reliability (Saunders *et al.*, 2009). To reduce this possibility even further, participants are given clear and simple definitions of each of the constructs being tested, as well as being provided with contact details and encouraged to contact the researcher if they have any difficulties or questions. Moreover, the cover letter explains the purpose of the research. Still, given that the questionnaire is fairly long, it is possible that participants may have lapses of concentration. To minimise this problem, the questionnaire has been carefully laid out to ensure that respondents can fill it in as easily as possible; the teachers included in the pilot study are asked to comment on the ease of completing the questionnaire. Although lengthy, the pilot survey suggested that this did not inhibit respondents, as was subsequently confirmed by the high response rate to the survey. It is also possible that teachers may exaggerate their confidence in using technology if they perceive that they should be able to exhibit this pedagogic skill. However, it has been noted that people who self-administer questionnaires anonymously are less likely to lie, as no-one – including the researcher – will know who has responded (Saunders *et al*., 2009).

An online questionnaire uses less time and effort compared to other methods because of the relative ease of distribution and the data processing. Given the large size of the target population in this study –secondary school teachers in Jazan– and because the researcher is outside the country, other data collection methods would be extremely difficult. In addition, questionnaires can be used for collecting data from a large sample to obtain data that are more representative of the population being studied. Nevertheless, the most significant reason for using this method is its ability to provide results that can be numerically coded and analysed statistically; that is, data can be analysed by using programmes or software like the Statistical Package for the Social Sciences (SPSS). This makes the processes of analysing the obtained data more rigorous and generates results in an accurate statistical form (Milne, 2013).

4.6.2 Questionnaire Design – The Questions

In this study, the questionnaire design was based on studies conducted by Venkatesh *et al*. (2003), who used the UTAUT model to explore the acceptance of technology; it was also based on other studies conducted on the acceptance of digital learning technologies by teachers, such as Anderson *et al.* (2006), Dulle & Minishi-Majanja (2011); Pynoo et al. (2011) and Teo (2011); (see also Literature Review Chapter 3).

The questionnaire was designed cross-sectionally (snapshot study) rather than longitudinally in this research; this means that current behaviours and attitudes are recorded. Although a cross-sectional study has the advantage of being quicker and cheaper than a longitudinal one, it cannot show changes over time unless carefully replicated at a later date (Janssen & Creswell, 2005).

A number of caveats were considered in designing the questionnaire. For instance, leading questions that encourage a particular response were to be avoided, as was using language that was too complex or technical for the participants. Double negatives were avoided in questions and statements, and the use of open-ended questions was minimal**.** It was important to consider the ordering of the questions, and these progressed logically (Cohen *et al*., 2007). Close attention was paid to how items on the questionnaire were worded, and the participants were given clear instructions throughout. The questionnaire was designed after examining many other surveys conducted in the field of education. Many of the questions in the final draft of the questionnaire had already been tested and used in other studies, although some questions were adapted for the Saudi educational context and others were designed from scratch. The formulation of questions took into account both what had been learnt from previously conducted work in the field and information gathered from informal interviews with Saudi secondary school teachers in the preliminary phase.

The types of question used in the actual survey questionnaire are discussed in detail in (Appendix A).

The factors explored in Section C of Phase One survey are detailed below, along with the sources of the questions. A brief rationale for the inclusion of each factor is also given. Further details on the theories included in the UTAUT model can be found in Chapter 3.

4.6.3 Specific Questions on UTAUT Factors

Performance Expectancy

Venkatesh *et al*. (2003) noted that Performance Expectancy (PE) is the most significant forecaster of behavioural intention and technology use because it indicates an individual's perception that he or she can improve in terms of job performance by using the technology in question. The literature in general suggests that this construct is significant (Bere, 2014; Akbar,2013; Alwahaishi & Snášel, 2013; Pardamean & Susanto, 2012; Pynoo *et al*., 2011; and Lowenthal, 2010). Furthermore, many authors have demonstrated that the relationship between PE and the intention to use the technology or the system is almost always positive (San Martin and Herrero, 2012; AbuShanab *et al*., 2010; Venkatesh *et al.*, 2003).

Teachers are often expected to use technology tools as part of their teaching and other duties (Teo, 2011). Thus, a positive relationship between these factors indicates that if secondary school teachers in Jazan think that e-learning tools will assist in the efficient and speedy completion of daily teaching, they will be more likely to want to use these tools. This is increasingly important, as there is a rising expectation that teachers will seamlessly integrate digital technology into their pedagogy (Pelgrum, 2001).

PE was tested in the survey using questions suggested by Venkatesh*et al*. (2003) and other authors. The questions were either used as they were in the original or adapted to fit the Saudi secondary education context and discover the extent to which it affects the behavioural intention to accept and use e-learning technology; the questions also sought to address the following research question: **To what extent does Performance Expectancy explain variances in the behavioural intention to use e-learning technologies by Saudi secondary school teachers?** As with all the questions in Phase One of the study, the aim is to explore to what extent the various factors explain variances in technology acceptance, and to highlight areas to be covered by Phase Two which addresses why this happens, in other words to find the underlying reasons for the influence of each factor.(See Table 4.2 below).

Table 4.2 Survey Questions on Performance Expectancy

QUESTION	SOURCE
I find e-learning technologies useful for teaching and learning.	Venkatesh *et al*. (2003)
Using e-learning technologies enables me to accomplish tasks more quickly.	Venkatesh *et al*. (2003)
E-learning increases communication between teachers and learners.	Algahtani (2011), Keller *et al.*(2007),Venkatesh *et al*. (2003)
Using e-learning technologies makes it easier to teach course content	Venkatesh *et al*. (2003)

The participants were given clear definitions of the factors being tested as a heading to the relevant section, as follows:

> **These questions seek to determine how much you think e-learning technologies are currently helping you to do your job.**

Effort Expectancy

Effort expectancy (EE) is defined as the degree of ease associated with the use of the system and represents the second independent variable linking to intention to accept and use the technology. In the early stages of adoption, individuals who utilise a system may perceive that there are several problems concerning the use of the technology; however, when the individuals become accustomed to using the technology, this factor becomes more important in determining use behaviour. The literature suggests that this variable is important in explaining technology acceptance and use in an educational context (Khechine *et al*., 2014; Pynoo *et al*., 2011; Lowenthal, 2010; and AlAwadhi & Morris, 2008).

EE was tested in the survey using questions suggested by Venkatesh *et al*. (2003) and other authors. The questions were either used as they were in the original or adapted to fit the Saudi secondary context and discover the extent to which it affected the behavioural intention to accept and use e-learning technology (See Table 4.3 below). Moreover, the questions sought to address the following research question: **To what extent does Effort Expectancy explain the variances in the behavioural intention to use e-learning technologies by Saudi secondary school teachers?**

Table 4.3 Survey Questions on Effort Expectancy

QUESTION	SOURCE
I find e-learning technologies clear and easy to use.	Venkatesh *et al.* (2003)
I have the skills I need to use the e-learning technologies in my school	Venkatesh *et al.* (2003)
Learning to operate and use new e-learning technologies is easy for me.	Venkatesh *et al.* (2003)

The participants were given a clear definition of the factor being tested as a heading to the relevant section, as follows:

> **These questions seek to determine how easy you currently find it to use e-learning technologies.**

Social Influence

Social influence (SI) is the third independent variable, defined as the extent to which teachers perceive that significant individuals believe they are supposed to utilise the system. In this study, *significant individuals* comprise the teachers' managers, colleagues and students, as well as students' parents. SI takes into account the subjective norms and self-image of teachers as well as how agents of socialisation and social control affect perceptions and behaviours (Bere, 2014; Khechine *et al*., 2014; Venkatesh *et al*., 2003). According to previous models of technology acceptance, including the UTAUT model, this factor has a positive relationship with the behavioural intention to utilise technology; thus, teachers' perceptions of the attitudes of significant individuals in this matter need to be taken into account (Khechine *et al*., 2014; Oye, 2012; and Adegbite & Downe, 2005).

SI was tested in the survey with questions suggested by Venkatesh *et al*. (2003); the questions were in the original or adapted to fit the Saudi secondary education context to determine the extent to which SI affected the behavioural intention to use and accept the e-learning technology. (See Table 4.4 below).Moreover, the questions sought to address the following research question: **To what extent does Social Influence explain variances in the behavioural intention to use e-learning technologies by Saudi secondary school teachers?**

Table 4.4 Survey Questions on Social Influence

QUESTION	SOURCE
The principals and supervisor think that I should use e-learning technologies.	Venkatesh *et al.* (2003)
My colleagues have helped me to use e-learning technologies.	Venkatesh *et al.* (2003)
My students think that I should use e-learning technologies	Venkatesh *et al.* (2003)
Most staff in my school think e-learning is important	Venkatesh *et al.* (2003)
Parents think that that I should use e-learning technologies	Suggested by academic experts

The participants were given a clear definition of the factors being tested as a heading to the relevant section, as follows:

> **These questions seek to determine what you currently think other people's ideas are about your use of e-learning technologies.**

Facilitating Conditions

Facilitating conditions (FC) are defined as the extent to which persons perceive that a technical and organisational infrastructure supports the usage of a system. FC is the fourth independent variable and considered a perceived barrier or enabler within an environment; moreover, it is thought to affect individuals' perceptions of the difficulty or ease of performing a task (Venkatesh *et al.,* 2003).

FC in the context of secondary education include the availability of additional resources, such as online help, relevant training, adequate software, hardware and internet infrastructure, as well as in-house technical aid. In addition, teachers' acceptance of different technologies has demonstrated that FC has an important influence on the perceived ease of use and the adoption by users of the technology (Fathema *et al*., 2015).

FC was tested in the survey with questions suggested by Venkatesh*et al*. (2003), as well as some questions developed by the researcher; the questions were in the original or adapted to fit the Saudi secondary education context and determine the extent to which this factor affected the behavioural intention to use and accept the e-learning technology (See Table 4.5 below). Moreover, the questions sought to address the research following question: **To what extent do Facilitating Conditions explain the variances in the use of e-learning technologies by Saudi secondary teachers?**

Table 4.5 Survey Questions on Facilitating Conditions

QUESTION	SOURCE
Classes in my school are equipped with computers	Venkatesh *et al.* (2003)
I have the resources necessary to use e-learning technologies in school.	Venkatesh *et al*. (2003)
A specific person (or group) is available for assistance with e-learning technologies.	Venkatesh *et al*. (2003)

The participants were given a clear definition of the factor being tested as a heading to the relevant section, as follows:

> **These questions seek to determine what you think about the current facilities that support your use of e-learning technologies.**

Behavioural Intention

Behavioural Intention (BI) has been identified as one of the factors influencing the use of technology in addition to the indirect and direct influences of perceived ease of use and perceived usefulness; it is defined as the subjective probability that users will carry out the behaviour in question. Furthermore, in relation to this study, EE will have a direct effect on PE, but the reverse would not be the case: Just because teachers find a digital technology easy to use does not mean that they will perceive it as useful for their teaching (Riad *et al*., 2013; Teo, 2011; AlAwadhi& Morris, 2008 and Venkatesh *et al.*, 2003).

The original UTAUT model only includes facilitating conditions as directly affecting actual use; it does not explain what factors are involved in the relationship between intention to use technologies and their actual use (Moghavvemi *et al.*, 2013). This study aims to explore the effect of facilitating conditions and teachers' educational experience on use behaviour, as well as the influence of behavioural intention, to better understand this relationship.

Behavioural Intention was tested in the survey to determine whether and how it affected actual use of e-learning technologies. The questions were in the original or adapted to fit the Saudi secondary education context; (See Table 4.6 below). Moreover, they sought to address the following research question: **To what extent does Behavioural Intention explain variances in the use of e-learning technologies by Saudi secondary school teachers?**

Table 4.6 Survey Questions on Behavioural Intention

QUESTION	SOURCE
I intend to use e-learning technologies in the future.	Venkatesh *et al.* (2003)
I predict that I will use e-learning technologies in the future.	Venkatesh *et al.* (2003)
I intend to attend a training programme on using e-learning technologies in the future.	Suggested by academic experts

Use Behaviour

The literature provides some information about the factors that directly and indirectly affect use behaviour. The actual usage of e-learning technologies is affected by teachers' behavioural intentions, as well as their attitudes towards the use of the technologies.

Anxiety is recognised as a significant factor that can affect users' perceptions about e-learning technologies' ease of use and perceived usefulness. Thus, use behaviour is affected both directly and indirectly by perceived usefulness, teacher attitude and behavioural intention, as well as the perceived ease of use. The facilitating conditions, coupled with behavioural intention, specify the technologies' actual usage (Šumak *et al*., 2011; Park, 2009).

Use Behaviour was tested in this study via the questions given below, which were taken from the original or adapted to suit the Saudi secondary education context (See Table 4.7 below).

Table 4.7 Survey Questions on Use Behaviour

QUESTION	SOURCE
I use computers as part of my preparation.	Self-developed
I use computers as part of my teaching.	Self-developed
I use Data Show as part of my teaching.	Self-developed
I use PowerPoint as part of my teaching.	Self-developed

Attitudes towards Using Technology

The attitudes and perceptions of teachers towards using e-learning technologies as part of their pedagogy is a vital factor for the successful adoption of e-learning technologies. Teachers are unlikely to want to adopt e-learning technologies if their attitudes towards them are negative. The literature suggests that PE and EE are the major factors affecting the attitudes of individuals towards use. Furthermore, these attitudes and beliefs change throughout the gained experience (Jonsson, 2013; Lee, 2010). It is thus important to bear in mind that this study gives a 'snapshot' of the attitudes of Saudi secondary teachers in Jazan at the time of the survey.

Teachers' attitudes to using e-learning technologies were tested in the survey through the questions given below, which cover all of the elements described above. The questions were in the original or adapted to fit the Saudi secondary education context. The questions aimed determine the extent to which this factor affected the behavioural intention to use and accept e-learning technology (See Table 4.8below).Moreover, the questions sought to address the following research question: **To what extent does**

Teachers' Attitudes towards Technology explain variances in the behavioural intention to use e-learning technologies in Saudi secondary school teachers?

Table 4.8 Survey Questions on Teacher Attitude towards Using Technology

QUESTION	SOURCE
I like using e-learning technologies.	Ajzen and Fishbein(1980)
E-learning technologies make work more interesting.	Ajzen and Fishbein (1980)
Using e-learning technologies is a good idea.	Ajzen and Fishbein (1980)

Teacher Anxiety

Teachers with long experience in the use of computers have greater confidence in their ability to use these devices efficiently. Teachers' competence is directly connected to their confidence in utilising technological devices in the classroom and especially to the perceived competence of their students. Moreover, a greater degree of confidence is connected to the loss of fear of technological devices, such as computers (Buabeng-Andoh, 2012). Confidence can be enhanced through programmes that improve confidence in teachers, the regular use of personal computers, a project partner and evaluative activities. Well-designed initial pedagogical and technical training based on relevant curriculum activities that gradually build knowledge and skills in information and communication technology is essential. Furthermore, there needs to be a commitment by the community, students and schools to encouraging teachers, and affirmative feedback must be provided by parents, students, school principals and peers (Hennessey et al., 2010). In this study, teacher anxiety also comprises the element of 'self-efficacy', which is defined as the beliefs that teachers hold about their ability to use and integrate e-learning technologies. The literature reveals that that this factor affects acceptance and use, as does resistance to change (Fathema *et al*., 2015; Buabeng-Andoh, 2012; Gulbahar & Guven, 2008 and Hennessey *et al.*, 2010) (See Table 4.9 below).

Thus, technology confidence (anxiety) was tested to address the following research question: **To what extent does Teachers' Anxiety explain variances in the**

behavioural intention to use e-learning technologies by Saudi secondary school teachers?

Table 4.9 Survey Questions on Teacher Anxiety

QUESTION	SOURCE
I hesitate to use e-learning technologies for fear of making mistakes I cannot correct.	Venkatesh *et al.*(2003)
I worry the students will not respect me if they see I struggle with technology.	Self-developed
I believe that e-learning technologies lack security.	Self-developed
E-learning technologies do not make for better teaching and learning.	Self-developed
I prefer traditional ways of teaching to using e-learning technologies.	Self-developed
E-learning technologies are not compatible with my teaching methods.	Self-developed
I have less time to plan and use e-learning technologies during school time.	Self-developed

Teacher Educational Experience

In this study, a teacher's educational experience (TEE) is defined as the experience of both being taught with the aid of e-learning technologies and using them directly in their own learning process. This factor is extremely significant for technology acceptance and use, as teachers can acquire an understanding of what it is like for their students to learn by using a range of educational technologies. In addition, this experience may provide teachers with the confidence to use e-learning technologies, as they can draw on their own experiences of being taught through these technologies to overcome any challenges involved in using e-learning tools. The literature also reveals that teacher educational experience is considered one of the significant factors influencing teachers' perceptions and beliefs about e-learning technologies; the lack of sufficient experience related to these technologies is recognised as one of the major reasons for negative perceptions and attitudes of teachers towards using them in their teaching processes (Donnelly &McSweeney, 2008; Jimoyiannis & Komis, 2008 and Alexander, 2001).

Teacher Educational Experience was tested in the survey with questions below, which were developed by the researcher to fit the Saudi secondary education context and determine the extent to which this factor affected the behavioural intention to use and accept the e-learning technology (See Table 4.10 below). Moreover, the questions sought to address the following research question: **To what extent does Teacher Educational Experience explain variances in the use of e-learning technologies by Saudi secondary school teachers?**

Table 4.10 Survey Questions on Teacher Educational Experience

QUESTION	SOURCE
I used e-learning technologies at my secondary school.	Self-developed
My teachers at college/university used e-learning technologies.	Self-developed
I used e-learning technologies at college/university.	Self-developed
I learned how to use e-learning technologies in teaching during the university's preparatory course to be a teacher.	Suggested by academic experts

Education Policy

Education Policy (EP) for implementing information and communication technology can be classified into three levels of implementation. The first concerns the major implementation of information and communication technologies within schools and does not demand a large amount of transformation in the activities of learning and teaching. The second level involves the organisation of activities that encourage the incorporation of technologies into teaching. Finally, there is the full implementation of information and communication technology in the system. Education policy can thus be utilised as a tool to differentiate between good and unsatisfactory practice, which affects the acceptance and use of the technologies (Oyaid, 2009).

In this study, the focal aspects of education policy are pre-service and in-service teacher training to use e-learning technologies, the role of teachers in encouraging students to use these technologies and the rules and regulations that pertain to their implementation and use.

Education Policy was tested in the survey with the questions below, which were developed by the researcher to fit the Saudi secondary education context and determine the extent to which this factor affected the behavioural intention to use and accept the e-learning technology (See Table 4.11 below).

Moreover, the questions sought to address the following research question: **To what extent does Education Policy explain variances in the behavioural intention to use e-learning technologies by Saudi secondary school teachers?**

Table 4.11 Survey Questions on Education Policy

QUESTION	SOURCE
There is a lack of training courses on how to use e-learning technologies.	Self-developed
Most training programmes are theoretical, not practical.	Self-developed
I have not been encouraged to take a training course in using e-learning technologies.	Self-developed
There is no coherent plan or policy to integrate e-learning technologies in my school.	Self-developed
I don't think my school principal and teachers are aware of the Ministry of Education's e-learning policy.	Self-developed

4.6.4 Questionnaire Translation

Since the native language of the population of the study is Arabic, the questionnaire was translated into Arabic to ensure that the respondents could understand it. It was then sent to two translators specialising in English–Arabic translation for verification. This step was taken to ensure that each item retained its English meaning. The questionnaire was distributed to the study sample in its final form.

Francis *et al.* (2004) suggested that the translation of research instruments, such as questionnaires, should ideally be carried out by native speakers of the language into which the questionnaire is being translated. The questionnaire for this study was translated by the researcher and sent to the pilot study participants for checking and feedback**.** Furthermore, the researcher is a native Arab speaker and, having worked in education, is acquainted with the level of vocabulary and language of Saudi teachers. In the pilot study (see details in Section 4.6.7 below), the participants were specifically asked for feedback on the language used in the translated questionnaire, and a few changes were made in accordance with their suggestions. It was considered important to use language that was unambiguous and appropriate for the target participants. Moreover, the study used language that would be appropriate for both genders. When nouns that alter with gender were used, both forms were included. For example, the word ‘manager’ in Arabic is *mudir* for a male and *mudirah* for a female. In the cover letter and questionnaire, this appeared as *mudir/ah*.

4.6.5 The Covering Letter

According to Cohen *et al*. (2007), covering letters should be sent to all respondents in order that they can be told about the nature of the study they are to participate in and the value of their contribution. The letter should also reassure respondents of the confidentiality and anonymity of their participation and encourage them to reply. A covering letter was accordingly designed to be sent with the questionnaire. The participants were also told how many sections were included in the questionnaire, encouraged to indicate if they wanted to participate in subsequent interviews about their experiences and attitudes to using e-learning technologies and thanked in anticipation of their cooperation (See Appendix B).

4.6.6 Online Questionnaires

Using an online questionnaire is an easy way to gather data if the target population is spread over a wide area or far away from the researcher. Communicating online can be more reliable than by post, as some postal services are unpredictable. In contrast to traditional survey methods, which can be expensive, the costs of administering online questionnaires are relatively minimal. As data are handled electronically and stored in a database, there is a smaller likelihood of errors. Respondents may find it easier to navigate through an online questionnaire that can automatically direct them to the next question; this reduces errors and may also increase the response rate. It also saves time, as the data do not need to be entered by the researcher manually (Sincero, 2012).

In spite of these advantages, there are some disadvantages to online questionnaires. For instance, they are not appropriate for a target population that includes many individuals with have no access to the internet. As this survey is for Saudi teachers, it was assumed that the majority of the population will have access to the internet at home, at work or both. The biggest disadvantage of online questionnaires is survey fraud, where people complete the questionnaire for the sake of a reward (Sincero, 2012). This disadvantage does not apply here, as no inducement was offered. However, there is a significant drop in the response rate after 10–15 questions (Harris, 1997); this means that it was especially important to stress the value of the respondent's contribution in the cover letter. As the topic is of direct relevance to teachers, this may have increased their motivation to respond and in the resultant high response rate. The survey also allowed participants to save their replies and return to the questionnaire later. It is always possible that the system will suffer a crash, causing the participants' responses to be partially lost; this may de-motivate them, which is another reason why being able to save replies is important.

The online system used to distribute the questionnaire was Qualtrics. This was chosen because it is a global leader as a system of data collection and analysis for academics. This survey tool has a number of advantages: It is easy for participants to use, and the results can be instantly and easily accessed by the researcher. It allows over 85 types of question to be included, which provides great flexibility, and it allows the survey to be written in Arabic. Scoring the data, which is essential for quantitative analysis, is also easy with Qualtrics, as there is an option for automatically scoring data as it is entered by participants (Qualtrics, 2016). The data can be exported directly to SPSS, CSV, PDF, Word, Excel and Power Point; this also means that data do not have to be 'cleaned' before processing to identify questions not answered, as Qualtrics offers an option that disallows participants from missing questions (Munn &Dreyer, 1996).

4.6.7 Piloting the Questionnaire

Pilot participants were approached by the researcher directly, drawing on teachers known personally. These participants were chosen to ensure there would be a good spread of teachers from different areas of the region who all taught different subjects and were both male and female. The cover letter and consent form were sent along with the questionnaire. The academic experts for the pilot were selected from among Saudi university academics who had published something about their subjects. The researcher emailed them and explained what was required for the pilot study. Those academics who agreed to participate were sent the questionnaire and asked for feedback.

4.6.8 The Pilot Study with Saudi Teachers

The Director of Education for Jazan in Saudi Arabia was contacted and a discussion was held to explain to him what was required. The director then sent the link to the draft questionnaire to the Director Managers of each of the educational districts in Jazan, asking them to identify both male and female teachers from a variety of schools in their district who could act as pilot study participants. In this way, individuals were found who were willing to be participants for the pilot study, and they were asked to contact the researcher by phone, either by calling or by texting through WhatsApp. A total of 18 teachers contacted the researcher, who explained that they needed to fill in a questionnaire and give feedback on the questions. Respondents were subsequently contacted by phone for a short, informal interview about the questionnaire to clarify their reactions to the questionnaire, check how long the survey took to complete and determine whether the questions were considered clear, unambiguous and appropriate. Sixteen of the teachers were from secondary schools, one was from a primary school and one was from an intermediate school; furthermore, 8 of the teachers were female and 10 were male.

The teachers suggested that the subject of ‘Family and Consumer Science’ (formerly Home Economics or Home Science) should be added to the list of subjects taught. In addition, they thought that the category of ‘Mountainous area’ should be included as a type of region, as these areas are particularly remote and underserved in terms of facilitating conditions for e-learning. It was also suggested that teachers should say whether their school opened in the morning or afternoon. This was important, as changes to schedules have occurred because of the war in the Jazan area and emergency work on buildings. Managers often did not make allowances for this, and teachers coming in later would find facilities like the learning resource centre closed or all the smart board pens locked away. The option ‘slow internet connection’ was suggested as an addition to the question on the school’s internet connection.

The questionnaire was re-evaluated in light of this feedback, and the researcher also made the following changes:

- Asking whether the teacher taught at a public (state) or private school;

- Specifying that the computer used at school was ‘provided by the Ministry of Education’; and

- Adding ‘iEN Portal’ to the list of options for Information Technology (IT) equipment and tools used in teaching.

In addition, a request was added at the end of the questionnaire for participants who were willing to be interviewed to provide their name and contact details.

4.6.9 Reliability of the Questionnaire

Reliability is defined as the degree to which outcomes are able to be replicated. How representative the study sample is of whole target population under study and whether the study’s outcomes are able to be replicated under the same methodology measure the reliability of the research tool. In contrast, validity specifies whether the study truthfully measures what was intended to be measured and the extent of the truthfulness of the results of research (Simon, 2011).

Van Teijlingen& Hundley (2001) noted that while it is important to employ the services of experts (such as the translators and academic experts in this case), it also essential to pilot the research instrument with participants who come from the same group as the target population. Saudi teachers were the intended participants, and the questionnaire needed to be clear and easy to answer for them. Once the questionnaire was satisfactorily translated into Arabic, the pilot study was conducted with 18 participants drawn from Saudi educators and 10 academics from different subject backgrounds who were currently working at different universities.

The reliability of a research instrument depends on how consistent the findings are given a particular way the data have been collected and the way data are analysed. If an instrument is highly reliable, then it should yield the same results if used on another occasion; it should also be clear how the raw data have been transformed into findings and conclusions (Saunders *et al*., 2009). Reliability was initially tested at the pilot study stage to measure the constructs from the UTAUT model using Cronbach’s alpha. This test is considered to be the most appropriate for testing the reliability of scales composed of multiple items, such as those in the Phase One questionnaire. It has been proposed that the value of Cronbach's alpha should be above 0.70 to consider a scale reliable; for excellent reliability, there should be a result of 0.90. A result of 0.50–0.70 indicates high moderate reliability, but anything below 0.50 shows that the reliability is low (Hinton *et al*., 2004). Once the different factors in the questionnaire were tested with Cronbach's alpha, the researcher decided to eliminate certain items with weak reliability.

4.6.10 Validity of the Questionnaire

Ascertaining the validity of a research instrument, such as a questionnaire, involves determining the degree to which it measures what the researcher intended to measure. The researcher was keen to determine whether the questionnaire had internal content validity, that is, whether factors like facilitating conditions were consistently measured throughout the questionnaire (Gay *et al*., 2009; Macnee & McCabe, 2008). The questionnaire was largely designed using constructs from the UTAUT model, which have already been well-established in the literature and questions that had already been validated in other studies. Thus, the validity of the questionnaire was already high. However, as some questions needed to be adapted to fit the Saudi context, and as they were being translated into Arabic, it was considered advisable to test the validity of the research instrument (Straub *et al*., 2004).To this end, the researcher decided to conduct a preliminary stage in the pilot study with Saudi teachers, by sending the questionnaire to 10 academics.

The academics were identified through personal contacts of the researcher. Academics in different subject fields were chosen to ensure that feedback about the questionnaire would reflect the range of subjects taught in Saudi schools. The researcher emailed each respondent and sent the link to the questionnaire, asking for feedback regarding the clarity of the questions, the quality of the translation into Arabic, how appropriately the questions linked to the UTAUT factors and any other suggestions or comments about the length of the questionnaire or inclusions or omissions that the contact could give.

Changes were suggested by the academics and the questionnaire was adapted to reflect these. The academics suggested that the questions on teacher qualifications should include 'Higher Diploma' and make a distinction between degrees that were 'educational' or 'non-educational', i.e. whether they had a teacher-training element or not to obtain a clearer sample profile. They also suggested that teachers should be able to say what digital equipment, if any, they had at home. This was important for two reasons, namely that it would show familiarisation with technology and that it would cover the possibly that teachers had their own equipment to bring to school. The academics also suggested that since SI was a major factor, the statement ‘Parents think I should use e-learning technologies’ could usefully be added. Under the category of behavioural intention, they suggested including the statement ‘I intend to attend a training programme on using e-learning technologies in the future’. For questions on teacher educational experience, the statement ‘I learned how to use e-learning technologies in teaching during the university’s preparatory course to be a teacher’ was suggested. Moreover, the statements ‘There is no coherent plan to integrate e-learning technologies in my school’ and ‘I don't think my school principal and teachers are aware of the Ministry of Education’s e-learning policy’ were suggested for the section on education policy. The academic experts also suggested that at the end of the questionnaire, teachers should be asked, ‘Please add any comments that would encourage your use of e-learning technologies in the classroom and/or anything you feel discourages you from using e-learning technologies’. There were also minor grammatical and vocabulary changes suggested.

4.6.11 Dissemination of the Survey

The link to the online questionnaire and cover letter included the purpose of this research and the researcher’s contacts details for participants to use if they faced a problem with the online link. Indeed, a small number of participants contacted the researcher because they had a problem with their internet connection or the link. After receiving their permission, the researcher sent a hard copy to them via a contact in Saudi Arabia to fill out, scan and send back. Using an online questionnaire meant that teachers who were less confident with using digital technology may not have responded owing to technical problems with the link. This would have led to a lack of inclusiveness in the sample. One method of dealing with this problem was to make the questionnaire available as a hard copy. That way, participants who had these difficulties could still be included.

The Regional Director having given permission (see Appendix 4D), it was agreed that a systematic sample of secondary teachers would be sent the link, as coming from the researcher, in accordance with the requirements for a significant sample size, as stated above. The sample covered a range of schools throughout the area. Participants in the selected sample were sent the survey link by SMS; thanks for participating and a reminder to those who had not yet responded was also issued. The links were sent as coming from the researcher rather than the Regional Director so that teachers would not perceive that there was any obligation to complete the questionnaire.

See Appendix 4C for the final draft of the online questionnaire.

4.6.12 Data Analysis for Phase One

The quantitative data that was be obtained from the research sample by means of the Phase One survey was be analysed with SPSS. This programme was chosen as it is very easy to use and the researcher was quickly able to learn how to use. It offers several types of statistics that are needed when making an analysis of quantitative data as well as being able to create useful tables and graphs that can be displayed in the report. One of the most important features of SPSS is that it allows factor analysis i.e. the correlations that occur in a large set of variables.

The methods used to analyse the data were related to the research questions as well as the type of data to be analysed (Pallant, 2011). The data analysis process does not rely solely on the choice of the appropriate program for the analysis process but also on the basic steps must be carried out at the beginning. In this study, both descriptive statistics, which reduce a large amount of data into the numerical, tabular and graphical forms needed for the report and inferential statistics, which allow for conclusions to be made about the target population of Saudi Secondary teachers were required (Argyrous, 2005). Thus, measurements such as frequency, averages such as means and modes and dispersion measurements such as standard deviation needed to be taken. Data analysis strategy not only involves choosing the appropriate statistical analysis techniques, but also the initial steps to handle the data such as coding the responses and cleaning the raw data (Pallant, 2011). As the study used the online questionnaire, all variables were defined in the design phase, which allowed easy export of the data to the statistics software.

The second stage of analysis is looking for the missing data, which is a frequently occurring problem in many studies. Data may be missing because of lack of knowledge of an item by the respondent, a data entry mistake or a respondent's refusal to answer certain items (Creswell, 2014). For this reason, the researcher designed the questionnaire to be such that the participant cannot move forward without completing the answer.

Lastly, the data had to be assessed for outliers and normality of distribution by means of multiple regression tests which assumed the data was free of such outliers and normal. The standardised scores of the main variables as well as the kurtosis values and skewness of the data distribution were closely looked at by the researcher before the analysis was done (Pallant, 2011).

The validity and reliability of the study's main scales were ascertained through exploratory and confirmatory factor analysis which allowed the researcher to evaluate the extent to which these scales measured the constructs. Moreover, the reliability of the scales was assessed by the results of the confirmatory factor analysis (Straub *et al*, 2004). More details of this are discussed in the following chapter.

In this stage the quantitative data helped to answer research questions one and two.

Research Question One:

What are the processes of e-learning implementation and use in teaching in Saudi Arabian Secondary education? Behaviour variables about teachers' use of technology as well as data about what equipment, systems, technical help and training are elicited by the questionnaire. These relate to the Use Behaviour and Facilitating Conditions elements in the UTAUT model and serve to give a picture of the current e-learning situation in Saudi Secondary schools. To analyse the data required to answer this question, the researcher applied a descriptive statistical analysis.

Research Question Two

What are the factors that influence the acceptance and use of e-learning technologies in teachers' practices in Saudi secondary education? This question and its subsidiary questions are about teachers' acceptance and use of digital educational technology and directly address the various factors in the expanded UTAUT model that were felt to be relevant to the context. Before starting to answer this question, the researcher must identify the dependent and independent variables in the research model. The independent variables in this research (Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Teacher Attitude, Teacher Anxiety, Teacher Educational Experience and Education Policy) and the dependent variables (Behavioural Intention and Use Behaviour). Because the research question involves more than one independent variable, the researcher used multiple regression analysis, which is one of the most commonly used statistical tools for measuring the relationship between variables (Gay, *et al.*, 2009; Tabachnick & Fidell, 2007). This question requires multiple regression analysis to identify the extent to which each independent variable impacts on Saudi secondary teachers' intention to use and actual use of digital educational technologies. In this way those factors having the greatest impact can be revealed. SPSS was used to carry out the Correlation Coefficient test to explore how each factor related to the sub-factors.

The process of research in the quantitative survey (Phase One) is shown in Fig. 4.3.

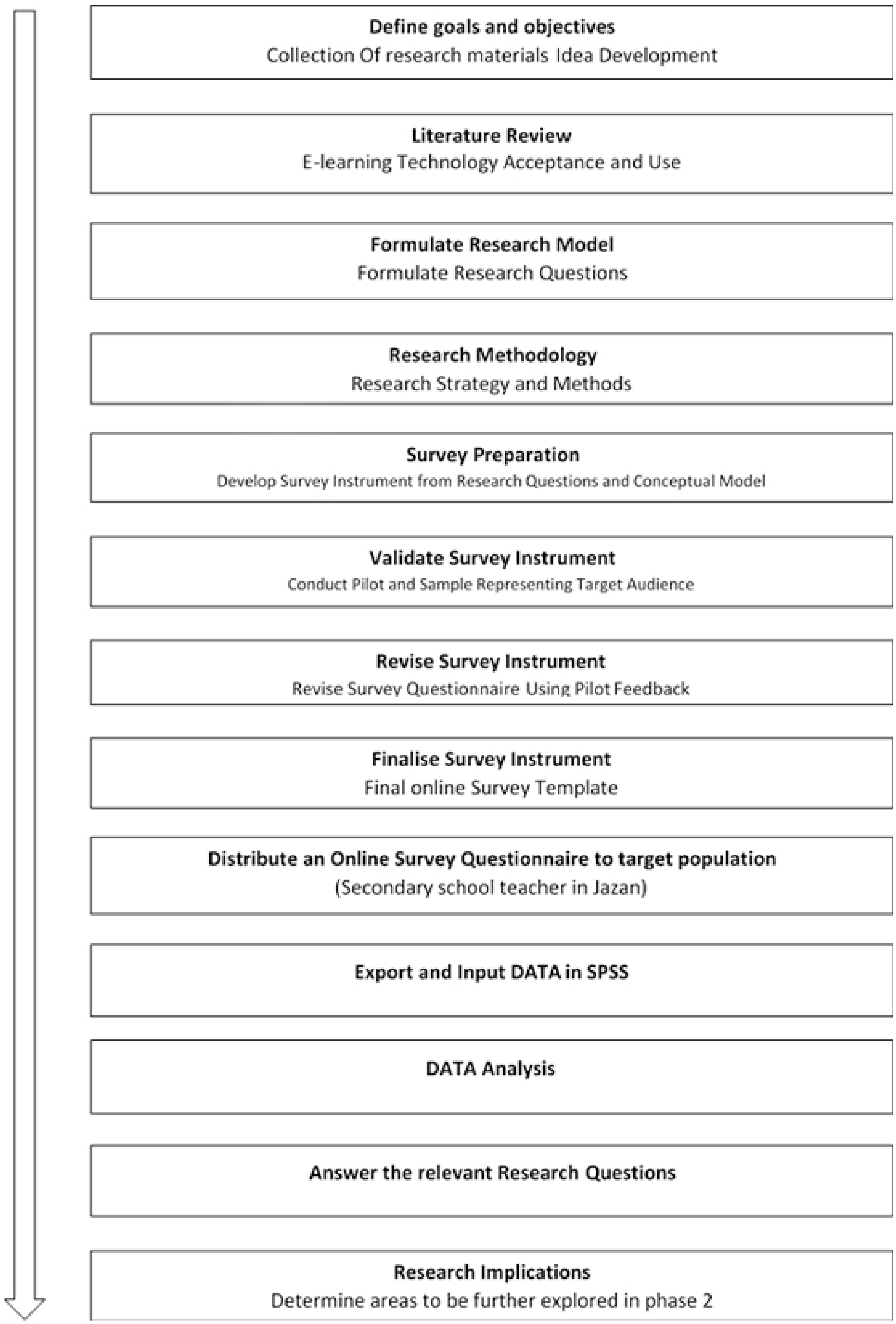


Figure 4.3 The Quantitative Process

4.7 Phase Two –Qualitative Data Using Interviews

The second phase of the research involved interviewing teachers. In contrast to Phase One, this allows the researcher to come into direct contact with those survey sample participants who had elected to be interviewed and to probe more deeply into the relevant areas.

When detailed information is required and open-ended and complex, questions need to be asked, interviews are invaluable, as they allow the researcher to more fully explore the participants' experiences and perceptions. It is sometimes hard for participants to describe the latter in a questionnaire, and they may not wish to commit certain experiences to writing if they are sensitive issues for them (Oates, 2006). In the current study, the researcher wanted to carry out detailed investigation of areas like teachers' difficulties with using digital educational technologies and how they felt about possibly appearing incompetent in front of their students. Such issues are often best handled in a face-to-face situation using tact and sensitivity.

Interviews vary in form and the extent to which they are structured; they also differ in whether they are mainly exploratory or explanatory, how open the researcher is about their purpose, as well as what they propose to examine (Kvale, 1996). When conducting structured interviews, the researcher asks every interviewee the same questions in the same order, and closed questions are often used for ease of analysis; therefore, structured interviews are essentially quantitative. This kind of interview would not be flexible enough for the purposes of this study. Unstructured interviews are the extreme opposite, as each interview can be totally different; the interviewer asking supplementary questions as the need arises or omitting questions that are not considered relevant (Cohen *et al*., 2007; Corbetta, 2003). This interview structure was also deemed unsuitable, as it would make it very difficult to carry out the planned thematic analysis.

Therefore, the semi-structured interview was selected for this study as, in order to permit integration with survey data and compare data from all the interviewees, the researcher would have to ensure that the interviews obtained common areas of information. In this kind of interview, all the questions are usually put to every participant. Although more controlled than the exploratory conversational interviews that were conducted in the preliminary stage of the study, this method still allowed the researcher a fair measure of freedom in obtaining data from participants; and it gave the interviewees a lot of leeway in how they replied. This flexibility is vital for interviewees to be able to raise issues other than those considered important by the researcher (Turner, 2010; Bryman & Bell, 2011)

Although interviews can often be easier for respondents, particularly if impressions or opinions are required, they can also be time-consuming; thus, they have to be carefully time-tabled. The interviewer forms part of the measurement instrument; he or she has to be well-versed in interview techniques and know how to respond to any eventuality. Analysis can be difficult, and a high level of interpretive skills is required; furthermore, it is not always easy to compare results. In addition, the data generated by the interviews need to be integrated with the survey data (Crow, 2013).Thus, due to the nature of the research and to accomplish the objectives and aims of the study, the researcher employed two diverse techniques for data collection; these are outlined in more detail in Section 4.4.2.

The advantage of using semi-structured interviews is that they are flexible whilst maintaining a form that makes the interviews more easily comparable with one another. The researcher's set of questions were pre-determined through an analysis of the Phase One survey, but, when appropriate, questions could be added or omitted. If for example, if the participant volunteered information that answered a later question, it would make sense to leave that question out. In addition, semi-structured interviews allow the order in which the questions are asked to be modified, and questions can be paraphrased to suit particular interviewees. Moreover, this method allowed the researcher to learn from the information given by the teachers, so that the initial model –the proposed revised UTAUT model that informed Phase One –can evolve as a result (Creswell, 2015; Corbetta, 2003; Robson, 2002 and Kidder *et al*., 1986).

4.7.1 Interview Design

In this section, the design for all stages of Phase Two are briefly considered and details of the pilot study and the steps taken to ensure the reliability and validity of the interviews are provided.

The semi-structured interview was designed to cover both the topics identified in the literature and the findings of the first phase, as teachers' answers to the survey questions highlighted areas in need of further investigation. In other words, the results of the survey data were analysed with a view to generating questions that would be asked in the interview. Thus, as the survey yielded potential interviewees for Phase Two, these interviewees could be asked to clarify and further explain the answers that they gave in the Phase One survey. In this way, a more refined theory about the adoption of e-learning technologies by Saudi secondary teachers in Jazan could be built by the researcher; this would be grounded in the data obtained from the target group participants (Creswell, 2015).

In this study, seven stages are used in the Phase Two inquiry. The first of these is thematising, when the purpose of conducting the semi-structured interviews was established, i.e. to address the research question: 'How may the UTAUT model be used to better understand what Saudi secondary school teachers perceive they need to effectively adopt e-learning technologies?' This was done by investigating further any unexpected outcomes from the survey and exploring the relationship between the factors in the proposed revised UTAUT model and the acceptance and use of digital educational technology by interviewees more deeply, allowing the model to be further refined if necessary. Designing the interview schedule was stage two, where the interview schedule and all of the planning and techniques needed to conduct the interviews were prepared (Kvale, 2007). Consequently, at the design stage, the researcher required a clear plan for all the subsequent stages, which are shown below in figure 4.4.

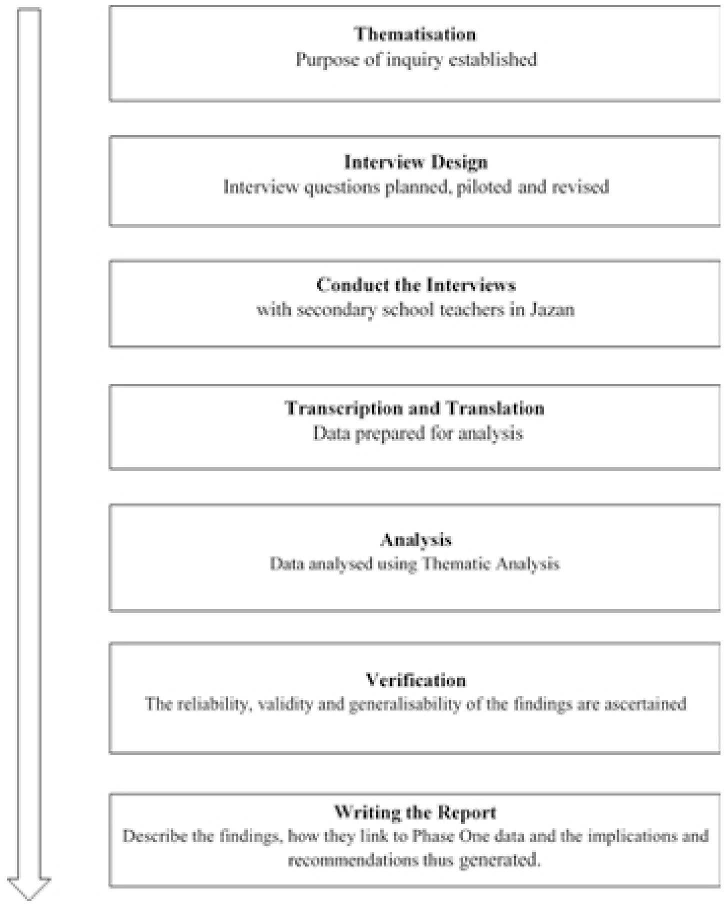


Figure 4. 4 The Qualitative Process- Adapted from Kvale, 2007

4.7.2 Piloting the Interview

The interview questions were firstly developed in English then translated into Arabic by the researcher; then reviewed by a number of academics and teachers to assess whether the language used was clear and unambiguous and whether the questions would be effective in obtaining the required data.

The pilot study used just one interviewee to establish approximately how long the interview would take and whether the interview questions obtained the required results. The pilot interview was be conducted with a Saudi teacher residing in England, who was sent a covering letter explaining that they should answer the questions and then give feedback; the covering letter assured the participant's anonymity and confidentiality. A consent form was signed at the interview, and the interview timed to get an idea of how long the main interviews would take. After the pilot interview, the interviewee also commented on the covering letter; the appropriateness, relevance and clarity of the questions; the length of the interview; and whether there were additional questions that could usefully be included. After the pilot interview, any changes deemed necessary either for the procedure or the questions were made. The resulting interview schedule is displayed in Appendix 4E.

4.7.3 Conducting the Interview

The interviews were scheduled to be carried out in Jazan with approximately 30 interviewees (sixteen female and fourteen male secondary teachers). The interview sample also reflects the more or less equal numbers of male and female secondary teachers in Jazan (see Table 4.1). In groups that are reasonably homogenous, a sample of this size is optimal (Guest *et al.,* 2006). For the purposes of this study, Saudi secondary teachers can be thought of as relatively homogeneous, as the Saudi educational system is regulated nationally such that conditions of work for secondary teachers are similar in all areas. The interviews focus on the degree to which teachers are given support and encouraged to use e-learning and which, if any, strategies are being used for the implementation of e-learning in secondary schools, as well as investigating teachers' opinions in more detail and revisiting the concerns that were highlighted by the survey data.

Prior permission had been obtained for the interviews and participants were assured of confidentiality; moreover, the researcher checked that they were comfortable with the interviews being recorded, and reminded them that at any time, they could ask that the tape be turned off. An MP3 was to be used to tape the interview as the small size of this device makes it unobtrusive; it is also able to record a lot of data, which can then be easily transferred onto a PC, stored safely and transcribed relatively easily. Audio-taping alone does not record non-verbal elements of communication such as gesture or facial expression; however, in order to record these, the interviews would have to have been videoed, which would have the disadvantages of being more intrusive and making transcription more complicated (Cohen *et al*, 2007). Hence, audio-taping was selected for the purposes of this study, as this method is simpler to use and the participant's tone of voice is recorded. If necessary, the interviewer can make notes about any non-verbal communication considered relevant. It is also useful to take some notes during the interview as these can be used if the recording is faulty or if the interviewee changes his or her mind about being recorded. After each interview, the researcher completed a log to supplement the notes. The location, time and date of the interview was logged, as well as any problems, such as interruptions, that occurred and some impressions about how the interview went, for example if any question was not answered in sufficient depth (Robson, 2002; Saunders *et al.*, 2009).

Audio-taping also allows the researcher to focus on communication with participants, and the data it yields is more accurate and less biased than just note-taking. Once the tape has been made, it can be listened to as often as required and can also be used to log any supplementary questions asked which proved to be relevant and could be used in subsequent interviews. Moreover, actual quotations from participants can be given to illustrate arguments made in the analysis.

When planning the interviews, the researcher also took into account the participants' comfort and how his own behaviour could be monitored so as not to influence interviewees other than putting them at ease. This would require some sensitivity and skill as ideally the participants' body language as well as their words would be observed as indicators of any problems or misunderstandings. It was therefore vital to make sure that the participants spoke as freely as possible and that the interviewer was not 'leading' them either by the questions being asked or by his body language. During the planning and piloting stage of Phase Two of the research, these issues were therefore tested and reviewed (Creswell, 2008; Saunders *et al*., 2009).

4.7.4 Transcription and Translation

As it can be very time-consuming to transcribe interviews, it was important to plan the transcription phase of the research very carefully. If the transcriptions are to be rendered in a form that makes them easy to analyse, the researcher can count on taking approximately ten hours for every hour of recorded tape (Gillham, 2000; Seidman, 2006). Transcription involves turning a dynamic form into a static one, and the method used to accomplish this is determined by how the researcher intends to use the transcriptions (Cohen *et al,* 2007). In order to illustrate key points in the analysis, as well as using reported speech to identify and comment on general themes, this study needed actual quotations by teachers. These quotations had to be carefully translated from Arabic to make sure that the exact meaning was rendered. Verbatim translation that includes paralanguage, such as ‘mmm’, was considered unnecessary, although any meaning lent to the statement by tone could be reported. As there were time constraints, translations into English were only made when quotations were needed; and the accuracy of these translations was ascertained by having the quotation in English re-translated to Arabic to establish that there had been no change in meaning (Healey & Rawlinson, 1994; Ghauri&Grønhaug, 2005; Easterby-Smith *et al*., 2008).

4.7.5 Data Analysis for Phase Two

Thematic analysis was used in the Phase Two data analysis. This can be defined as a method for the identification, analysis and reporting of themes (patterns) found in the qualitative data (Boyatzis, 1998). This method has the advantage of being very flexible, but it requires careful planning and execution; moreover, the ‘themes’ should not be seen as just emerging from the data, as the role of the researcher is pivotal in how these themes are selected (Braun and Clarke, 2006).

There are two basic approaches to thematic analysis –deduction and induction. The deductive process involves using a theory, namely the adapted UTAUT model in this study, from which the propositions to be tested are derived (Saunders *et al*., 2009; Yin, 2003). In this approach the key patterns and themes to be identified in the data are determined prior to analysis, and actively generated by the nature of the interview questions.

One of the main limitations of the deductive approach to thematic analysis is that the data may contain vital themes that were not included in the conceptual framework. In an inductive approach, themes are identified in the data without the prior selection of key themes and patterns; and arguably, this method allows for a better ‘fit’ between the social reality of those being interviewed and the theory that eventually emerges. For this reason, both of these approaches are commonly used in thematic analysis (Saunders *et al*., 2009); and this was done in Phase Two of this study.

In order to systematically identify the themes in the text of the transcriptions, the researcher used Atlas software which organised the material electronically. This was to save time as well as being able to construct diagrams to show the codes clustered around each theme. This made it easy to see the relationships between the themes and what the interviewees actually said, or in this case translations of what they said, as the Atlas qualitative data analysis tool was used with Arabic data.

4.7.6 Validity and Reliability of the Interviews– Verification Stage

The concepts of validity and reliability are widely used in quantitative research; however, they are also applicable to qualitative research. Since validity and reliability are rooted in the positivist standpoint, they have to be redefined to some extent if they are to be used in an interpretivist context. As these terms are routinely used in quantitative research, this provides a springboard for examining what validity and reliability mean in the paradigm of qualitative research (Golafshani, 2003).

In this study, it was important to establish that the researcher's descriptions and interpretations of Saudi secondary teachers' attitudes and experiences would be recognised by the participants. This would render the findings credible and correspond to what is usually referred to as 'internal validity' in quantitative studies (Sandelowski, 1986). The researcher therefore asked three interviewees to read the description and analysis of the findings to see if they thought these reflected their attitudes and experiences. It is also important to establish whether the findings of Phase Two can be applied to other groups of Saudi secondary teachers, as well as groups of secondary teachers in similar contexts, such as the other Gulf countries. Qualitative studies where the findings can be applied in this way have what can be described as 'fittingness', which is analogous to external validity in quantitative studies (Appleton, 1995). The researcher accordingly decided to ask several other secondary teachers from other parts of Saudi Arabia to read the report to see if they considered the findings applicable to them. All reported that they did.

It was also important for the researcher to ensure that there was a clear description of the process of collecting, processing and analysing the interview data obtained from the teachers; and to be careful that this was done consistently with all the interviewees. Doing this established 'auditability' meaning that the procedures used in this research can be replicated reliably and that throughout the investigation, the procedure was applied consistently, as it is the auditability and consistency of a qualitative study that determines its reliability. (Guba & Lincoln, 1989). The researcher carried out all of the interviews in this study face-to-face with all male teachers and by phone with all the female teachers. Furthermore, in order to establish consistency, a log of the procedure was kept, and the procedure itself is detailed in the report to ensure auditability. Consistency of procedure was established for the face-to-face interviews with male teachers and for the phone interviews with female teachers. There were differences as, for example, there were no visual cues with females. The researcher's interviewing skills are also relevant to consistency in this study, as the data was obtained by means of the interviews (Appleton, 1995). The researcher was able to make use of the pilot study to identify and rectify any difficulties that could happen during interviews.

Quantitative studies need to demonstrate objectivity –the detachment of the researcher from the process of research – to establish reliability and validity; the Phase Two interviews, however, arguably required the researcher to establish a rapport with the teachers interviewed. This involvement, along with the emphasis on the subjective experiences and attitudes of the teachers, means that in this qualitative research, subjectivity is valued (Sandelowski, 1986). Here, what is required rather than objectivity is rigour in reporting the research process and ensuring that it is what the teachers themselves actually say, feel and think that is reported, and not the researcher's own interpretation as this may not accurately reflect what the teacher means.

The researcher thus also monitored the interviews for any effects of interviewer bias; this is where the appearance or behaviour of the interviewer affects how an interviewee responds and thus introduces bias into the data (Saunders *et al*, 2009). For this reason, the researcher took care to appear neutral but interested in what the teachers were saying without encouraging particular responses. As with the survey, teachers may want to appear more adept at using e-learning technology than they actually are, or conversely, to exaggerate difficulties, as the interview may give them an opportunity to complain. Alternatively, they may not want to give out certain information, and thus they may only give an incomplete or distorted account of their situation (Saunders *et al*, 2009). Care was thus also taken to monitor any interviewee bias of this sort, and neutral questions like: 'Can you tell me a little more about that?' used to elicit further information. They could also be reminded that the interview was confidential and their anonymity would be preserved. The possibility of interviewer bias may be higher when the interviewer digs deeper and the researcher needed to remain aware of this (Oppenheim, 1992).

4.8 The Ethical Approach of the Research

Ethical considerations relate to the responsibilities that researchers have towards the study participants, the community and any sponsor (British Educational Research Association [BERA], 2011). This research was designed in accordance with the Code of Good Practice in Research laid down by the University of Brighton. Moreover, it adheres to the seven principles of public life identified by the Nolan Committee on Standards in Public, follows the guidelines required by the university's ethics committee and has been awarded Tier 1 ethical approval (University of Brighton, 2015) (See Appendix 4F). The confidentiality of any information acquired from participants and their anonymity are requirements of the Code of Practice; and to this end, the participants were contacted through the Department of Education in Jazan; thus, the researcher did not need to have their personal contact details. According to Cohen *et al.* (2007) cover letters should be sent to all respondents to ensure that they are given information about the nature of the study they are invited to take part in. The letter encouraged them to participate by emphasising the value of their contribution as well as giving them reassurance about confidentiality and anonymity (Cohen *et al.*, 2007). In this study, an appropriate covering letter was formulated to be sent with the questionnaire.

The research aims were also explained in the covering letter, and the researcher took pains to acquire informed consent and ensure that participants knew that they could withdraw from the study at any time without being asked to give a reason, as is required by the Ethics Committee. The participants were also told how many sections the questionnaire included, encouraged to indicate if they would like to participate in subsequent interviews about their experiences and attitudes to using e-learning technologies and thanked in anticipation of their co-operation. As interviewees were selected from those survey participants volunteering to be interviewed, they had already answered the questionnaire, and were thus informed of the nature of the study.

The interviews were conducted in an environment where the participant would not be pressured by other people, and to this end were asked to indicate a place and time convenient for them. Interviewees were informed from the start that interviews were to be tape-recorded, that is, when they were initially contacted to make arrangements for the interview. In addition, the consent form included a statement that the interviews would be taped, and that the tape and noted data would be securely kept by the researcher and that when it was no longer required for the research, it would be destroyed.

The questions asked in both the survey and the interviews were piloted so that the researcher could check if the questions were potentially problematic for the respondent in any way, in terms of being too personal or intrusive and whether the language used was appropriate according to the pilot participants. Furthermore, there are cultural restrictions involved when Saudi women to come into contact with an unrelated man; these were resolved by conducting interviews with female participants by telephone. Although some Saudi women may not be comfortable being interviewed over the phone by a male interviewer, female teachers indicating that they were willing to be interviewed knew beforehand that this was to be with the male researcher. Indeed, because of the difficulties in making contact with members of the opposite sex, in many studies in the KSA, the researcher interviews participants of the same gender. It is not possible, for example, to conduct a mixed-gender interview in a public place, as the owner of the location would not allow it (Al Munajjed, 1997).The education system in Saudi Arabia is segregated by gender, as there are religious restrictions. Islamic law or *Shari'ah*insists on this segregation (Bingimlas, 2010; Oyaid 2009).

4.9 Conclusion

This chapter discussed the methodology used in this research, demonstrated that the underlying research philosophy is a pragmatic approach which borrows from the critical realist paradigm. Mixed methods with an explanatory–sequential design is used in this research, since it includes quantitative followed by qualitative methods; this was identified as being an optimal design for the present study. The research instruments deployed were online questionnaires and semi-structured interviews to be conducted with the research sample. The challenge identified is to analyse the results of the survey from Phase One such that it is possible to identify what needs to be further explored in Phase Two of the research, and then to successfully integrate both sets of data so that their combined strengths will allow the researcher to understand the issues surrounding the acceptance and use of digital educational technologies in the Saudi secondary context more fully. The next chapter outlines and analyses the results of the survey and the areas identified for further exploration in Phase Two.

Chapter 5 Quantitative Data Analysis

5.1 Introduction

In this chapter, the results of data analysis from the survey questionnaire are discussed. An interpretation of the findings are derived from the quantitative data obtained in this study; in order to understand Saudi secondary teachers' adoption and use of e-learning technologies. There is also an indication given of the areas highlighted by the survey results for deeper investigation in the interviews to be conducted with Saudi secondary teachers.

Chapter Five outlines the statistical methods used in the quantitative part of the research and describes the factor analysis as well as the tests conducted for reliability and stability. The data generated by the survey questions is given in separate sections, showing general information about the participants and their teaching environments and participants' use of technology and the facilitating conditions for this, before going on to detail the factors for each of the ten elements that make up the theoretical model: Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Teacher Anxiety, Attitudes to Technology, Behavioural Intention, Actual Use, Teachers' Education Experience and Education Policy. The chapter goes on to consider what multiple regression analysis reveals about the data, and in particular how models are formulated to explain variance in teachers' behavioural intentions and actual use of e-learning technologies.

This chapter aims to create an overview of the sample data; test the quality of the data and go some way to answering the research questions. The chapter begins by testing the construct validity of the questionnaire by using factor analysis and Cronbach's alpha with the responses to the survey. After this, the frequency statistic is analysed for the demographic information of the population being studied. The total number of participants and the percentage of each category for demographic representation are calculated; the response rates are discussed, and descriptive statistics of the sample are presented. The results of the analysis and the discriminate validity statistics of the sample are provided. Stepwise regression techniques were mainly employed in order to examine the relationship between independent and dependent variables separately. The computed factor scores for each factor were used as predictor variables in a regression analysis with the dependent factor (see section below for fuller description). The chapter concludes by identifying the areas to be further investigated in the qualitative part of the study and by summarizing the main points.

5.1.1 Statistical Methods Used in the Study

In order to fulfil the objectives of the study, a number of statistical techniques were utilized in the data analysis:

- **Cronbach's alpha coefficient:** a Cronbach's alpha measurement of internal consistency was adapted to assess the overall reliability of the measurement scale for each defined construct of the study, where alpha is defined as an estimate of the proportion of the total variance that is not due to error.
- **Descriptive Statistics:** descriptive statistics such as means frequencies, and standard deviation, were used to identify the major characteristics of respondents in term of their gender, age, and ICT Skills.
- **Correlation:** One of the commonest and most useful statistics which comprises a single number demonstrating the degree of relationship between variables.
- **Regression Analysis**: Multiple regression analysis and simple regression were used. The measurement model specifies relationships between the observed variables, where a latent variable is a hypothesized and unobserved concept that can only be estimated by observable variables. Considering the advantage of the SPSS technique that ensures the research objectives will be met, this technique was adopted in this study.
- **T-test**: This test shows whether the means of two groups vary statistically from each other. This analysis was used to compare the means of the groups.
- **ANOVA**: The one-way analysis of variance (ANOVA) is used when there are three or more independent groups to check for any statistically significant differences between their means.

Chapter Five presents the data analysed by the SPSS statistics tool. The research investigated the factors influencing the acceptance and use of e-learning technologies in secondary schools in Saudi Arabia from teachers' perspectives, in the light of the main objectives of the study that were discussed in detail. The study objectives addressed in Chapter Five are to investigate Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Attitudes towards and Anxiety about using technology, Education Policy and Teachers' Education Experience as well as Behavioural Intentions and actual use of e-learning tools (Use Behaviour)**.** In order to fulfil the study objectives, the researcher conducted different tests and analysis such as the relationship between factors (correlations), reliability and stability tests, data analysis and factor analysis.

The data was collected from 347 teachers who took part in this research and who responded to the research questions as per the requirements. There was no missing data because the questionnaires were distributed online.

5.2 Test of Normality

The normal (or Gaussian) distribution is the one most used in statistical analysis and is the basis of much parametric statistical analysis. Populations from which samples are taken are assumed to be normally distributed and this assumption means that parametric tests are stronger than non-parametric ones as they can identify smaller differences within the same sample size as well as differences in smaller sample sizes. However, the researcher needs to be aware of assumptions such as normality; as it becomes impossible to make reliable and accurate conclusions about phenomena when these assumptions do not hold. The Central Limit Theorem tells us that the sampling distribution in large samples of over 200, such as that of this study, is usually normal; and thus, rather than just doing a calculation, a visual rendition of the distribution is essential, as is the value of the skewness and kurtosis statistics.(Field, 2009)

In this research, we therefore have to calculate the standardized skewness for the data set in order for the assumption of normality to be tested. This was achieved by taking the skewness (statistic) value divided by its standard error of skewness value, then comparing that value against ± 3.29. Values in excess of +3.29 were deemed to be a concern. That is, if the standardized skewness was in excess of $\pm$3.29 it was concluded to demonstrate a significant departure from normality, meaning that the assumption of normality had not been met (Kim, 2013).

Table 5.1Statistics for Showing Standardized Skewness Values

	total scores
N	347
Mean	35.8875
Median	35.3738
Std. Deviation	4.18622
Skewness	0.397
Std. Error of Skewness	0.131

As shown in Table (5.1) for this set of data, we find:

A standardized skewness value: $\frac{0.397}{0.131} = 3.03$

Since the standardized skewness value did not exceed $\pm$3.29, we can conclude that the assumption of normality has been met for this set of data, see figure 5.1.

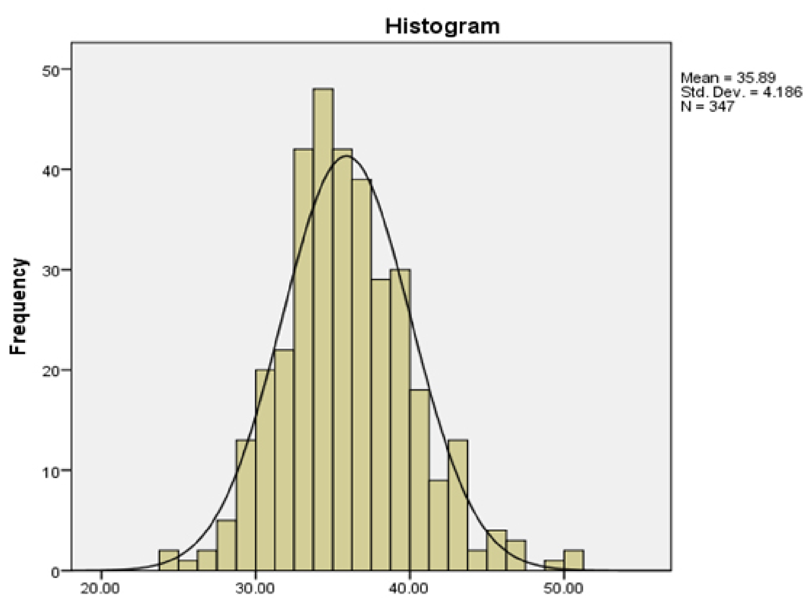


Figure 5.1 Normal Distribution

Furthermore, the normality of each factor was also calculated as can be seen in Table5.2. By observing the skewness and kurtosis of each of the factors we can assume that all meet the normality assumption. The skewness statistic was less than 2, while the kurtosis was less than 7 (Kim, 2013).

Table 5.2 The skewness and kurtosis of each of the factors

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PE	347	2.25	5.00	4.5756	.55565	-1.429	.131	2.015	.261
EE	347	1.33	5.00	4.1018	.78391	-.868	.131	.441	.261
SI	347	1.00	5.00	3.6075	.76894	-.346	.131	.251	.261
FC	347	1.00	5.00	2.0788	1.42085	1.045	.131	-.434	.261
BI	347	1.33	5.00	4.5668	.55199	-1.642	.131	2.409	.261
UB	347	1.00	5.00	3.7889	1.09548	-.873	.131	-.116	.261
ATT	347	1.00	5.00	4.1864	.71446	-1.017	.131	1.870	.261
AX	347	1.00	5.00	2.6649	.89454	.280	.131	-.307	.261
TEE	347	1.00	5.00	2.1981	1.10545	.838	.131	-.167	.261
EP	347	1.00	5.00	4.1187	.75874	-.944	.131	.998	.261
All	347	24.51	50.00	35.8875	4.18622	.397	.131	.620	.261
Valid N	347								

5.3 Exploratory Factor Analysis

Similar variables in the factor analysis are grouped together into dimensions, a process referred to as the identification of latent variables. This process does not need the user to distinguish between the variables that are dependent or independent being an exploratory analysis which reduces the observation dimension to simplify data. In the factor analysis below, the abbreviations are as follows.

- PE: Performance Expectancy
- EE: Effort Expectancy
- SI: Social Influence
- FC: Facilitating Conditions
- BI: Behaviour Intention
- AX: Anxiety to use e-learning
- UB: Use Behaviour
- TEE: Teacher Education Experience
- EP: Education Policy.
- ATT: Attitude Toward using Technology

There are a variety of statistical methods which aim to define the structure which underpins the structure of variables, and factor analysis is used to investigate the correlations among those variables. This allows the researcher to establish the structure's separate dimensions and then describe the extent to which each of these dimensions explains each variable (Straub, 1989; Hair *et al.,* 2006).

In order to establish that a group of items are indeed measuring their underlying constructs, it is important to evaluate the validity of those constructs and to combine the results of these evaluations into the final research model so that a good level of fit with the data acquired from the measurement model can be demonstrated. This should ideally be done before any validation or analysis procedures are carried out (Hair *et al*, 2010).

The questionnaire used for this study was refined using Exploratory Factor Analysis (EFA) such that the factorial validity of the items that the questionnaire is composed of can be assessed and a check can be made as to how well they measure the same concepts or variables. In social science this technique is widely used (Costello& Osborne, 2005). Traditionally, EFA has been a method for exploring the factor structure that possibly underlies a group of observed variables without a preconceived structure being imposed on the outcome. As such it can be thought of as an orderly simplification of measures that are interrelated (Child, 1990).

When the underlying structures of a model's variables are to be defined, Exploratory Factor Analysis (EFA) is commonly used, especially when the researcher is not certain about the relationship between the constructs (unobserved variables) and the items (observed variables) (Byrne, 2010). Although EFA is usually considered unnecessary when the theory is already established, and the UTAUT is one such theory, it was considered precautionary to confirm the validity of the constructs used in the revised UTAUT proposed for this study; and it was felt important to make sure that the survey items really measured their underlying variables. Version 22.0 of the Statistical package for Social Science (SPSS) was used for this EFA (Pallant 2011).

EFA allows the researcher to evaluate both convergent and discriminant validity by checking that items loaded cleanly onto only those factors that they had been expected to load onto (convergent validity) and did not cross-load onto other factors (discriminant validity) (Straub *et al*, 2004) .

5.3.1 Factor Analysis - Communalities and Components

The communalities found by the analysis are displayed before and after extraction (see Appendix 5A). Initial components assume that, at the initial stage, all the variances are similar at 1.0, while in the data structure, the common variance is reflected in the communalities column titled 'Extraction'. The reason for variance after extraction can be explained by the fact that, in the extraction process, some of the information is lost due to the fact that some of the factors that were used in the initial factor analysis were discarded. After the extraction has been done only the values that are left explain variance in the variables. The Performance Expectancy, Facilitating Conditions and Effort Expectancy factors had the highest commonalities after extraction of >0.70, indicating that to a very great extent, they affect the implementation of e-learning technologies in secondary schools. It was also noted that the commonalities of all the other factors was >0.5, hence there was influence to a great extent on the application of e-learning technologies.

5.3.2 Factor Analysis- Total Variance Explained

One of the aims of multivariate analysis is to explain why observations, in this case the sample of Saudi secondary teachers, had different answers in the survey. Factor analysis puts survey questions that differ together; this reduces a large number of variables (i.e. the survey items) into a smaller set of factors, thus making it easier to model in a regression or an ANOVA. A percentage of the total variance is explained by each factor; and the final model may not include those factors that do not explain much variance.

In (Appendix 5B), the first section represents the eigenvalues related to each factor (Linear component) in three states, before and after extraction as well as the retention of the sum of squares. There were 41 linear components identified after extraction within the data set.

The highest variance in this analysis was 19.533% of the total variance. The first three factors (1-10) had high % variance, accounting for 69.275 of the total % variance, with the subsequent factors (11-41) showing just insignificant (small) variance. If factor solutions account for 60% of the total variance explained, this is generally accepted as satisfactory in the field of social science (Hair *et al.* 2006). After extraction, eleven eigenvalues which were greater than one were extracted- this left us with only 10 factors. The extractions are displayed as an Extraction sum of Square Loading and shown in value and percent. These values displayed after extraction are similar, however the other factors are discarded, these were components which were less than 1, and this left the lower section from component 4 blank. The ten elements extracted can be viewed as the major elements in each variable that affects the application of e-learning technologies in secondary schools. The ten elements did not only have a strong correlation between each other but also affected other variables. This is an indication that the ten components are the major factors that influence the implementation of e-learning technologies in secondary schools.

5.3.3 Factor Analysis - Rotated Component Matrix

In order to facilitate interpretation of the results of factor analysis, factor rotation was undertaken. This is a mathematical strategy that allows a better understanding of the pattern of loadings (Brace *et al,* 2006). The cumulative percentage of variation explained by the extracted components is maintained by the rotation, but that variation is now more evenly distributed over the components. The considerable alterations in the individual totals indicate that it will be easier to interpret the rotated component matrix than the un-rotated one. When this has been done, the rotated matrix can be examined to see the items that load onto each factor and to decide which factor loading to include. Factor loadings of more than ±0.30 can be thought to constitute a minimum level with anything of ± 0.40 being important and ± 0.50 being practically significant (Hair *et al*, 2006).

In this study, results were checked against the structure matrix; and, if an item's factor loading was at 0.40 or more, the item was deemed to load onto the factor. This was considered sufficient for the purposes of interpretation. If the difference between factor loadings was lower than 0.10, then the item was deemed to load onto more than one factor (Goring & Papageorgiou, 2008).

The Rotated Component Matrix displayed (Appendix 5C), after conducting a Varimax rotation which refers to a means of rotating factors so as to make it simpler to understand the factors which maintain a zero correlation among all the factors (Cramer & Howitt, 2011). This rotated shows the factor loadings for each variable and each variable that was most strongly loaded. The elements were classified into categories of ten components and variables, with irregular values extracted from each component column. A component matrix extracts by highlighting the values that are high and leaves the values that are almost equal. There exist both positive and negative relationships between the variables and the components. However, the extracted components have a high variance with the component variables. This is an indication that the relationship that exists between the components and the variables is very low.

5.4 Reliability

In research, highly reliable tests are indicated by their stability over period of time, stability is therefore an aspect of reliability and measures the extent to which test scores are essentially invariant over time. Reliability tests are used to measure the reliability of the variables in terms of internal consistency; and reliability can be tested using Cronbach's alpha test, which is used in this study.

It has been proposed that the value of Cronbach's alpha should be above 0.70 to consider a scale reliable; for excellent reliability, there should be a result of 0.90. A result of 0.50–0.70 indicates high moderate reliability, but anything below 0.50 shows that the reliability is low (Hinton et al., 2004).

Construct reliability needs to be assessed before any validation or analysis procedures are carried out (Hair *et al.*, 2010). The test has a range of between 0 and 1, and the closer the coefficient is to 1.0, the greater the internal consistency. The reliability of the consistency of the latent variables in the consistency test is reliable between 0.69 and 0.82, as recommended by Hair *et al.* (2003). The researcher carried out scale reliability testing as the mode of coding by using the SPSS statistical tool. It is important to note that there was no missing data for items in this section, given that the research questions were answered online and each question had to be answered before the participant could move on through the questionnaire.

A reliability test was conducted for each of the ten variables, which were: Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Behavioural Intention, Anxiety to use e-learning, Use Behaviour (Actual use of e-learning technologies), Attitudes towards the use of e-learning technology, Teacher Education Experience, and Education Policy.

The tool reliability was verified by using Cronbach's alpha coefficient; and the results are shown in Table 5.3 below:

Table 5.3 Reliability Analysis

Construct items	Factors	Number of Items	Cronbach's Alpha
1	Performance Expectancy	4	.876
2	Effort Expectancy	3	.829
3	Social Influence	5	.763
4	Facilitating Conditions	3	.933
5	Behavioural Intention	3	.789
6	Use Behaviour	4	.892
7	Anxiety	7	.813
8	Attitudes	3	.717
9	Teacher Education Experience	4	.834
10	Education Policy	5	.766
Total degree		**41**	**.823**

It is clear that Cronbach's alpha coefficients are valid and acceptable statistically and managerially because (α) values are greater than the accepted percentage (0.69).

5.5 Descriptive Results of the Survey

5.5.1 General Information

In this section, general statistical methods were used for coding, where SPSS descriptive statistics were used; and the researcher used statistical and mathematical techniques such as frequencies, tables and charts to display results.

Data analysis for both general and objective research questions are presented below:

5.5.2 Participant Profile

The questionnaire began with questions that would allow the researcher to build up a profile of the participants in terms of salient features such as age and gender. This gave an indication about whether the sample was representative as well as giving a general overview of participants' educational background. The results are shown in Table 5.4 below:

Table 5.4 Participant Profile (N = 347)

	Descriptive Statistics	Frequency	Percentage
Gender	Male	189	54.5%
	Female	158	45.5%
Total		**347**	***100%***
Age range	Less than 25	3	0.9
	25 - 29 yrs.	50	14.4
	30 – 34 yrs.	105	30.3
	35 – 39 yrs.	100	28.8
	40 – 44 yrs.	51	14.7
	45 – 49 yrs.	29	8.4
	50 – 54 yrs.	9	2.6
	55 – 59 yrs.	0	0%
Total		**347**	***100%***
Number of years in teaching service	Less than 5 Yrs.	74	21.3%
	5 - 9 Yrs.	91	26.2%
	10 - 14 Yrs.	77	22.2%
	15 - 19 Yrs.	55	15.9%
	More than 20 Yrs.	50	14.4%
Total		**347**	***100%***
Qualifications	Bachelor degree (non-educational)	49	14 %
	Master degree	13	3.7%
	PhD	1	0.3%
	Bachelor degree (educational)	273	79%
	Higher Diploma	11	0.3%
Total		**347**	***100%***

Gender and Age

More male participants took part than female participants (see Table 5.4 above). The disparity in the gender representation occurred because the sampling was purely random rather than random stratified to ensure an equal number of male and female participants were sent links to the questionnaire; however, this had no significant impact on the reliability of the research and the survey outcomes, as the disparity was relatively small. In Saudi Arabia male and female teachers work in separate schools, but are subject to the same policies and curricula. The study seeks to explain technology use and acceptance in general for both genders

The survey established that the largest group of participants were aged 30-34, followed by those aged 35-39; those aged 40-44 and 25-29. The 45-49s represented just over 8%

of the sample while only 3 participants were aged below 25 years and 9 were 50-54 (see Table 5.4 above).

To ensure that there was a representative range of ages, the researcher randomly selected more participants for the category with more teachers (the group aged 30-34) and fewer participants for the category with few teachers (the groups below 25 and over 50). This was to ensure that the sample was representative in this respect.

Number of Years in Teaching Service

The survey established that the biggest number of participants had worked in teaching for 5-9 years, followed by those who had worked in teaching for 10-14 years and those who had taught for less than 5 years. The fewest participants had been in teaching more than 20 years, followed by those who had served 15-19 years (see Table 5.4 above).

Given that the majority of the participants had worked for more than 5 years, the teachers in the sample were mostly long-established in their secondary schools and had a wealth of experience to draw on when answering the survey questions. Also, long-serving teachers would have experienced teaching both without and with e-learning technologies, as well as having witnessed the Saudi Ministry of Education's initiatives to introduce e-learning (See Chapter 2 section 2.9).

Educational Qualifications

The majority of participants had a Bachelor of Education degree qualification, followed by participants with an ordinary Bachelor degree, Master's degree and Higher Diploma. Only one participant had a PhD (See Table 5.4 above).

Most participants had a Bachelor of Education degree which meant that they had had training in pedagogy including one semester of actual teaching practice and an opportunity to study e-learning technologies as a module of their course. This contrasts to the purely academic qualifications.

5.5.3 Teacher Skills and Training

As well as creating a general profile of the sample, it was felt that more specific details about the skills and training in ICT that the teachers had was important in order to build a picture of the current practices in the use of e-learning technologies by Saudi secondary teachers (See Table 5.5 below).

Table 5.5 Teacher Skills and Training

	Descriptive Statistics	Frequency	Percentage
Teachers' computer skills	Beginner level	21	6.1
	Intermediate level	146	42.1
	Advanced level	149	42.9
	Expert	31	8.9
Total		**347**	***100%***
Presentation slides (PowerPoint) and educational programs used	Designed by me	51	14.7
	Ready (from the Internet - colleagues - the market)	100	28.8
	Both	157	45.2
	I do not use presentations and educational programs (PowerPoint)	39	11.2
Total		**347**	***100%***
Tools used in the teaching process	Computer	212	61.1
	Smartboard	78	22.5
	Projector	246	70.9
	Computer Lab	49	14.1
	Learning resource centres (LRC)	125	36.0
	Overhead projectors	21	6.1
	Tablets	25	7.2
	Mobile	87	25.1
	E-mails	42	12.1
	iEN National Education Portal	15	4.3
	None of the above	41	11.8
	Others	21	6.1
Programs and applications used	PowerPoint	280	80.7
	Word processing	173	49.9
	Spreadsheet	41	11.8
	Graphics/drawing packages	75	21.6
	E-mail	67	19.3
	The internet	121	34.9
	Social networks	76	21.9
	iEN National Education Portal	21	6.1
	Specialist programmes	34	9.8
	Blogs	32	9.2
	None of them	34	9.8
	Others	16	4.6

	Descriptive Statistics	Frequency	Percentage
Educational training programs attended in how to use e-learning technology in teaching and learning	Yes	198	57.1
	No	149	42.9
Total		**347**	***100%***

Level of Computer Skills

The survey findings indicated that the majority of participants believed they had an advanced level or an intermediate level of computer skills, with a much smaller group classing themselves as having an expert level of skills, and an even smaller number considering themselves beginners. Interestingly, only one participant said they had a non-existent level of computer skills (see Table 5.5 above). This is an indication that all the participants, apart from one, knows how to operate computers and have the relevant skills required for using e-learning technologies. However, it should be noted that the assessment of computer skills in this survey is subjective; therefore teachers grading themselves as 'advanced' for example may actually all have a different level of skills; the self-assessment thus reflects confidence as well as ability. This is a complex issue which will necessitate further investigation in the interviews. Although teachers are required to have a range of digital literacy skills that go beyond the basic 'computer skills' such as using a keyboard, the term 'computer skills' (in Arabic) was used in the survey as the terminology was considered more identifiable by participants.

Presentation Slides (PowerPoint) and Educational Programs

The survey established that most of the participants used presentation slides (PowerPoint) and educational programs that are either designed by them or ready-made from the internet, a colleague or the market. The participants who used ready-made presentational slides and educational programs were more numerous than those who designed their own educational programs and presentation slides. Some participants do not use presentations and educational programs (PowerPoint) at all (see Table 5.5 above). From the above findings, it is evident that the participants use educational programs and presentational slides that are both personally designed and ready-made.

However, as most rely on ready-made options this highlights that they may lack the skills needed to design specific tools most relevant to their own students and that there is a lack of training in this.

Tools Used in the Teaching Process

The survey findings established that the most used tools in the teaching process were projectors (which was the most popular tool), computers and Learning Resource Centres (LRC); also that a small but significant number of participants used Mobile, Smart-board, Computer Lab, and E-mail tools in the teaching process.

The survey also established that the least used tools in the teaching process were the iEN National Education Portal, overhead projectors and tablets (see Table 5.5 above). It would be interesting to see why so little use was made of the Portal as it is available nationwide and has been promoted by the Ministry of Education; also why nearly 12% of participants used no digital tools in the teaching process.

Programs and Applications Used for Teaching

The most used programs and applications for teaching were PowerPoint, word processing and the internet. The next most programs and applications cited were social networks, graphics/drawing packages, e-mail and spreadsheet programs and applications. The least used programs and applications for teaching were the iEN National Education Portal, blogs and nearly 10% of the sample used none of the programs or applications. The respondents also used alternative programs and applications for teaching, such as PDF, Auto-play, Keynote, Pages and Show Me (see Table 5.5 above).

The low use of the iEN Portal was interesting and may show that teachers have not been properly inducted into its use in that they were not given examples of good practice using this tool. It is also possible that a lack of facilitating conditions in the school environment is a contributory factor and this needs further investigation.

Training

The survey established that somewhat more participants had attended educational training programmes on how to use e-learning technology in teaching and learning than those who had not attended any (see Table 5.5 above). According to Liu (2010), not attending educational training on how to use e-learning technology, is a major limiting factor to the application of e-learning technologies in schools**.** Although the majority attend training programmes, it is not entirely clear that these programmes provide adequate training and have positive outcomes. Furthermore there are a significant number of participants who have not attended training, yet say they possess the skills, which implies that teachers may be learning these skills outside an official context. This is an area which clearly requires further investigation.

5.5.4 Teaching and School Environment

The survey also sought to describe the working life of the participants in terms of what they actually did at work and the workload itself.

Teaching Load

The researcher wanted to include teachers of all subjects taught in secondary schools in Saudi Arabia, hence included a question to create a profile of subjects taught by participants to ensure that all the subjects were represented. It was felt that it was important to do this as the results of the study create a conceptual framework that could be used to build a national strategy to assist implementation of e-learning in Saudi secondary education. The results show a spread of subjects, and that the vast majority of respondents did work other than teaching at the schools where they were employed. This is an indication that the majority are expected to carry out other tasks and this may impact on their time or include work that necessitates the use of e-learning technologies. Another factor which affects the demands made on teachers is the number of hours they are expected to spend in the classroom. The great majority of secondary teachers in Jazan taught between 10 and 19 hours. According to Obasa *et al.*, (2013), it is possible to teach a large number of students and a high number of lessons per week with e-learning technologies, as they allow for broad coverage relevant to a wide range of students and make for efficient teaching. However, this is only the case if the facilitating conditions allow for easy preparation and delivery. Teachers who have a high number of hours of teaching may well be less likely to use technologies if they have to struggle to prepare materials. Teachers' workload is also affected by the number of students in the class. The survey results indicated that, in the classes they taught only 9.2% had fewer than 20 students in their classes. Given that the majority of the participants indicated that their classes had on average 21-40 students, and 10.1% had over 40, using e-learning technologies in teaching could be useful. This implies that it is efficient to teach using e-learning technologies if there are a high number of students in the class, given that this is economical and promotes effectiveness and students' understanding. However, as noted in the section above, this is only an advantage if e-learning technologies are perceived as relatively easy to use and the relevant equipment is available (see Table 5.6).

Table 5.6 Teaching Load

	Descriptive Statistics	Frequency	Percentage
Subjects currently taught	Computing (ICT)	35	10.1
	Mathematics	44	12.7
	Chemistry	33	9.5
	Physics	35	10.1
	Biology	25	7.2
	Geology	9	2.6
	Science	7	2.0
	Arabic Language	40	11.5
	English Language	31	8.9
	Social Science (History - Geography)	30	8.6
	Islamic education	34	9.8
	Library and Research Skills	11	3.2
	Physical Education	4	1.2
	Family and Consumer Sciences	9	2.6
Total		**347**	***100%***
Work other than teaching	Yes	228	65.7
	No	119	34.3
Total		**347**	***100%***
Class periods taught	Less than 5	44	12.68
	5-9 Classes	50	14.41
	10-14 Classes	121	34.87
	15-19 Classes	96	27.67
	20-24 Classes	36	10.37

	Descriptive Statistics	Frequency	Percentage
Total		**347**	***100%***
The average number of students in class	Less than 20 Students	32	9.2
	21-30 Students	155	44.7
	31-40 Students	125	36
	More than 41 Students	35	10.1
Total		**347**	***100%***

School Environment

A general picture of the physical working environment and shape of the working day was also sought by the survey.

Table 5.7 School Environment

	Descriptive Statistics	Frequency	Percentage
School Location	Mountainous area	22	6.3
	Rural	174	50.1
	Urban	151	43.5
Total		**347**	***100%***
School Building	Government owned	303	87.3
	Rented	44	12.7
Total		**347**	***100%***
School Opening Times	Afternoon	23	6.6
	Morning	324	93.37
Total		**347**	***100%***

School Location and Building

Location was also a factor felt to be important in the Jazan area and results showed teachers were working in rural and urban environments in roughly equal proportions with a small but significant number from mountainous areas. With respondents from all areas, the researcher was able to investigate the application of e-learning technology in those contrasting locations, all of which exist in the Jazan area. Given that the Ministry of Education is faced with the challenge of providing educational technologies for all areas, it is useful to consider the 'mountainous area' cohort separately to see if there are specific problems, and whether the geography of Jazan is producing a 'digital divide'. Similarly, the Jazan context means that type of building is a relevant factor. The survey found that a small but significant number of participants came from schools that were in rented buildings (see Table 5.7 above). The Ministry of Education plans to replace rented buildings with government buildings to save costs and for ease of administration (Al-Khattaf, 2016). However, it may well be the case that schools in rented buildings are not as well provided with digital equipment. The survey data reveals that these are areas for further investigation.

School Opening Hours

Recent events in Saudi Arabia have meant that school opening hours have possibly become a relevant factor. As a result of the war with Yemen, some schools near the border were put into school buildings where school was held in the morning, and told to use the building in the afternoon. There is anecdotal evidence from the initial interviews that managers did not give full access to digital equipment in the afternoon. The Ministry of Education sent secondary teachers in the south of Saudi Arabia (near the warzone) on courses to learn to use e-learning tools. This was to provide them with alternative tools that could be used when their schools were closed for security purposes; this training involved learning to use strategies such as You Tube, Tablets, and visual learning technologies. The survey found that the vast majority of participants worked in schools that were open in the morning, but it would be interesting to investigate this issue further (see Table 5.7 above).

5.5.5 ICT Infrastructure

In this section, as with section 5.5.1, general statistical methods were used for coding where SPSS descriptive statistics were used. There was no missing data and all items in this section result from fully completed questionnaires. The survey looked to provide information about the participants' use of digital technology at home as this has a bearing on their use of it in their professional life.

ICT Devices at Home

The majority of the participants had personal computers at home, more than any other IT device; the second most commonly-owned appliance was the Smart Phone. Furthermore, a large number of participants did not have a Tablet and one participant had no device at all at home. All these appliances can be used to facilitate e-learning technology; and the availability of IT devices at home in order to prepare lessons and communicate with colleagues and support the application of e-learning technologies in educational institutions (see Table 5.8).

Table 5.8 ICT Appliances at Home

	Descriptive Statistics	Frequency	Percentage
IT appliances at home	Personal Computer	314	90.5
	Tablet	125	36.0
	Smart Phone	279	80.4
	None of the above	1	0.3
Type of Internet Connection at home	DSL	167	48.1
	Fibre Optic	9	2.6
	3G	110	31.7
	4G	95	27.4
	Slow internet connection	68	19.6
	No internet connection	2	0.6

Type of Internet Connection at Home

The highest number of participants had a DSL internet connection at home, followed by participants with 3G internet and then participants with 4G internet connection only 2.6% of the total sample having a fibre optic internet connection. Interestingly, only 2 participants had no internet connection at all but nearly a fifth reported a slow internet connection. Having a good internet connection at home helps teachers in their preparation as they can download information more quickly and there is less chance of internet failure (see Table 5.8).

Use of e-learning Tools in School

The survey gathered information about current facilitating conditions provided by the Ministry of Education.

Table 5.9 ICT Appliances in Schools

	Descriptive Statistics	Frequency	Percentage
Computer available at school	Yes	84	24.2
	No	263	75.8
Total		**347**	***100%***
Type of Internet Connection in Schools	DSL	116	33.4
	Fibre Optic	2	0.6
	3G	46	13.3
	4G	50	14.4
	Satellite	5	1.4
	Wireless	62	17.9
	Slow internet connection	59	17.0
	Internet Connection not provided	85	24.5
Type of Internet Connection in Class	DSL	8	2.3
	Fibre Optic	0	0.0
	3G	11	3.2
	4G	7	2.0
	Wireless	22	6.3
	Slow internet connection	8	2.3
	Internet Connection not provided	302	87.0
Use of Internet connection at school	Official work	89	25.6
	Teaching	27	7.8
	Both	139	40.1
	Neither	92	26.5
Total		***347***	***100.0***
Technology Equipment Available in the School	Classroom computers	69	19.9
	Smartboard	121	34.9
	Projector	208	59.9
	Computer Lab	158	45.5
	Learning resource centres (LRC)	177	51.0
	Overhead projectors	45	13.0
	Internet Access in Classroom	10	2.9
	Laptops	24	6.9
	None of the above	59	17.0
	Others	18	5.2

Availability of Ministry of Education Computers in Secondary Schools

The survey established that the great majority of participants had no computers provided by the Ministry of Education as compared to just under a quarter who indicated that they did. This implies that the Ministry of Education has not put much effort in supplying teachers with computers which they could use in their teaching (see Table 5.9).

Type of Internet Connection at School

The highest number of participants reported having a DSL internet connection at school, followed by the wireless internet, 4G internet connection and then 3G. There were problems in this area as 17% of participants said their school's slow internet connection was slow and nearly a quarter worked in schools that had none. Very few participants had satellite internet and only 2 had a fibre optic internet connection, which is thus the least used at school. This implies that the internet connection most used in schools by the participants, are the DSL internet connection and the wireless internet; but that a significant number of teachers have inadequate or no connection to the internet which would have a great impact on their use of e-learning tools (see Table 5.9).

Type of Internet Connection in Class

An even greater number of participants (87%) reported having no internet connection in class. Of those who did, the most used internet connection in class was the wireless internet, with a small number having 3G, DSL or 4G internet connection while no participants had a fibre optic internet connection. A fifth of the teachers whose classrooms did have connection reported this to be slow. A fast internet connection is important for e-learning technologies, and the benefits of e-learning such as ability to deliver content constantly and reduce cost and flexibility have been realised as a result of fast and efficient connections. However, many teachers teach in classrooms that have no connection and this severely restricts the range of e-learning activities that they can use. It would be interesting to investigate what strategies teachers may have to overcome this restriction (see Table 5.9).

Use of Internet Connection at School

In school, the internet is mostly used for both official work and for teaching, while well over a quarter indicated that they neither use the internet for teaching nor for official work. The number of participants who used an internet connection at school for official work only was higher than those who used internet connection for teaching. This is an indication that internet connection in schools overall is used more for official work than it is used for teaching (see Table 5.9).

Technology Equipment Available in School

The survey findings indicated that the most available appliance in schools was the projector, whilst the second most-used facility was the Learning Resource Centre (LRC). Under half of the participants indicated that computer labs were available in their school but less than a fifth had computers available in classrooms and less than 3% had internet access there. Smart board technology, laptops and overhead projectors were available to a minority and 17% of the teachers had no access to any e-learning technology (see Table 5.9).

5.6 Description of Factors that Influence Acceptance and Use of e-learning Technologies:

As well as all the participants' responses to questions relating to each factor being tabulated, the mean and standard deviation were calculated in order to determine to what extent the variables (factors) influence (impact) their adoption and use of e-learning technologies.

5.6.1 Performance Expectancy

Teachers were asked about their perceptions about how e-learning technologies were useful in their teaching.

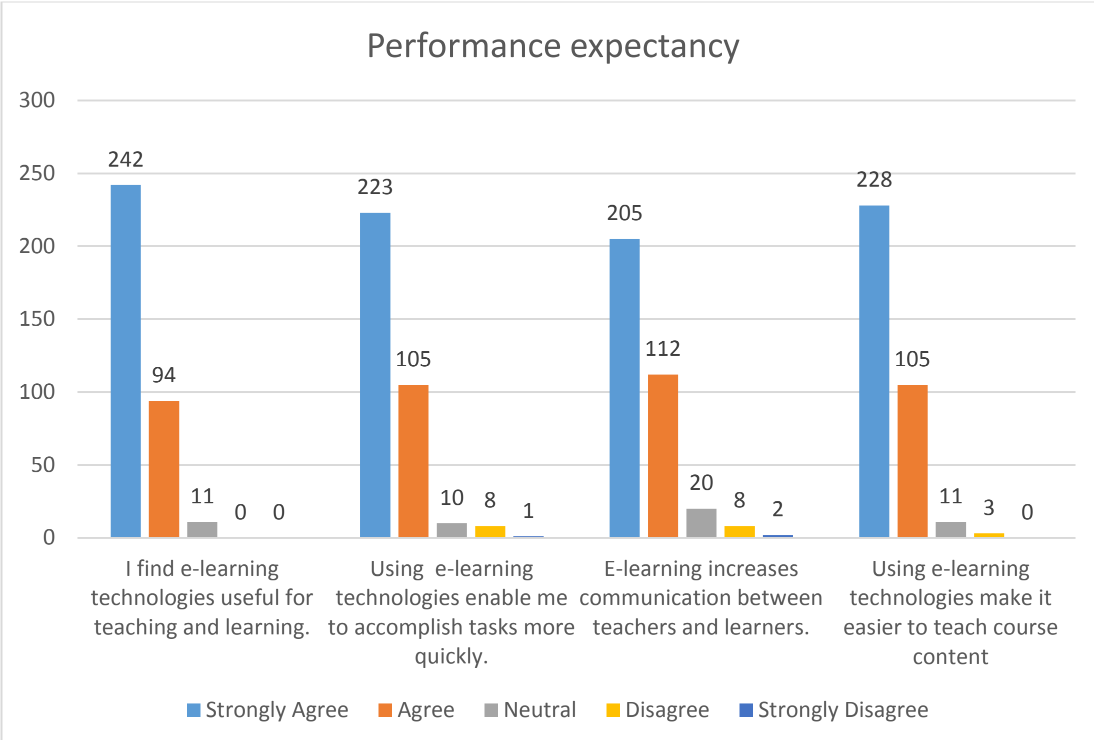


Figure 5.2 Participants' Responses about Performance Expectancy

Figure 5.2 shows that the great majority of participants said they find e-learning technologies useful for teaching and learning, as opposed to very few who were neutral and none who disagreed. Similarly, all but a few participants believed that using e-learning technologies enabled them to accomplish their tasks more speedily and thought that e-learning increased communication between teachers and learners. Finally, all but 3 teachers believed that using e-learning technologies made it easier to teach source contents. This implies that e-learning technologies are seen by teachers to improve their performance and make it easier to teach curriculum content. These results suggest that there is a very positive expectation among Saudi secondary teachers about how e-learning technologies can promote the quality and efficiency of teaching.

Table 5.10 Mean and standard deviation for PE (to determine how far teachers think e-learning technologies are currently helping them to do their job)

No.	Statement	Mean	Std. Deviation
1	I find e-learning technologies useful for teaching and learning	4.6	.536
2	Using e-learning technologies enable me to accomplish tasks more quickly	4.5	.692
3	E-learning increases communication between teachers and learners	4.4	.757
4	Using e-learning technologies make it easier to teach course content	4.6	.595
Total		**4.5**	**0.645**

As shown in Table 5.10, the mean of teachers' responses about how e-learning technologies are currently helping them to do their job (Performance Expectancy) is 4.5 with a standard deviation of 0.645, which is within the interval 4.20 to 5. This indicates that the e-learning technologies are considered very useful by teachers in Saudi secondary education.

5.6.2 Effort Expectancy

Teachers were required to evaluate the ease of using e-learning technology in their work.

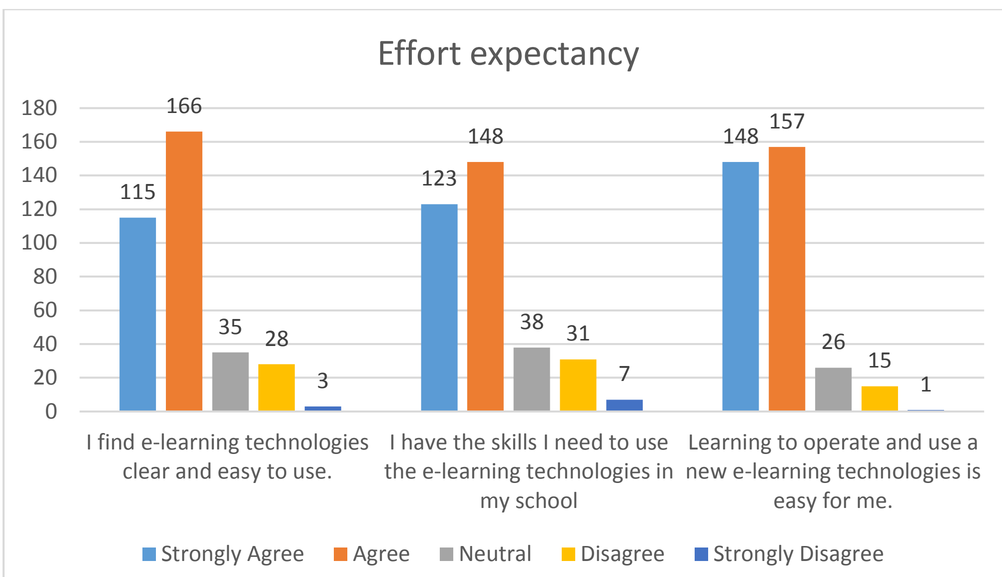


Figure 5.3 Participants' Responses about Effort Expectancy

The survey findings show that most participants believe that e-learning technologies are clear and easy to use and that they have the skills they need to use in e-learning technologies in their school (see Figure 5.3). However, there were some neutral and negative beliefs which would merit further investigation. The majority also thought that learning to operate and use new e-learning technologies was easy. This implies that e-learning impacts effort expectancy because it is seen as clear and easy to use, the skills needed by the secondary teachers to use e-learning already exist and teachers think it is easy for the users to learn to use and operate new e-learning technologies hence they can easily be used in teaching and learning.

Table 5.11 Mean and standard deviation for EE (to determine how easy teachers find it to use e-learning technologies)

No	Statement	Mean	Std. Deviation
1	I find e-learning technologies clear and easy to use	4.0	.913
2	I have the skills I need to use the e-learning technologies in my school	4.0	1.003
3	Learning to operate and use a new e-learning technologies is easy for me	4.3	.798
Total		**4.1**	**0.679**

As shown in Table 5.11, the mean of teachers’ responses about how easy they find it to use e-learning technologies (Effort Expectancy) is 4.1 and the standard deviation 0.679, which lies within the interval 3.40 to less than 4.20. This indicates that teachers in Saudi secondary education generally believe it is easy to use e-learning technologies in their teaching practices.

5.6.3 Social Influence

Teachers were asked for their perceptions about how significant others regarded their use of e-learning technologies.

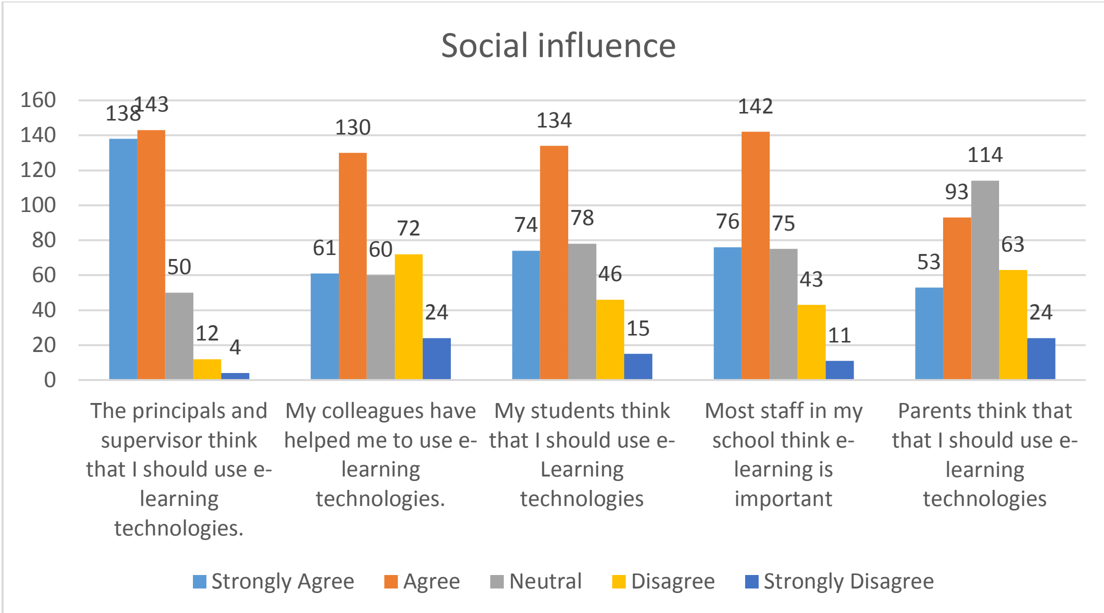


Figure 5.4 Participants' Responses about Social Influence

The survey findings indicate that social influence about e-learning technologies impacts on these users. Firstly, most participants believed that their principals and supervisors think that they should use e-learning technologies. A few did not think this was the case or were neutral. Although the majority believed that colleagues helped each other use e-earning technologies; a sizeable minority did not indicate that this was the case. Similarly, there was a small but significant minority who were neutral or did not believe that their students wanted them to use e-learning technologies.

Again, although the majority of participants believed that most staff in their school think e-learning is important, a sizeable minority were neutral or negative about this. Finally, a lot of participants were neutral or negative about whether parents think that they should use e-learning technologies, although, a large number of the respondents believed that they did. This means that social influence impacts positively on teachers' perceptions of using e-learning technologies in that they perceive that principals and supervisors think that teachers should use e-learning technologies, colleagues help each other to use e-learning technologies, students think that they should use e-learning and most staff in school think that e-learning is important. However, when it came to parents, there was uncertainty (see Figure 5.4).

Table 5.12 Mean and standard deviation for SI (to determine teachers' current perceptions of other people's ideas about their use of e-learning technologies)

No.	Statement	Mean	Std. Deviation
1	The principals and supervisor think that I should use e-learning technologies	4.2	.874
2	My colleagues have helped me to use e-learning technologies	3.4	1.192
3	My students think that I should use e-learning technologies	3.6	1.093
4	Most staff in my school think e-learning is important	3.7	1.051
5	Parents think that that I should use e-learning technologies	3.3	1.130
Total		**3.6**	**1.068**

As shown in Table 5.12 the mean of sample responses about teachers' current perceptions of other people's ideas about their use of e-learning technologies (SI) is 3.6 with a standard deviation of 1.068, which is lies within an interval of 3.40- to less than 4.19. This indicates that teachers' current perceptions of other people's ideas are about their use of e-learning technologies are mainly positive. It would be useful to investigate further the nature of these social influences both positive and negative.

5.6.4 Facilitating Conditions

Teachers were asked about resources as well as the technical support needed to use them.

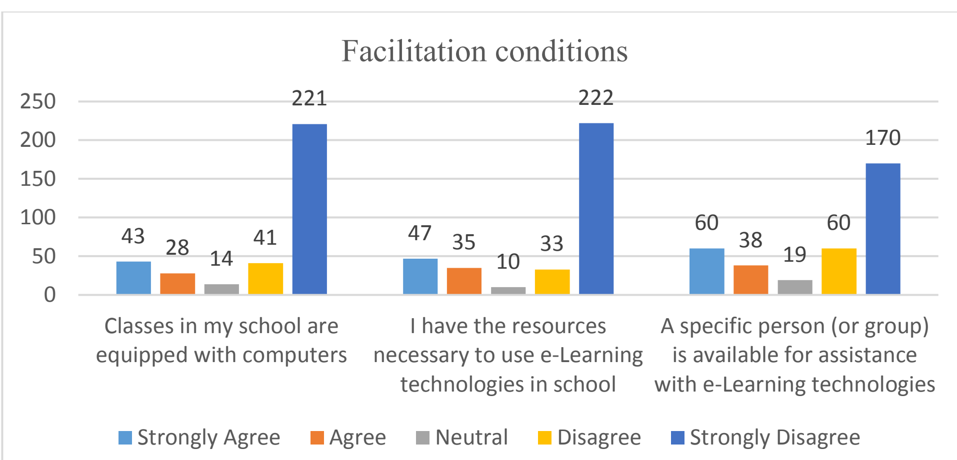


Figure 5.5 Participants' Responses about Facilitating Conditions

The survey established that the majority of participants do not feel that classes in their schools are adequately equipped with computers or the resources necessary to use e-learning. Also, most participants said that there was no specific person (or group) available for assistance with e-learning technologies, although some teachers reported that their school provided technical assistance and there were resources and computers available.

From the results, it is thus evident that there are not sufficient facilitating conditions for e-learning technologies and these limitations contribute to secondary teachers not being able to fully take advantage of the opportunities afforded by e-learning (see Figure 5.5).

Table 5.13 Mean and standard deviation for FC (to determine what teachers' think about the current facilities that support their use of e-learning technologies)

No	Statement	Mean	Std. Deviation
1	Classes in my school are equipped with computers	1.9	1.455
2	I have the resources necessary to use e-learning technologies in school	2.0	1.516
3	A specific person (or group) is available for assistance with e-learning technologies	2.3	1.567
Total		**2.1**	**1.513**

As shown in Table 5.13, the mean of sample responses about what teachers' think about the current facilities that support their use of e-learning technologies (FC) is 2.1, with a standard deviation of 1.513, which lies within an interval of 1.80- to less than 2.60. This indicates that the teachers' attitudes towards the current facilities that support their use of e-learning technologies are highly negative.

5.6.5 Behavioural Intention

Teachers were asked about their intentions for future use and training in e-learning.

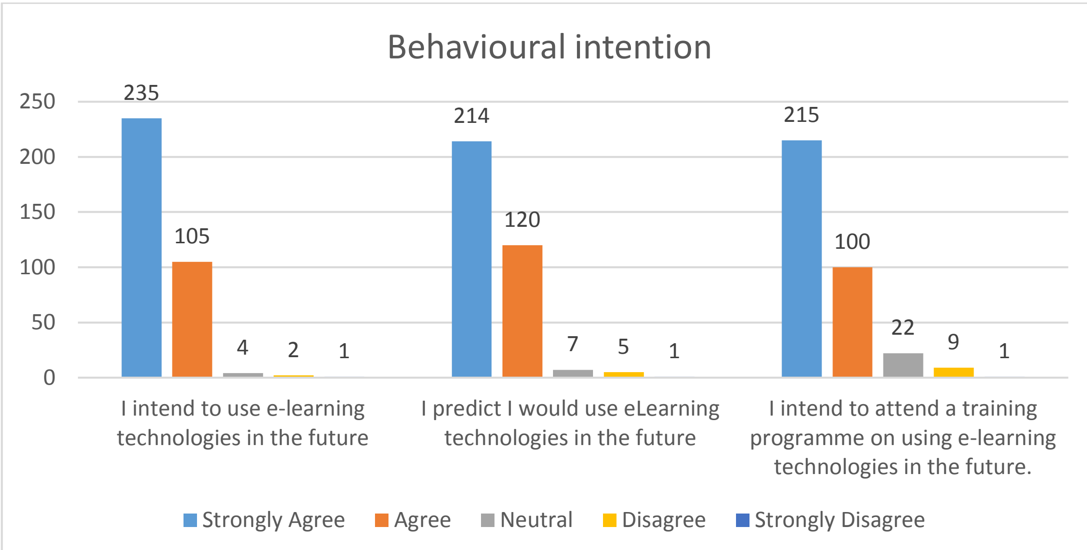


Figure 5.6 Participants' Responses about Behavioural Intention

The survey findings established that a large majority of participants intend to use e-learning technologies in future and also predicted that this would take place. The first question (in Arabic translation) suggests that the participant believes that they will be using technologies in future, whereas the second question introduces an element of doubt. A large majority of participants intend to attend training programme on using e-learning technologies in the future, although a small number were uncertain or did not intend to train. These results indicate that there are positive behavioural intentions for using and learning to use e-learning technologies by Saudi secondary teachers in Jazan. This is essential if they are to successfully use these technologies to enhance the teaching and learning process (see Figure 5.6).

Table 5.14 Mean and standard deviation for BI (to determine teachers' behavioural intention to use e-learning technologies)

No	Statement	Mean	Std. Deviation
1	I intend to use e-learning technologies in the future	4.7	.567
2	I predict I would use e-learning technologies in the future	4.6	.640
3	I intend to attend a training programme on using e-learning technologies in the future	4.5	.754
Total		**4.6**	**0.6537**

Table 5.14 shows that the mean of sample responses about teachers' BI to use e-learning technologies is 4.6, with a standard deviation of 0.6537. This lies within an interval of 2.60 to less than 3.40, and indicates that the teachers' behavioural intention to use e-learning technologies is very high.

5.6.6 Actual Use of e-learning Technologies

As a contrast to intention to use, teachers were asked about their actual use of specific e-learning technologies.

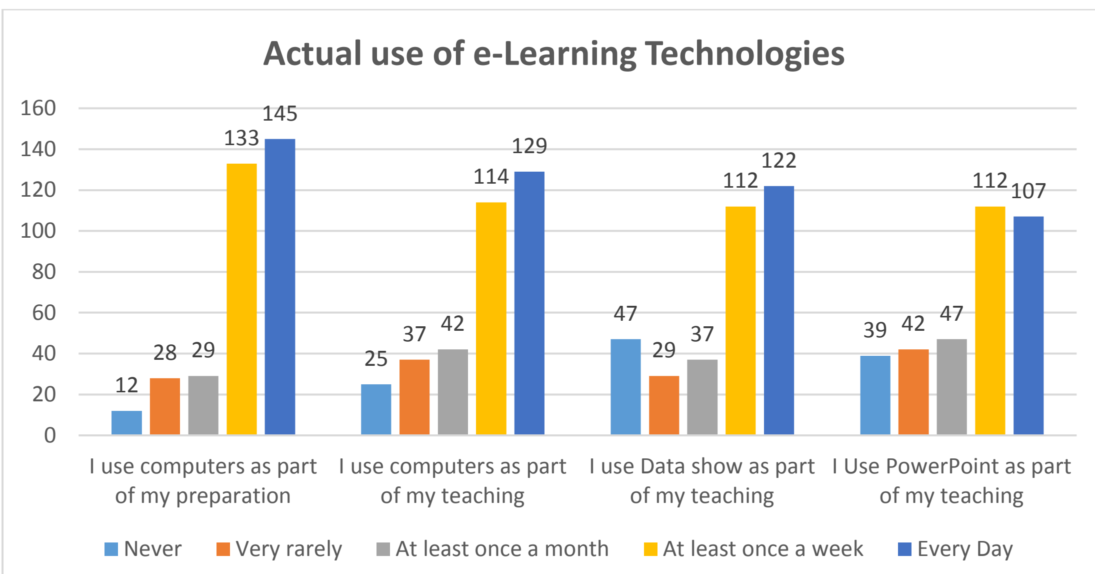


Figure 5.7 Participants' Responses about Actual Use of e-learning Technologies

The survey found out that most participants use computers as part of their preparation and for teaching every day, weekly or monthly; however a small number never or very rarely use computers for these purposes. Data Show was slightly more utilised as part of teaching than Power Point; however, a small but significant minority use neither as part of their teaching. Using these particular e-learning tools arguably allows teachers more flexible ways of sharing information with their pupils. It would be useful to have more details about what precludes the use of these tools and the extent to which poor facilitating conditions explain it as opposed to teachers' choice (see Figure 5.7).

Table 5.15 Mean and standard deviation for AU (to determine teachers' actual use of e-learning technologies)

No	Statement	Mean	Std. Deviation
1	I use computers as part of my preparation	4.1	1.065
2	I use e-learning technologies (Such as Computers. Smartboard, Tablet, …) as part of my teaching	3.8	1.241
3	I use Data show as part of my teaching	3.7	1.382
4	I Use PowerPoint as part of my teaching	3.6	1.334
Total		**3.8**	**1.256**

As shown in Table 5.16, the mean of teachers' actual use of e-learning technologies is 3.8, with a standard deviation of 1.256, which lies within an interval of 3.40 to less than 4 20; and indicates that teachers' actual use of e-learning technologies is high.

5.6.7 Teachers' Attitudes towards Using of e-learning Technologies

This part of the questionnaire sought to discover how teachers felt about using e-learning technologies.

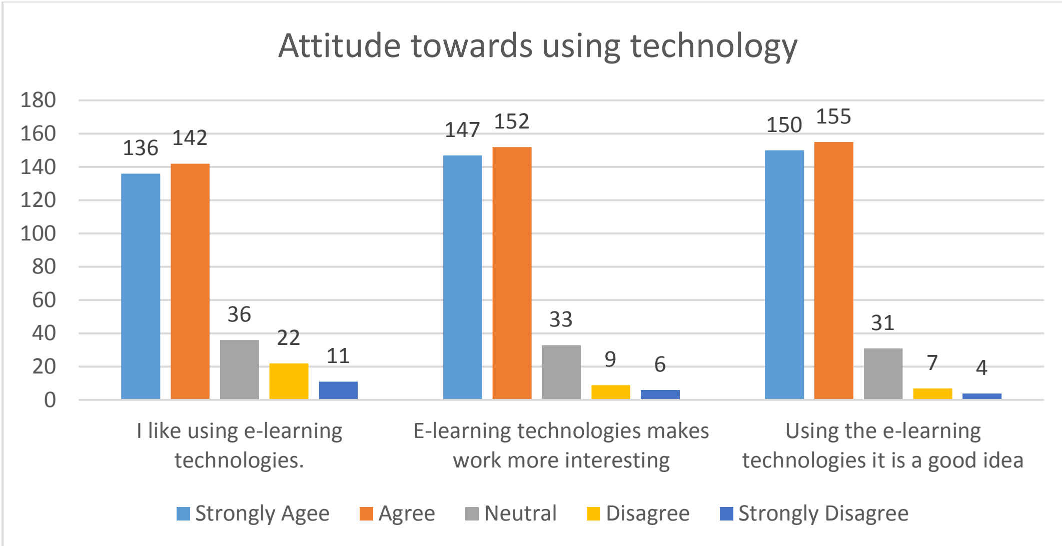


Figure 5.8 Participants' Responses about Attitudes towards using e-learning Technologies

The survey findings identified that participants generally have positive using e-learning technologies. The majority of teachers reported that they liked using them; they were thought to make work more interesting and were a good idea for education. This implies that there is generally a positive attitude among the secondary teachers about the use of e-learning technologies and an understanding that they can be inspirational tools that assist communication between teachers and learners. There were a number of teachers who were neutral about this and a very small number with negative attitudes and it would be useful to explore attitudes further (see Figure 5.8).

Table 5.16 Mean and standard deviation for AT (to determine teachers' attitudes toward using e-learning technologies)

No	Statement	Mean	Std. Deviation
1	I like using e-learning technologies.	4.1	1.016
2	E-learning technologies makes work more interesting	4.2	.854
3	Using the e-learning technologies it is a good idea	4.3	.798
Total		**4.2**	**0.889**

As shown in Table 5.16, the mean of teachers 'attitudes toward using e-learning technologies is 4.2, with a standard deviation of 0.889. This lies within an interval of

4.20 to 5, and indicates that the teachers' attitudes toward using e-learning technologies are very positive.

5.6.8 Teachers' Anxiety

Teachers were also asked about the anxieties they felt about using e-learning technologies.

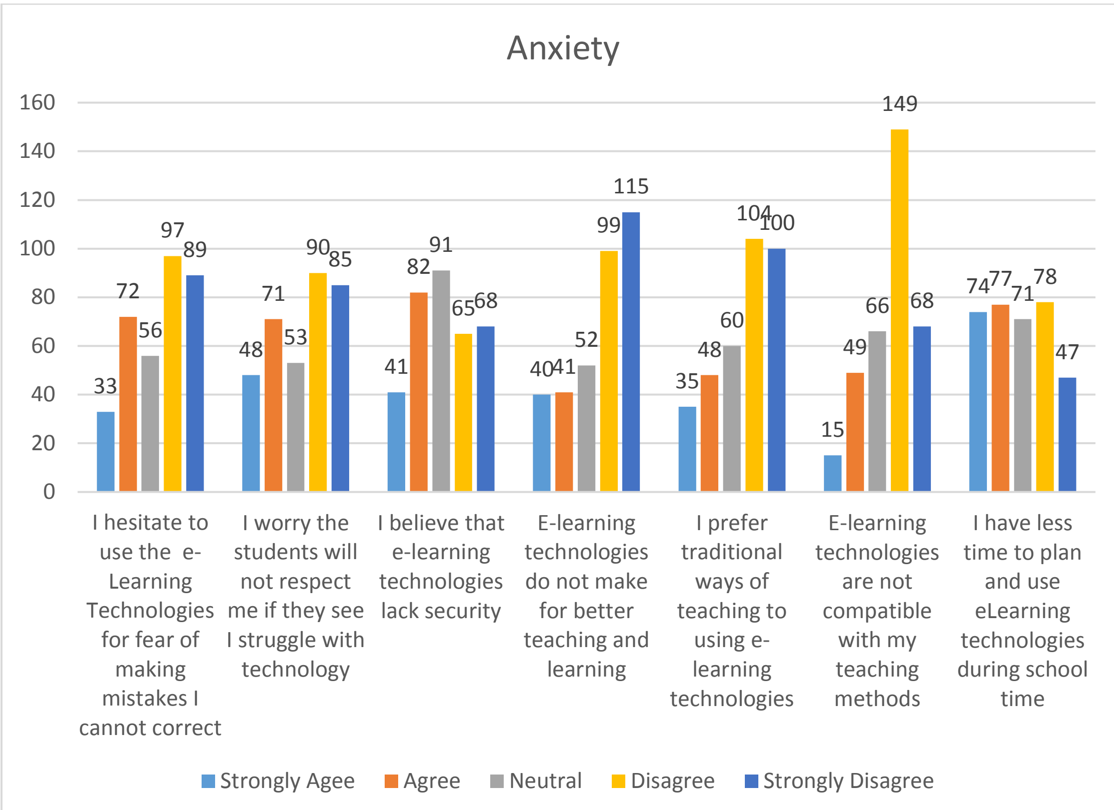


Figure 5.9 Participants' Responses about Anxiety

The results indicated that overall there were more teachers who believed that e-learning is compatible with their teaching methods; that e-learning technologies makes teaching and learning better and who did not prefer traditional ways of teaching to using e-learning technologies than the reverse. Nonetheless, from the study, some levels of anxiety were established; and the biggest worry for teachers in this sample was not having enough time to plan and use e-learning technologies, followed by concerns about its lack of security, making mistakes that could not be rectified and appearing inept in front of students. There were also quite a lot of neutral responses which suggests that some teachers may be quite uncertain about their anxieties and this factor needs further investigation (see Figure 5.9).

Table 5.17 Mean and standard deviation for AX (to determine the level of anxiety about using e-learning technologies among teachers)

no	Statement	Mean	Std. Deviation
1	I hesitate to use the e-learning Technologies for fear of making mistakes I cannot correct	2.4	1.086
2	I worry the students will not respect me if they see I struggle with technology	2.6	1.320
3	I believe that e-learning technologies lack security	2.7	1.390
4	E-learning technologies do not make for better teaching and learning	2.9	1.294
5	I prefer traditional ways of teaching to using e-learning technologies	2.4	1.355
6	E-learning technologies are not compatible with my teaching methods	2.5	1.308
7	I have less time to plan and use e-learning technologies during school time	3.2	1.350
Total		**2.7**	**1.003**

As shown in Table 5.17, the mean for teachers' anxiety about using e-learning technologies is 2.8, with a standard deviation of 1.003, which lies in an interval between 2.60 to less than 3.40. This indicates a medium level of anxiety about using e-learning technologies among teachers.

5.6.9 Teachers' Education Experience

Teachers were asked about the frequency with which they had experienced e-learning technologies being used throughout their education since secondary school.

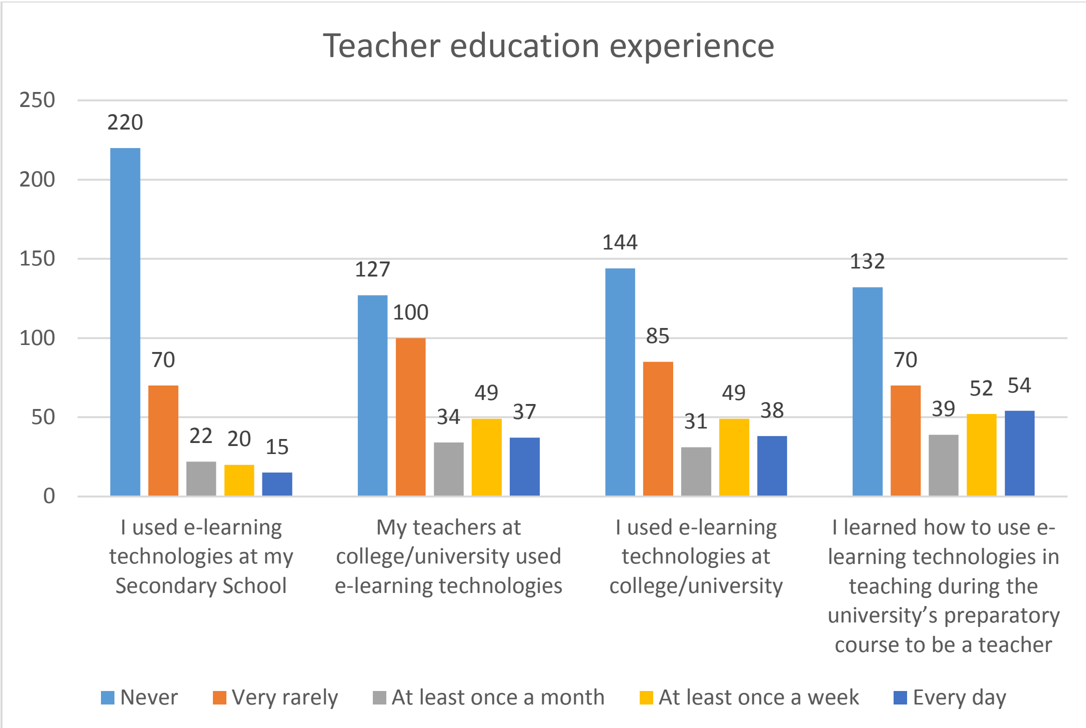


Figure 5.10 Participants' Responses about their Education Experience

The survey findings showed that the great majority of participants indicated that they never or rarely used e-learning technologies at their secondary school; as opposed to just a few that used e-learning technologies at school on a regular basis. Similarly, most participants noted that they and their teachers never or very rarely used e-learning technologies at university and college, with many fewer participants noting that e-learning was used here regularly. This was also the case for participants when doing their pre-service teacher training.

From these findings, it is evident that the teachers experience of e-learning technology in their own education is to a great extent very low, given that many said they never used e-learning technologies at their secondary school, their teacher at college/university never used e-learning technologies, never used e-learning technologies at college/university and never learnt how to use e-learning technologies in teaching during the university's preparatory course to be a teacher. Nonetheless, this does not mean that every secondary teacher had very little educational experience in e-learning technologies, given that some of the participants used them every day or at least once a week and were oriented in how to use e-learning technologies as a teacher and used these technologies every day or at least once a week at college/university. However, this number was small compared to those who never interacted with e-learning technologies (see Figure 5.10).

Table 5.18 Mean and standard deviation for TEE (to determine the level of teachers' experience of using e-learning technologies in their educational experience)

No	Statement	Mean	Std. Deviation
1	I used e-learning technologies at my Secondary School	1.7	1.102
2	My teachers at college/university used e-learning technologies	2.3	1.372
3	I used e-learning technologies at college/university	2.3	1.407
4	I learned how to use e-learning technologies in teaching during the university's preparatory course to be a teacher	2.5	1.500
Total		**2.2**	**1.345**

As shown in Table 5.18, the mean of teachers' educational experience in using e-learning technologies is 2.2, with a standard deviation of 1.345, which lies within a period of 1.80 to less than 2.60. This indicates a low level of teachers' experience of using e-learning technologies in their own education.

5.6.10 Education Policy

Teachers were asked their opinions on current ICT policy and their school's awareness of it.

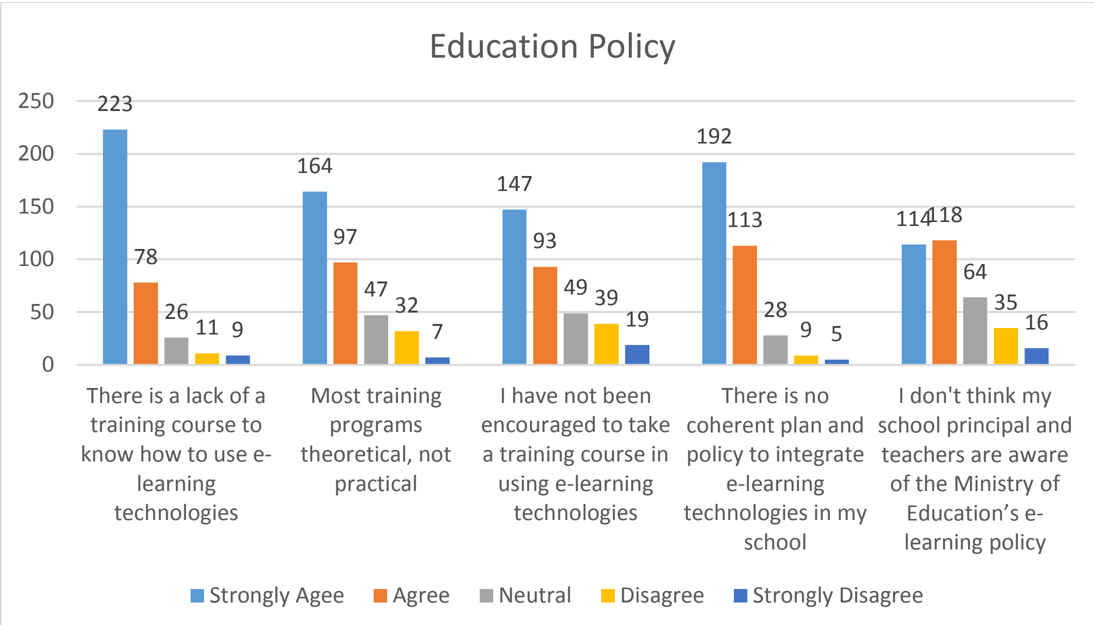


Figure 5.11 Participants' Responses about Education Policy

The survey's findings on the education policy were that most participants believed there was a lack of training courses in e-learning technologies, and that most training programmes were theoretical, not practical. Similarly most participants felt they had not been encouraged to take a training course in e-learning technologies and that there was no coherent plan and policy to integrate e-learning technologies in their school. Few disagreed, but there were some 'neutral' answers. Finally, more participants felt that school principals and teachers were unaware of the Ministry of Education's e-learning policy; however, there was some disagreement on this point and this factor merits further investigation.

This implies that there has been a very great laxity in the application of education policy on e-learning technologies according to participants. The survey indicated that they feel there is lack of training courses on how to use e-learning technologies, most of the training programmes are theoretical and not practical, teachers have not been encouraged to take a training course in using e-learning technologies, and there has not been a coherent plan and policy to integrate e-learning technologies in school, and this makes the participants think that their colleagues and principals are not aware of the Ministry of Education's e-learning policy (see Figure 5.11).

Table 5.19 Mean and standard deviation for EP (to determine the influence of EP and teachers' perceptions of it on using e-learning technologies)

No	Statement	Mean	Std. Deviation
1	There is a lack of a training course to know how to use e-learning technologies	4.4	.948
2	Most training programmes are theoretical, not practical	4.1	1.074
3	I have not been encouraged to take a training course in using e-learning technologies	3.9	1.225
4	There is no coherent plan and policy to integrate e-learning technologies in my school	4.4	.853
5	I don't think my school principal and teachers are aware of the Ministry of Education's e-learning policy	3.8	1.139
Total		**4.1**	**1.048**

As shown in Table 5.19, the mean of the influence of EP on using e-learning technologies is 3.3 with a standard deviation of 1.0429. This lies within the period 2.60 to less than 3.39; and indicates that the influence of EP on using e-learning technologies is high.

5.7 Extent of Factors Affecting Acceptance and Use of e-learning Technologies

5.7.1 Correlations

To investigate the extent to which acceptance and use of e-learning technology is affected by different factors, correlations were used. The probability of patterns in the relationship happening just by chance is tested through Significance Testing (Berman, Brown & Saunders, 2008).The strength of the relationship between any two ranked or numerical variables can be quantified by a correlation coefficient (r) which varies from -1 (perfect negative correlation) to +1 (perfect positive correlation).Thus correlation coefficients between -1 and +1 are weaker, with 0 indicating that the variables are independent (Saunders, Lewis, & Thornhill, 2009).

Two-tailed significance levels were used, and the correlation was considered significant if the significant value was <=0.01 and of no significance if the two-tailed significant value was>0.01. The correlation>0.7 indicates a very strong relationship between factors, correlations between >0.4 and <0.7 show a strong relationship between factors, correlations between >0.01and <0.4 show a moderate relationship, while <0.1 correlations show little relationship between factors and negative correlations showed no relationship between variables. Tests using Pearson's Rank Correlation Coefficient assess the strength of the relationship between two ranked data variables and can be used to check if relationships are there purely by chance (Saunders, Lewis, & Thornhill, 2009).

In this analysis, there were no missing items, given that the questionnaires were distributed online and response was necessary in order to proceed. The correlations were related to the parts of the research questions that were concerned with establishing to what extent the factors affected each other.

The Pearson correlation coefficients among the core constructs of the model proposed in this study are found in Table 5.20. Behavioral Intention is significantly positively correlated with Performance Expectancy (r=.467, p=.000), Effort Expectancy (r=.427, p=.000) and Attitude towards Technology (r=.406, p=.000). The magnitude of these three coefficients show a moderate correlation with Behavioural Intention. Statistically significant positive correlations are also found with Social Influence (r = 0.240, p=.00),indicating a weak relationship with Behavioural Intention. Education Policy is very weakly correlated with BI (r = 0.129, p=.016) to accept e-learning technology. Finally a negative weak relationship is found with Teacher's Anxiety and teachers' Behavioural Intention to accept e-learning technology (r=-.214, p=.000).

Table 5. 20 Pearson's correlations among study variables

Variable	1	2	3	4	5	6	7	8	9
1. Performance Expectancy (PE)									
2. Effort Expectancy (EE)	.56**								
3. Social Influence (SI)	.36**	.34**							
4. Facilitating Conditions (FC)	.18**	.16**	.31**						
5. Behavioural Intention (BI)	.47**	.43**	.24**	.09					
6. Use Behaviour (UB)	.25**	.33**	.24**	.38**	.21**				
7. Attitude towards use of Technologies (ATT)	.47**	.44**	.26**	.20**	.41**	.32**			
8. Teacher Anxiety (AX)	-.30**	-.28**	.03	.06	-.21**	-.07	-.12*		
9. Teacher Education Experience	.12*	.26**	.21**	.12*	.13*	.18**	.11*	.17**	
10. Education Policy (EP)	-.05	-.07	-.16**	-.25**	.13*	-.09	-.05	.24**	.02

*p<.05; **p<.01.

When looking at the potential predictors of Use Behaviour in regards to e-learning technology, we find Use Behaviour is significantly positively correlated with Facilitating Conditions(r=.375, p=.000) and Behavioural Intention (r=.208, p=.000). The magnitude of these two coefficients show a moderate correlation with Use Behaviour. Finally a positive weak relationship is found with Teacher Education Experience and Use Behaviour of e-learning technology (r=.184**, p=.001).

5.7.2 Multiple Regressions

In research that is ecological, evolutionary or behavioural, statistical inference based on a Stepwise model selection is routinely applied. This contributes to strategies aimed at overcoming any shortcomings in finding the 'best' model (Mundry & Nunn, 2009).

Multiple regressions are an extension of simple (bi-variate) regression. The aim of multiple regressions is to enable the researcher to investigate the relationship between dependent (predicted) variable and several independent (predictor) variables. The final result of multiple regressions is the line of best fit (development of a regression equation) between the dependent variable and several independent variables.

The researcher conducted regression analysis (Stepwise) to determine the impact of the independent variables: (Teachers' Attitudes towards use of Technologies - Performance Expectancy - Effort Expectancy - Social Influence – Teacher Anxiety and Education

Policy) on the dependent variable employed which was Behavioural Intention. A Stepwise analysis technique was conducted in two steps: Step one is shown in Figure (5.12).

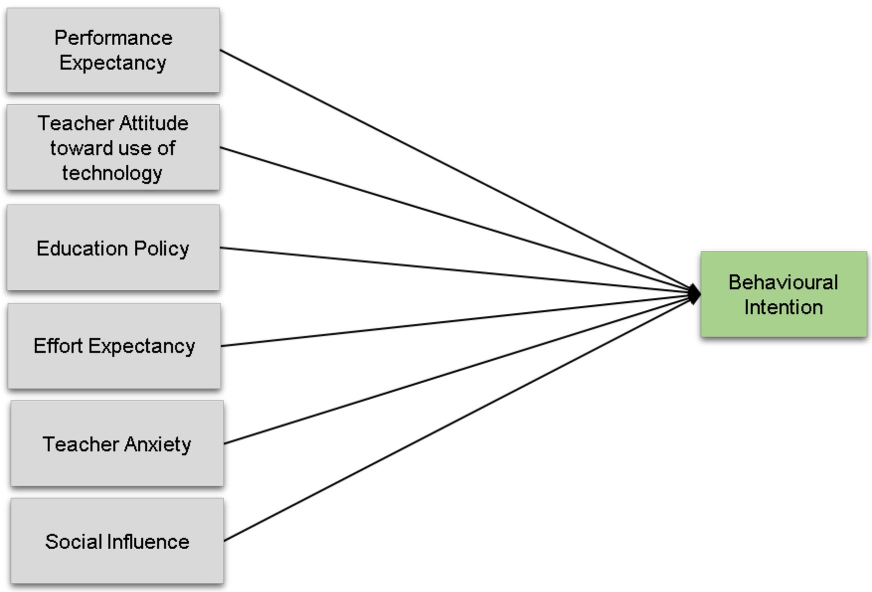


Figure 5.12 Study Model – (part 1)

Predictor variables are put into the regression equation one by one in a Stepwise regression according to statistical criteria. At every step in the analysis the predictor variable that adds the most to the prediction equation by increasing the multiple correlation, the value of R, is entered first. Only in the case that additional variables contribute statistically to the regression equation will the process be continued. The analysis stops when no additional predictor variables contribute anything statistically to the regression equation. Thus, not all predictor variables may enter the equation in a Stepwise regression.

In order to establish the extent to which a factor's variability can be explained or caused by its relationship to another factor, the R^2 statistical method is used. In trend analysis, the coefficient of determination is utilised, and computed as a value lying between 0 (0%) and 100 (100%); the higher the value, the better the fit. As the coefficient of correlation is indicated by **r**, the coefficient of determination is symbolized by $\mathbf{R^2}$ as it is square of the coefficient of correlation. In regression analysis this is a highly useful way to determine the 'goodness of fit' in the linear correlation of variables (Dufour, 2011).

Table 5.21 Regression Model Summary

Model	(R) value	(R) Square	Adjusted R^2	Std. Error
A	.467(a)	0.218	0.216	0.48887
B	.512(b)	0.262	0.258	0.47559
C	.536(c)	0.287	0.281	0.46812
D	.559(d)	0.313	0.305	0.46.21
E	.569(e)	0.324	0.314	0.45726

As shown in Table 5.21 the determination coefficient of model A (Performance Expectancy on teachers' Behavioural Intention) is $R^2 = 0.218$, which suggests that 21.8% of the variance in teachers' Behavioural Intention can be explained by the Performance Expectancy score.

The determination coefficient of model B (Performance Expectancy, Attitudes toward Using Technology on teachers' Behavioural Intention) is $R^2 = 0.262$. This suggests that 26.2% of the variance in teachers' Behavioural Intention can be explained by the scores for Performance Expectancy and Attitude toward Using Technology.

The determination coefficient of model C (Performance Expectancy, Attitude toward Using Technology and Education Policy on teachers' Behavioural Intention is $R^2 = 0.287$. This suggests that 28.7% of the variance in teachers' Behavioural Intention can be explained by Performance Expectancy, Attitudes toward Using Technology and Education Policy scores.

The determination coefficient of model D (Performance Expectancy, Attitudes toward Using Technology, Education Policy and Effort Expectancy on teachers' Behavioural Intention) is $R^2= 0.313$. This suggests that 31.3% of the variance in teachers' Behavioural Intention can be explained by the scores for Performance Expectancy, Attitudes toward Using Technology, Education Policy and Effort Expectancy.

The determination coefficient of model E (Performance Expectancy, Attitudes toward Using Technology, Education Policy, Effort Expectancy and Anxiety on teachers' Behavioural Intention) is R^2= 0.324.This suggests that 32.4% of the variance in teachers' Behavioural Intention can be explained by the scores for these factors.

Table 5.22 Regression Model Analysis of Variance ANOVA (f)

Model	Source of variation	Sum of Squares	Df	Mean Square	F	Sig.
A	Regression Residual Total	22.973 82.453 105.426	1 345 346	22.973 .239	96.124	0.000(a)
B	Regression Residual Total	27.616 77.809 105.426	2 344 346	13.8.8 .226	61.046	0.000(b)
C	Regression Residual Total	30.262 75.164 105.426	3 343 346	10.087 .219	46.032	0.000(c)
D	Regression Residual Total	32.992 72.434 105.426	4 342 346	8.248 .212	38.943	0.000(d)
E	Regression Residual Total	34.126 71.300 105.426	5 341 346	6.825 .209	32.642	0.000(e)

Table 5.22 represents the analysis of variance, testing the significant of the regression model of the independent variables (Performance Expectancy, Attitude toward Using Technology, Education Policy, Effort Expectancy and Anxiety) on the dependent variable, Behavioural Intention. We find that the (F) values of all Stepwise models were statistically significant, since all values have $p < 0.05$, and so the regression model (Performance Expectancy, Attitude toward Using Technology, Education Policy, Effort Expectancy and Anxiety), on the dependent variable, Behavioural Intention is a significant model which explains the changes that occur in teachers' Behavioural Intention.

Table 5.23 (Part 1) Regression Model Estimating Parameters

Model	Independent variables	Unstandardized Coefficients	Std. Error	Standardized Coefficients (β)	t	Sig
E	(Constant)	1.881	.279		6.738	0.000
	PE	0.242	.057	0.243	4.226	0.000
	ATT	.160	.040	0.207	3.964	0.000
	EP	.139	.033	0.191	4.16	0.000
	EE	.128	.039	0.182	3.243	0.001
	AX	-.070	.030	-0.113	-2.329	0.02

Dependent Variable: Behavioural Intention

Table 5.23shows the regression model parameters and the levels of their significance, and it was found that the regression coefficients (β) signals for each of the model variables were positive, which indicates that all relationships between the independent variables in the model and the dependent variable are positive, other than the relationship between Anxiety and Behavioural Intention, which is negative. Therefore, this confirms the validity of relationships for this part of the study model. Thus, the regression equation will be as follows:

$$\hat{Y}_1 = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + e_i$$

Where:

(β) represents the regression coefficient in the estimated model, (α) represents the model constant, $\{X_1, X_2, X_3, X_4, X_5\}$ represents the independent variables (Performance Expectancy, Attitude toward Using Technology, Education Policy, Effort Expectancy and Anxiety) and$e_i$the Standard Error (Model E)

So the optimum model for these variables is:

Teachers' Behavioural Intention = 1.881+ (0.243) PE + (0.207) ATUT + (0.191) E P+ (0.182) EE – (0.113) AX + 0.45726

The Second Step: Regression analysis (Stepwise) was conducted to determine the impact of the independent variables: (Teacher Education Experience - Facilitating

Conditions - Behavioural Intention) on the dependent variable Use Behaviour, as shown in Figure 5.13

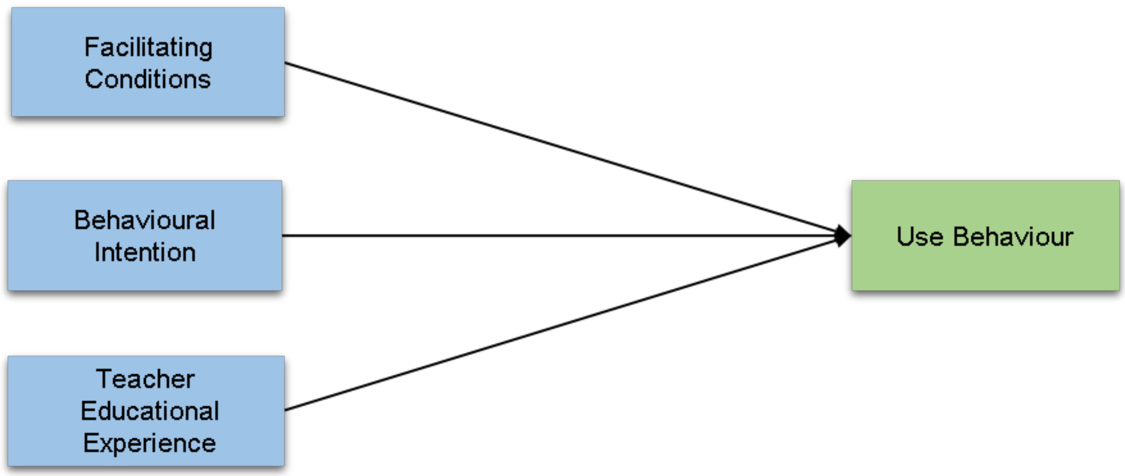


Figure 5.13 Study Model – (part 2)

As shown in Table 5.24 the determination coefficient of model A (Facilitating Conditions on teachers' Use Behaviour) is $R^2 = 0.141$ suggests that 14.1% of the variance in teachers' Use Behaviour can be explained by the score for Facilitating Conditions.

The determination coefficient of model B (Facilitating Conditions and Behavioural Intention on teachers' Use Behaviour) is $R^2 = 0.172$ and suggests that 17.2% of the variance in teachers' Use Behaviour can be explained by the scores for Facilitating Conditions and Behavioural Intention.

The determination coefficient of model C (Facilitating Conditions, Behavioural Intention and Teachers' Educational Experience on teachers' Use Behaviour) is $\mathbf{R^2} = 0.182$ and suggests that 18.2% of the variance in teachers' Use Behaviour can be explained by the scores for Facilitating Conditions, Behavioural Intention and Teachers' Education Experience.

Table 5.24 (Part 2) Regression Model Summary

Model	(R) value	R Square	Adjusted R^2	Std. Error
A	.375(a)	0.141	0.138	1.01682
B	.415(b)	0.172	0.167	.99966
C	.426(c)	0.182	0.174	.99220

Table 5.25 represents analysis of variance, testing the significance of the regression model of the independent variables (Facilitating Conditions, Behavioural Intention and Teachers' Education Experience), on the dependent variable, teachers' Use Behaviour. We find that the (F) values of all Stepwise models were statistically significant, since all values were ($p < 0.05$). Thus, the regression model of Facilitating Conditions, Behavioural Intention and Teachers' Education Experience on the dependent variable, teachers' Use Behaviour is a significant model which explains the changes that occur in teachers' use of e-learning technologies.

Table 5.25 (Part 2) Regression Model Analysis of Variance ANOVA (f)

Model	Source of variation	Sum of Squares	Df	Mean Square	F	Sig.
A	Regression Residual Total	58.523 356.701 415.225	1 345 346	58.523 1.034	56.604	0.000(a)
B	Regression Residual Total	71.462 343.763 415.225	2 344 346	35.731 .999	35.756	0.000(b)
C	Regression Residual Total	77.553 337.672 415.225	3 343 346	25.851 .984	25.353	0.000(c)

d Dependent Variable: Use Behaviour

Table 5.26 shows the regression model parameters and the levels of their significance, and it was found that the regression coefficient (β) signals for each model variables were positive, which indicates that all relationships between the independent variables in the model and the dependent variable are positive relationships.

Table 5.26 (Part 2) Regression Model Estimating Parameters

Model	Independent variables	Unstandardized Coefficients	Std. Error	Standardized Coefficients (β)	T	Sig
C	(Constant)	1.493	.449		3.328	0.001
	FC	.268	.038	.348	7.064	0.000
	BI	.322	.098	.162	3.299	0.001
	TEE	.122	.049	.123	2.487	0.013

Dependent Variable: Use Behaviour

Therefore, this confirms the validity of relationships about this part of the study model. Thus, the regression equation will be as follows:

Where:

(β) represents the regression coefficient in the estimated model,(α) represents the model constant, {X_1, X_2, X_3} represent the independent variables (Facilitating Conditions, Behavioural Intention and Teachers' Education Experience) and$e_i$the Standard Error (Model C) So the model that best fits these variables is:

Teachers' Use Behaviour= 1.493 + (0.348) FC + (0.162) BI + (0.123) TEE+ .99220

5.8 Additional analysis of demographic variables

In this section the researcher explains the associations between demographic characteristics and all ten factors in this study Performance Expectancy (PE), Effort Expectancy (EE), Social influence (SI), Teachers 'attitudes towards use of Technologies (ATT), Teacher Anxiety (AX), Education Policy (EP), Teachers' Education Experience (TEE), Facilitating Conditions (FC), Behavioural Intention (BI), and Use Behaviour (UB). The independent samples t-test was used to measure the effect of demographic characteristics with two levels on factors in this study. For demographic characteristics with three or more levels, the one-way ANOVA was used.

Gender

The differences between males and females are reported in Table 5.27. Gender differences are found in PE (t=2.21, p=0.028) with females (M=4.50) showing a significantly lower mean score compared to males (M=4.64). Lower scores for females are also found in EE (t=3.39, p=0.001); females (M=3.95) show a significantly lower mean score compared to males (M=4.23). In contrast, females show a higher mean score in UB (4.02 vs 3.59 ; t=-3.83, p=0.000) and AX (2.80 vs 2.55; t=-2.54, p=0.011).

Table 5.27 Differences in study variables by gender

Variable	Male (N=189) Mean SD	Female (N=158) mean SD	t	p-value[1]
Performance Expectancy	4.64 .513	4.50 .597	2.205	.028
Effort Expectancy	4.23 .689	3.95 .860	3.391	.001
Social Influence	3.66 .748	3.54 .791	1.486	.138
Facilitating Conditions	2.08 1.37	2.08 1.48	.034	.973
Behavioural Intention	4.58 .553	4.55 .552	.367	.714
Use Behaviour	3.59 1.22	4.02 .866	-3.831	.000
Attitude towards use of Technologies	4.17 .702	4.21 .731	-.586	.558
Teacher Anxiety	2.55 .914	2.80 .855	-2.544	.011
Teacher Education Experience	2.28 1.10	2.09 1.11	1.593	.112
Education Policy	4.09 .725	4.15 .799	-.716	.475

[1]p-value corresponding to the independent samples t-test

Attending educational training programmes

Attending educational training programmes in how to use e-learning technologies seems to play a significant role in most of the factors as reported in Table 5.28. Teachers that attended educational training programmes scored significantly higher in Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions and Use Behaviour compared to teachers who did not attend these programmes (all p-values < .01). On the other hand, those who attended educational training programmes scored significantly lower in Anxiety and Education Policy compared to teachers without educational training (both p-values < .01).

Table 5.28 Differences in study variables by education training

Variable	Yes (N=198) mean SD	No (N=149) mean SD	t	p-value[1]
Performance Expectancy	4.64 .513	4.48 .597	2.713	.007
Effort Expectancy	4.28 .704	3.87 .827	4.932	.000
Social Influence	3.74 .711	3.43 .811	3.693	.000
Facilitating Conditions	2.32 1.53	1.75 1.19	3.899	.000
Behavioural Intention	4.60 .540	4.53 .567	1.202	.230
Use Behaviour	3.97 1.08	3.55 1.07	3.527	.000
Attitude towards use of Technologies	4.22 .720	4.15 .708	.875	.382
Teacher Anxiety	2.54 .936	2.83 .812	-2.933	.004
Teacher Education Experience	2.27 1.10	2.10 1.10	1.476	.141
Education Policy	4.02 .797	4.25 .684	-2.905	.004

[1]p-value corresponding to the independent samples t-test

Type of school building

When looking at differences between type of school building as reported in Table 5.29,significant findings were obtained only for Facilitating Conditions (t=2.991, p=.004) and Anxiety (t=2.486, p=.013). In particular, teachers working in a government-owned building (M=2.15) showed a significantly higher mean score for FC compared to those working in a rented building (M=1.58). Those in government-owned buildings reported significantly higher levels of Anxiety (M=2.71) compared to those in rented buildings (M=2.35).

Table 5.29 Differences in study variables by type of school building

Variable	Government owned (N=303) mean SD	Rented (N=44) mean SD	t	p-value[1]
Performance Expectancy	4.56.565	4.69 .480	-1.431	.153
Effort Expectancy	4.07.797	4.30 .658	-1.828	.068
Social Influence	3.60 .777	3.65 .721	-.350	.727
Facilitating Conditions	2.15 1.44	1.58 1.15	2.991	.004
Behavioural Intention	4.55 .562	4.69 .468	-1.580	.115
Use Behaviour	3.79 1.09	3.75 1.14	.252	.801
Attitude towards use of Technologies	4.16 .712	4.34 .718	-1.615	.107
Teacher Anxiety	2.71 .880	2.35 .943	2.486	.013
Teacher Education Experience	2.17 1.08	2.36 1.26	-1.026	.305
Education Policy	4.14 .739	3.99 .879	1.239	.216

[1]p-value corresponding to the independent samples t-test

Time school opens

As reported in Table 5.30, the time school opens had a significant effect on Facilitating Conditions (t=4.470, p=0.000) and in Use Behaviour (t=2.258, p=0.025). In particular, teachers from schools that opened in the morning (M=2.13) showed a significantly higher mean score in FC compared to those in schools that opened in the afternoon (M=1.33). Likewise, those from schools with a morning schedule (M=3.82) reported significantly higher Use Behaviour compared to those from schools with an afternoon schedule (M=3.29).

Table 5.30 Differences in study variables by school opening time

Variable	Morning (N=324) mean SD	Afternoon (N=23) mean SD	t	p-value[1]
Performance Expectancy	4.60.524	4.29.858	1.667	.109
Effort Expectancy	4.11.765	3.931.01	.865	.396
Social Influence	3.63 .737	3.22 1.07	1.839	.079
Facilitating Conditions	2.13 1.44	1.33 .765	4.470	.000
Behavioural Intention	4.57 .557	4.56 .487	.014	.989
Use Behaviour	3.82 1.08	3.29 1.24	2.258	.025
Attitude towards use of Technologies	4.18 .714	4.26 .724	-.517	.605
Teacher Anxiety	2.67 .893	2.66 .935	.036	971.
Teacher Education Experience	2.17 1.09	2.61 1.20	-1.850	.065
Education Policy	4.11 .762	4.30 .703	-1.158	.248

[1]p-value corresponding to the independent samples t-test

Having a computer at school

Having a computer at school had a significant effect in most core constructs. Teachers who had access to a computer at school (M=4.71) showed a significantly higher mean in the PE score compared to the teachers who had no access (M=4.53); (t=3.000, p=0.003). The former also scored significantly higher in EE (M=4.37) compared to those with no access to a computer (M=4.02); (t=3.596, p=0.000). Positive effects of having a computer were also found for SI, FC, UB, ATT and TEE as reported in Table 5.31. A negative effect was observed for EP where teachers who had a computer at school (M=3.77) showed a significantly lower mean score compared to the teachers who had no computer at school (M=4.23).

Table 5.31 Differences in study variables by having a computer at school

Variable	Yes (N=84) mean SD	No (N=263) mean SD	T	p-value[1]
Performance Expectancy	4.71 .419	4.53 .587	3.000	.003
Effort Expectancy	4.37 .618	4.02 .813	3.596	.000
Social Influence	3.90 .657	3.51 .779	4.130	.000
Facilitating Conditions	2.81 1.55	1.84 1.29	5.181	.000
Behavioural Intention	4.51 .628	4.58 .525	-1.046	.296
Use Behaviour	4.28 .872	3.63 1.11	5.483	.000
Attitude towards use of Technologies	4.35 .582	4.14 .746	2.356	.019
Teacher Anxiety	2.61 .930	2.68 .884	-.699	.485
Teacher Education Experience	2.41 1.20	2.13 1.07	2.063	.040
Education Policy	3.77 .897	4.23 .675	-4.279	.000

[1]p-value corresponding to the independent samples t-test

School location

As reported in Table 5.32, the one-way ANOVA test run to look at differences by school location showed a significant effect in SI (F=4.252, p=0.015). Those who live in an urban location showed the highest agreement (M=3.74) followed by rural (M=3.51) and mountainous (M=3.47), respectively. Significant differences were also found for FC (F=14.68, p=0.000) where teachers who live in an urban location showed the highest agreement (M=2.49) followed by those living in rural (M=1.84) and mountainous areas (M=1.14), respectively. School location had also a significant association with UB (F=11.74, p=.00) and EP (F=4.223, p=.015). In particular, those in urban areas reported the highest score on UB while those in rural areas had the highest score on EP.

Table 5.32 Differences in study variables by school location

Variable	Urban (N=151) mean SD	Rural (N=174) mean SD	Mountainous area (N=22) mean SD	F	p-value[1]
Performance Expectancy	4.59 .549	4.56 .561	4.59 .585	.069	.934
Effort Expectancy	4.19. 742	4.06 .809	3.86 .821	2.287	.103
Social Influence	3.74 .727	3.51 .803	3.47 .646	4.252	.015
Facilitating Conditions	2.49 1.49	1.84 1.34	1.14 .303	14.68	.000
Behavioural Intention	4.57 .561	4.56 .549	4.59 .534	.031	.969
Use Behaviour	4.07 .993	3.63 1.12	3.10 1.08	11.74	.000
Attitude towards use of Technologies	4.17 .756	4.18 .695	4.33 .573	.507	.603
Teacher Anxiety	2.60 .939	2.70 .858	2.90 .855	1.286	.278
Teacher Education Experience	2.22 1.13	2.23 1.10	1.76 .946	1.849	.159
Education Policy	3.99 .766	4.23 .701	4.19 1.01	4.223	.015

[1]p-value corresponding to the one-way ANOVA

Course material design

Table 5.33 shows the results for the one-way ANOVA conducted to look at differences in the study factors by course material design. Significant effects were found for PE, EE, FC and ATT (all p-values<.001) with teachers who designed their own courses showing the highest scores, followed by teachers who both designed and bought ready-made resources from the Internet, colleagues or the market. Teachers who did not use presentations and educational programs and those that only used ready-made materials were the groups with the lowest scores across these four factors. A similar pattern was found for BI (F=4.852, p=0.003) where teachers who designed their own courses tools showed the highest score on BI (M=4.69) followed by teachers who both designed and bought ready-made resources (M=4.65). On the contrary, teachers who did not use presentations and educational programs (M=4.44), and those who bought ready-made resources (M=4.43) showed the lower scores.

The strongest differences were found for UB (F=51.260, p=0.000). Those who designed their own courses tools showed the highest score in UB (M=4.26) followed by teachers who both designed and used ready-made resources (M=4.19). On the other hand, those that used ready-made resources (M=3.47), and those who did not use presentations and educational programs (M=2.35) reported the lowest scores in UB.

The reverse pattern was found for AX (F=6.741, p=0.000), where those who did not use presentations and educational programs showed the highest level of anxiety (M=2.96) followed by teachers who used ready-made resources (M=2.85) and those who both designed and used ready-made resources (M=2.61). On the other hand, teachers who designed their own course tools reported the lowest levels of anxiety (M=2.25).

Table 5.33 Differences in study variables by course material design

Variable	Own (N=51) mean SD	Ready (N=100) mean SD	Both (N=157) mean SD	Don't use (N=39) Mean SD	F	p-value[1]
Performance Expectancy	4.79 .386	4.49 .590	4.63 .467	4.27 .787	8.41	.000
Effort Expectancy	4.61 .449	3.7 .871	4.27 .614	3.73 .908	24.31	.000
Social Influence	3.73 .767	3.57 .775	3.65 .728	3.39 .889	1.687	.170
Facilitating Conditions	2.36 1.48	1.79 1.17	2.33 1.59	1.44 .766	6.623	.000
Behavioural Intention	4.69 .444	4.43 .667	4.65 .461	4.44 .608	4.852	.003
Use Behaviour	4.26 .913	3.47 .957	4.19 .832	2.35 1.10	51.26	.000
Attitude: use of Technologies	4.41 .787	4.00 .704	4.33 .613	3.81 .787	10.22	.000
Teacher Anxiety	2.27 .868	2.85 .828	2.61 .918	2.96 .803	6.741	.000
Teacher Ed. Experience	2.33 1.18	1.96 1.09	2.29 1.07	2.25 1.13	2.192	.089
Education Policy	4.02 .764	4.21 .750	4.08 .772	4.17 .720	.970	.407

[1]p-value corresponding to the one-way ANOVA

Age, Years of teaching experience and Computer skills

Finally, some demographic variables collected as ordinal measures were treated as continuous for the purpose of this study. Pearson correlations were used to assess the association between them and the ten core constructs. The results are showed in Table 5.34. Age is weakly and negatively correlated with BI (r=-.13, p<.018), TEE (r=-.25, p<.001) and EP (r=-.24, p<.001); also, weakly and positively correlated with SI (r=.14, p<.009) and FC (r=.11, p<.000).

Years of experience in teaching is weakly and positively correlated with PE (r=.15, p<.007), EE(r=.15, p<.048), SI (r=.20, p<.000), FC (r=.21, p<.000) and UB (r=.11, p<.037) and weakly and negatively correlated with TEE (r=-.24, p<.001),AX (r=-.13, p<.014) and EP (r=-.24, p<.001). Computer skills is moderately and positively correlated with EE (r=.53, p<.001) and weakly and positively correlated with PE, SI, FC, BI, UB, ATT and TEE with coefficients ranging from .22 to .34; also, weakly and negatively correlated with AX (r=-.25, p<.000) and EP (r=-.113, p<.035).

Table 5.34 Pearson correlations between study variables and demographic characteristics

Variable	Age[1]	Years[2]	Computer skills[3]
1. Performance Expectancy (PE)	.05	.15**	.27**
2. Effort Expectancy (EE)	.00	.11*	.53**
3. Social Influence (SI)	.14**	.20**	.12*
4. Facilitating Conditions (FC)	.11*	.21**	.16**
5. Behavioural Intention (BI)	-.13*	-.03	.22**
6. Use Behaviour (UB)	.03	.11*	.34**
7. Attitude towards use of Technologies (ATT)	-.04	.04	.32**
8. Teacher Anxiety (AX)	-.04	-.13*	-.25**
9. Teacher Education Experience (TEE)	-.25**	-.24**	.25**
10. Education Policy (EP)	-.24**	-.24**	-.11*

[1] Age coded 1=less than 25, 2= 25-29, 3=30-34, 4=35-39, 5=40-44, 6=50-54, 7=55-59, 8=45-50; [2] Number of years in teaching service coded 1=less than 5, 2=5-9, 3=10-14, 4=15-19, 5=over 20 ; [3] Computer skills coded 1=non-existent, 2=beginner level, 3=intermediate level, 4=advanced level, 5=expert ; *p<.05; **p<.01.

5.9 Areas for Further Investigation

The survey findings revealed a number of areas that required further investigation. When tabulations obtained from survey results reveal interesting patterns that need further explanation and more detail, then this can be usefully obtained by qualitative research (Morgan, 1998).

Although the survey provided a description of behaviour and attitudes there were instances where more information was required to explain these answers. Each section of the survey results was carefully considered to see if there were issues that could usefully be raised when conducting interviews with survey participants.

It was felt that it would be useful to ascertain what sort of training in e-learning was given in the Bachelor of Education degree and the extent to which this training was felt to be effective and made use of by participants. Given that participants had been asked to rate their own computer skills it will be useful to find out on what criteria they had based this self-assessment; also to enquire how they had learnt those skills and what reasons lie behind teachers not using these skills in their current practice. Specifically, underuse of the Saudi iEN Portal was felt to need more explanation.

Leading on from these issues came the need to examine more deeply the actual working experiences of these teachers in terms of pressures of time, lack of resources and lack of support to see what part these play in not using or under-using e-learning tools. The relationship between the availability and efficiency of the digital equipment that Saudi secondary teachers have at home and their use of e-learning at school was also highlighted as being worth further exploration, for example in terms of seeing if some teachers had developed strategies to deal with poor facilitating conditions in their schools as well as discovering what sort of improvements they would welcome.

In terms of Social Influence more questioning was required about how school principals, teachers' colleagues and parents view the use of e-learning and Teachers' Attitudes also required more investigation especially to see what barriers there are to adopting e-learning technologies. Related to this issue was Teacher Anxiety and it will be useful to gain examples of when this prevented teachers using these tools. More details are required about resistance to using specific e-learning tools and seeking more training.

Although a description of the experience of the e-learning teachers had in their own education was obtained, it will be interesting to acquire concrete examples of this and to determine if teachers use these as models for their own teaching as well as seeing what criticisms they had about their own education in terms of e-learning tools and strategies. Finally, further details of teachers' attitudes and knowledge about Ministry of Education policy in this area are required.

5.10 Conclusion

This chapter gives us information about current use of technology and facilitating conditions available, as well as the general school environment in different areas of the study location; and the workload and conditions that teachers have. Information about teachers' skills and use of e-learning tools has also been described as well as teachers' attitudes and feelings towards e-learning technologies.

The survey revealed some notable features about the acceptance and use of e-learning technologies in Saudi secondary schools. Generally, survey participants had positive attitudes towards using e-learning technologies in their teaching; feeling that they both enhanced their performance and were reasonably easy to use. There were mixed responses about how significant others viewed their use of e-learning technologies, although overall the view was a positive one. There are clearly difficulties with facilitating conditions in Saudi secondary education, but in spite of this, most participants saw digital tools as something they intended to incorporate into their teaching and a considerable proportion were already using computers, Data Show and Power Point.

Attitudes then are generally favourable, although respondents also reported a number of anxieties about using digital tools. The survey also uncovered the fact that participants had little in the way of e-learning as part of their own education and had fairly negative views about the Saudi Ministry of Education's policies about implementing e-learning technologies.

The correlations between the different factors that can affect the adoption and use of e-learning technology were obtained, and these demonstrated that there are significant correlations between several factors and behavioural intention to use these technologies as well as on actual use. These discoveries have highlighted a number of areas that were further investigated in the qualitative part of the study, the semi-structured interviews with a sample of survey participants, which is the subject of the next chapter.

Chapter 6 Qualitative Analysis

6.1 Introduction and Preview of the Findings

The interviews were conducted with 30 secondary school teachers who were survey participants who had volunteered to be interviewed. However, in the case of three male teachers these were introduced to the researcher by the school manager as examples of staff members who were resistant to using technology. Although they had not participated in the survey, the researcher felt their contributions would be interesting as they could shed light onto barriers to technology acceptance. The interviews with all the male teachers were conducted at their schools in a separate and private room and at their convenience. The interviews with female teachers were conducted by phone to meet the cultural requirements of cross-gender contact in Saudi Arabia. These interviewees had previously given contact details. All interviews were conducted during school hours; and all interviewees were given the questions on the interview schedule prior to the interview and the researcher's contact details in case they had questions. Some face-to-face interviews were tape recorded but in others the interviewees preferred the researcher to take notes. The interviewees' answers in the phoned interviews were written down in note-form by the researcher. The researcher checked that all the interviewees did have the time for the interview and put the interviewees at ease.

In this section, the collected data are in the form of a narrative because the research tool utilized was the semi-structured interview which depends on open-ended questions. Because of the nature of the collected data, the researcher cannot use numerical tools for analysis, since there is no statistical data. The most appropriate instrument for analysing narrative data is thematic analysis that is clarified in Chapter Four (see Section 4.7.5). The data collected in Phase 2 of the investigation needed to be reduced such that the researcher could properly analyse it by extracting the key points that would answer the research questions and further illuminate the issues in Saudi secondary teachers' acceptance and use of e-learning technology. As it is considered important to start data analysis from the outset (Silverman, 2005), the researcher created summary sheets for each of the 30 interviews conducted to see what points each teacher made relating to each factor in the revised UTAUT model as well as other points that addressed issues pertinent to the Saudi secondary context; thus using both deductive and inductive analysis. These points were turned into codes which allowed analysis by means of the Atlas coding tool**.**

The codes were clustered into themes and diagrams created, these diagrams are displayed throughout this chapter to illustrate each major theme.

The teachers that were interviewed have been allocated numbers (T1 – T30) so as to completely preserve their anonymity. The answers to questions have been given under the categories listed below; however when responses appeared to pertain to other factors this has been noted. The discussion of results will include an evaluation of any changes in interviewees' attitudes as well as whether certain opinions appeared to recur. Evidence suggests that interviewing can itself have an effect on attitudes and are more likely to occur if the topic is important to the interviewee and he or she has unfocused or ambiguous opinions or information (Bridge *et al*, 1977).

The interviews sought to answer the following questions:

- What are the processes of e-learning implementation and use in teaching in Saudi Arabian secondary education?
- What are the factors that influence the acceptance and use of e-learning technologies in teachers' practices in Saudi secondary education?

These questions divide into a number of subsidiary questions that needed to be investigated through the primary research, as follows:

- To what extent and why do performance expectancy, effort expectancy, social influence, teacher attitudes, education policy and teacher anxiety explain variances in the behavioural intention to use e-learning technologies by Saudi secondary school teachers?
- To what extent and why do facilitating conditions, teachers' educational experience and behavioural intention explain variances in the use of e-learning technologies by Saudi secondary school teachers?

- How can the Unified Theory of Acceptance and Use of Technology (UTAUT) model be used to better understand what Saudi secondary school teachers perceive they need to effectively adopt e-learning technologies?

The research questions were codified and broken down into a number of categories (see table 6.1) and the interviews structured accordingly. (The Interview Schedule is presented in Appendix 4E).

Table 6. 1 Topics, Codes and Categories

Topics	Code	Categories
1. The processes of E-learning implementation and use in Saudi secondary education	PEI	-The workplace -Differences between schools in terms of technical equipment -The technical skills of teachers -The kind of work and technology
2. The factors that influence the use of technology in Saudi secondary education	FTE	-Performance Expectancy -Effort Expectancy - Actual Use -Facilitating Conditions - Social Influence -Behavioural Intention -Attitude toward the use of technology -Anxiety -Educational Experiences -Education Policy
3. The influence of the unified theory of acceptance and use of e-learning technology (UTAUT) to adopting technology in Saudi secondary education	U	-The viewpoints of teachers about the UTAUT

A profile of the participants who were interviewed is presented in Table 6.2 below. There were sixteen female and fourteen male participants. Twenty-two were located in rural areas, six in urban areas and two in mountainous regions. They worked in a wide variety of subjects and their work experience ranged from three to twenty-years.

Table 6.2 Participant Profile

Code	Gender	Age	Subj.	Work Exp.	Sch. Loc.
T1	Male	46	Islamic	22	Rural
T2	Female	45	Economic	19	Mountain
T3	Female	28	English	4	Rural
T4	Male	32	Islamic	5	Urban
T5	Female	42	Mathematic	13	Rural
T6	Female	33	Biology	5	Rural
T7	Female	36	Arabic	10	Urban
T8	Female	27	English	3	Rural
T9	Female	52	Economic	19	Rural
T10	Female	32	Chemistry	11	Rural
T11	Female	38	Arabic	12	Rural
T12	Female	46	Physics	22	Urban
T13	Female	47	Arabic	22	Rural
T14	Male	48	Biology	25	Rural
T15	Male	32	Arabic	5	Rural
T16	Male	41	Mathematic	18	Rural
T17	Female	34	Geography	8	Rural
T18	Male	45	Arabic	19	Rural
T19	Male	44	Islamic	20	Rural
T20	Male	46	Arabic	20	Urban
T21	Female	35	Arabic	9	Mountain
T22	Male	46	English	22	Rural
T23	Male	38	Arabic	14	Urban
T24	Female	35	Economic	6	Rural
T25	Male	43	Arabic	15	Rural
T26	Male	33	Chemistry	7	Rural
T27	Male	48	Mathematic	21	Rural
T28	Female	42	Mathematic	13	Rural
T29	Male	43	Chemistry	18	Urban
T30	Female	52	Islamic	24	Rural

6.2 Descriptive Account of Interviewees' Answers

6.2.1 The Processes of E-learning Implementation and its Use in Saudi Secondary Education

There are four categories under this topic; these are the workplace, the differences between schools in term of technical equipment, the technical skills of teachers and the kinds of work and technology used.

The Workplace

Teachers were asked to identify if they had worked in one school or in different schools. This was to ascertain whether they were in a position to compare facilitating conditions and the attitudes of school principals and supervisors as well as to obtain a complete profile of the interviewees.

Only six of the teachers said that their current school was their first, the others all had experience of working in several schools; one teacher having worked in nine. One teacher mentioned the type of school:

"*I have worked in two schools, one of them was rented*" (T17)

It was felt important to ask teachers about the differences between governments or 'rented building' schools in terms of technical equipment; and whether these differences affect the use of technology by teachers (see Figure6.1). The survey results had indicated that this would be a fruitful area of inquiry as there were indications that type of building was a significant factor related to facilitating conditions. The Ministry of Education recognises that rented buildings are inferior and there are plans to eliminate or improve them (Gulf Business, 2017).

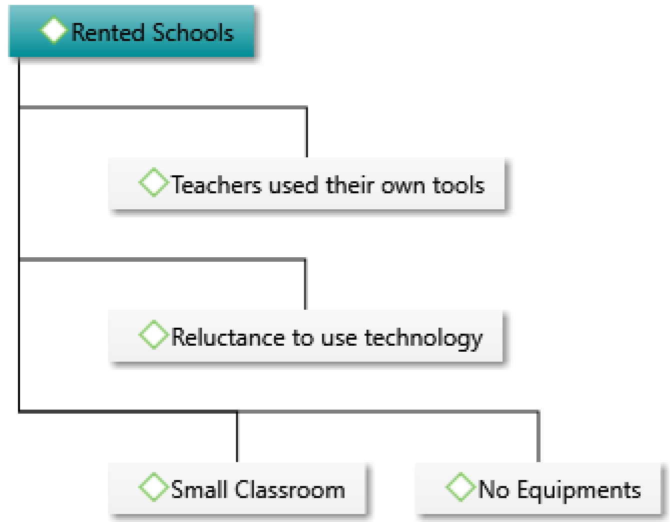


Figure 6.1 Rented Schools

The teachers interviewed were unanimous in believing that there are differences between government schools and rented schools in term of equipment. The majority of teachers said that "*government schools are better equipped*" (T24) and "*most of the equipment in rented buildings is poor*" (T7). They believed that this variation affects the use of e-learning technologies. One teacher suggested a reason for this:

> "*Yes, there are differences in technical equipment provided between schools, as rented schools lack technical equipment… some buildings and classrooms are just not commensurate with e-learning tools*". (T21)

Another suggested another infrastructural reason for the problem with 'rented schools':

> *"I worked in a rented school and there was no technology, because of the frequent interruptions of the network*" (T3)

Just having to move school could cause problems:

> "*Yes, there are differences and this causes reluctance to use technology, especially when you move from one school to another*." (T2)

Another teacher commented that:

> "*…there were differences between the government and rented schools and this difference was considered an obstacle and forced teachers to use their own tools."* (T10)

Other teachers indicated that they too had found ways to circumvent the problems.

> "..I *am self-taught; I use my own tools (my laptop and data show…*)" (T5). This teacher also commented that there were other reasons than school building type to explain variations in use:
> " *..I have noticed that most of the technical parameters are used during the attendance of supervisors in order to obtain a high evaluation of their job performance*." (T5)

This is related to the factor of Social Influence as it suggests that supervisors in this teacher's school would be impressed by the use of e-learning.

Some of the respondents indicated that they did not care as they did not use this technology, while other respondents were not asked the question as they had only worked in government schools.

One response merits further consideration:

> "*The sources of e-learning were closed off by the host school principal*" (T16)

Although this is not related to the issue of rented schools it bears out a finding from the initial informal interviews that owing to the war with Yemen, some teachers were asked to teach elsewhere in the afternoon and found that their access to digital learning tools had been shut off.

The teachers' responses to this question are in (see Appendix 6A)

The Technical Skills of Teachers

Teachers were asked about their technical skills and whether these skills affected their performance as teachers or not (see Figure 6.2). The survey participants had largely rated themselves as being competent in using computer skills, however as such self-assessment is subjective and the researcher felt it merited further investigation, interviewees were therefore asked to rate their skills and to give reasons for these ratings.

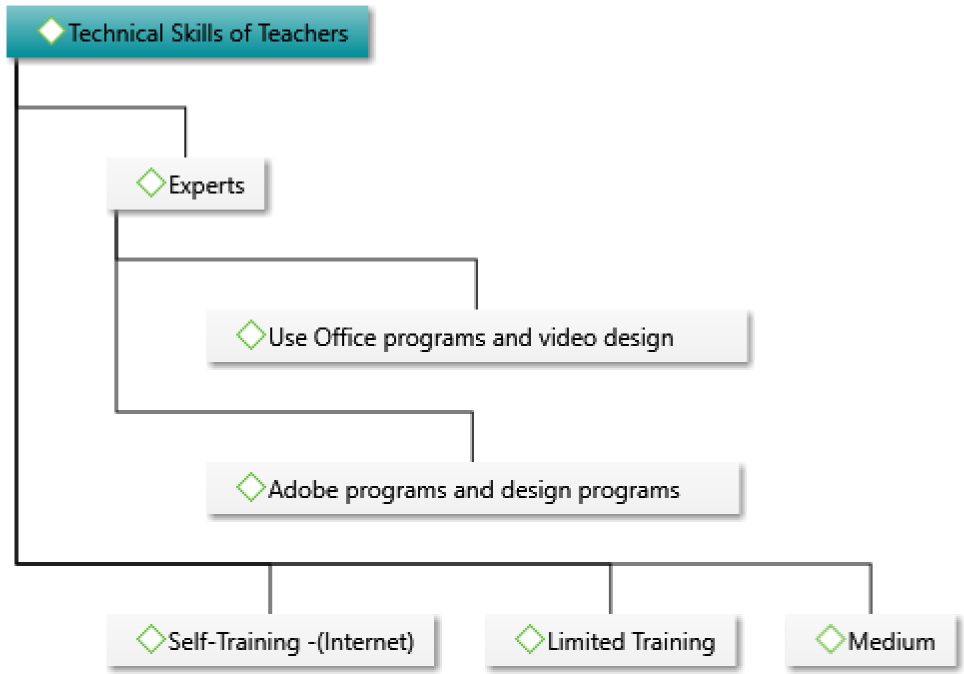


Figure 6.2 Technical Skills of Teachers

Three teachers stated that they simply did not use the technology. One of these explained that when his class went to the Learning Resource Centre, the students had to set up the data show. Three teachers identified themselves as beginners. However, most of the teachers (20) rated their technical skills as ‘medium’. One teacher said this was “*due to the lack of training courses as well as technical equipment*” (T11); and many teachers said that they had learnt these skills by themselves using a range of methods ranging from educational forums and courses and help available on internet sites such as You Tube. Learning from colleagues was mentioned by three teachers and one said they used their skills“…*to support some colleagues*” (T2).

Some teachers said that they had had training, for example T9, who mentioned “*internal courses*”, and there was an indication that IT skills were now being required of teachers:

> *"… as the working papers and tests are processed by computer and therefore it is necessary to use a computer; in addition, the new system requires the use of technology."* (T15)

There were also some teachers who were aware that their skills were insufficient. They rated themselves as only having 'medium' skills because of factors such as "*weakness in experience and skills in dealing with modern technology*" (T21). Another teacher said "*I use the monitor and the computer Smart boards but I do not use them in a perfect way*" (T13) and "*I feel that I need to learn more skills that make me use technology effectively."* (T10)

Two teachers considered themselves 'experts' in technical skills as they are able to "*use Office programs and video design*" (T6) and are "*perfect in the use of Office programs, Adobe programs and design programs*" (T7). The latter commented that this was despite being "*from a conservative family where there has been a rejection by the family to use the Internet."* This is an interesting comment that relates negatively to the factor of Social Influence. The teachers' responses are shown in Appendix 6B

Type of Work and Related Use of Technology

Teachers were asked about the kind of work, apart from teaching, that they do in school to see what effect this might have on their use of e-learning technology (see Figure6.3). The survey identified that having extra duties may impact on their time or include work that necessitates the use of e-learning technologies and the interviews were an opportunity to get more detail on this**.**

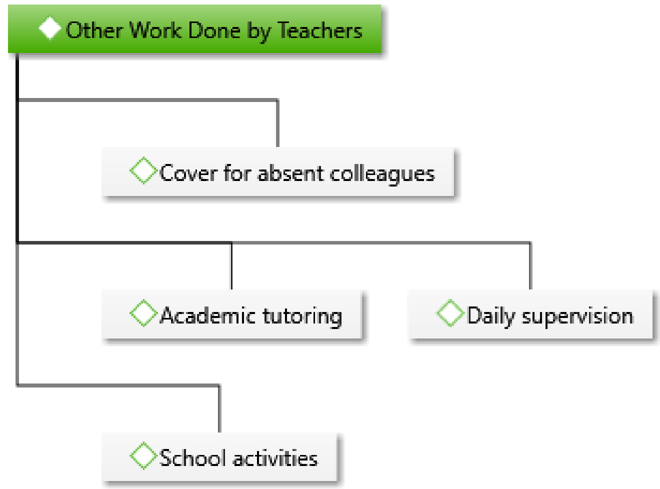


Figure 6.3 Other work done by Teachers

The teachers generally do a lot of other work at their schools as only two said that they only taught. However, some were keen to point out that having a lot of classes was in itself onerous. Half of the teachers mentioned that they were engaged in 'daily supervision'. One teacher mentioned academic tutoring; one was on a science committee and one mentioned health tutoring. One teacher was also a "*tutor in Islamic Awareness*" as well as a "*school committee member*" (T19). Three teachers mentioned that they co-ordinated active learning and provided leadership, and two mentioned cover for absent colleagues.

Some of the respondents indicated that these activities affect the use of technology such as having to use audio-visual equipment in the learning resource centre. Another teacher did tasks like implementing "*extra-curricular activities within the school*" (T7) which necessitated using technology such as running digital design workshops for students. However, one teacher had tasks that seemed to prevent its use:

> *"I am doing other work such as activity - leadership and some of the work required by the school principal and this prevents me using technology … because the processing takes time, especially when the classrooms are not ready."* (T10)

Other respondents indicated that their non-teaching work did not affect the use of technology. Sometimes this was due to a lack of facilities, as one remarked: "*because there is only one Smart board in the resource room*." (T29)

As a result of having extra duties some teachers resorted to doing all their preparation at home as one explained:

"However, the effect (of all the extra work) is not observed (managers do not realize the time it takes). I prepare everything at home since there is no time for doing this during the school day." (T15)

In considering supervisory work involving the use of video two teachers appeared to come up with contradictory attitudes towards this practice. One teacher said:

> *"I remember that I use video in the learning resource room and I noticed that the students are busy and they do not follow the lesson."* (T1)

Whereas another commented

> *"I use …… audio and video, and this positively affects the students."*(T3)

These comments appear to be negatively and positively related to Performance Expectancy; it is important to note however, that this difference in student reaction can be due to the way that technology is used and integrated into the activity. Teachers' responses to questions about this issue can be seen in Appendix 6C

6.3 The Factors that Influence the Acceptance and Use of e-learning Technologies in Saudi Secondary Education

The teachers were asked specific questions that related to each of the factors in the revised UTAUT model to elicit details not just about whether these factors were significant in their acceptance or rejection of e-learning technologies, but how and why they were.

6.3.1 Performance Expectancy

Teachers were asked about the benefits of using e-learning technologies in the teaching and learning processes as well as whether they believed these technologies contributed to improvements in the learning and teaching process (see Figure.6.4 below).

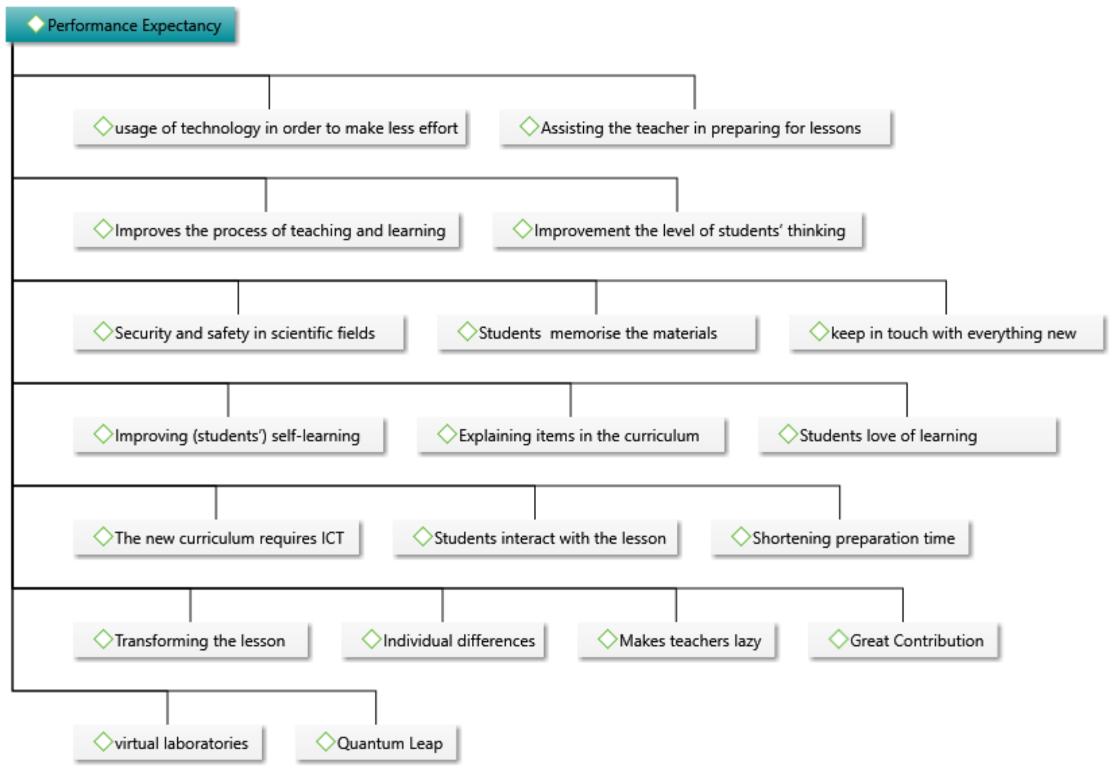


Figure 6.4 Performance Expectancy

The majority of teachers believe that there are benefits to the use of e-learning technologies, and that they ease the process of teaching and learning by assisting the teacher in preparing for lessons, shortening preparation time and explaining items in the curriculum as it had made a "*great contribution to the improvement of educational materials*" (T7) and could also "*take into account individual differences*" (T10)

Some comments revealed that teachers had extremely high expectations of the benefits:

> "*It is considered a quantum leap in the field of education and it has a significant role in improving education.*" (T16)

One teacher also said:

> "*Security and safety in scientific fields and its role in the improvement the level of students' thinking*" (T10)

This comment highlights the benefits of virtual laboratories as safer options as well as the positive pedagogic effect, which was echoed by (T23) who believed digital educational technologies play "*a significant role in improving (students') self-learning*."

Moreover, teachers generally felt that use of digital educational technologies was popular with students and that "*…it aids (students) in memorizing the materials …"* (T7). Another teacher commented:

> *"There is no doubt that its usage improves the process of teaching and learning, and it adds excitement, thrill and love of learning."* (T29)

There were also indications that digital technology was seen as an important part of modern life:

> *"The technology… is beneficial in the learning process since it helps the students get accustomed to the use of technology in the learning process and to keep in touch with everything new."* (T3)

However, the negative responses suggest that the problem is that teachers do not fully understand what digital educational technologies can do. For example, one teacher said:

*"…the benefit is limited in the processes of education and teachers depend on the usage of technology in order to make less effort …not to help in the improvement of education"(*T1)

This idea that e-learning technologies are just used so the teacher can do less work in the classroom contrasts strongly with the statement by another teacher who believes that it:

> "*…has an important role in transforming the lesson from an ordinary lesson into active one"*. (T13)

Other teachers, however, seemed well aware of the issues of technology acceptance:

> "*Yes, it is beneficial for education, provided that it coincides with the faith of teacher in the importance of technology as well as the active participation of students*" (T18).

Also, one teacher's response indicates that there is a growing awareness that using digital educational technologies will be the norm in the near future:

> "*It is significant because the new curriculum requires this*" (T6)

It was also notable that performance expectancy was linked to other factors. A few teachers who said that they did not use digital educational technologies themselves also noted that some of their colleagues found it useful, which suggests that there is some discussion of the subject and a possible source of social influence from colleagues. Students' reactions were also mentioned:

> "*I expect they will play a major role in learning, especially as more students interact with the lesson when using modern technologies.*" (T19)

A lack of facilitating conditions was also mentioned in this context:

> "*It (using digital educational technologies) is easy for the practitioner who is accustomed to use it; at the beginning I faced real obstacles since there are no persons provide support*" (T15)

The results of the interviews mirror the responses in the survey where Performance Expectancy was also shown to have a highly significant correlation with intention to use. The interview results throw light on why this is such a crucial factor and what aspects of e-learning technologies are considered to be important by Saudi secondary teachers. The teachers' responses to questions related to this factor are in Appendix 6D

6.3.2 Effort Expectancy

Questions about this factor were aimed at discovering how teachers perceive the degree of ease or difficulty in using technology; as well as finding out if teachers believe they need more time, effort and skills to do this effectively (see Figure 6.5 below).

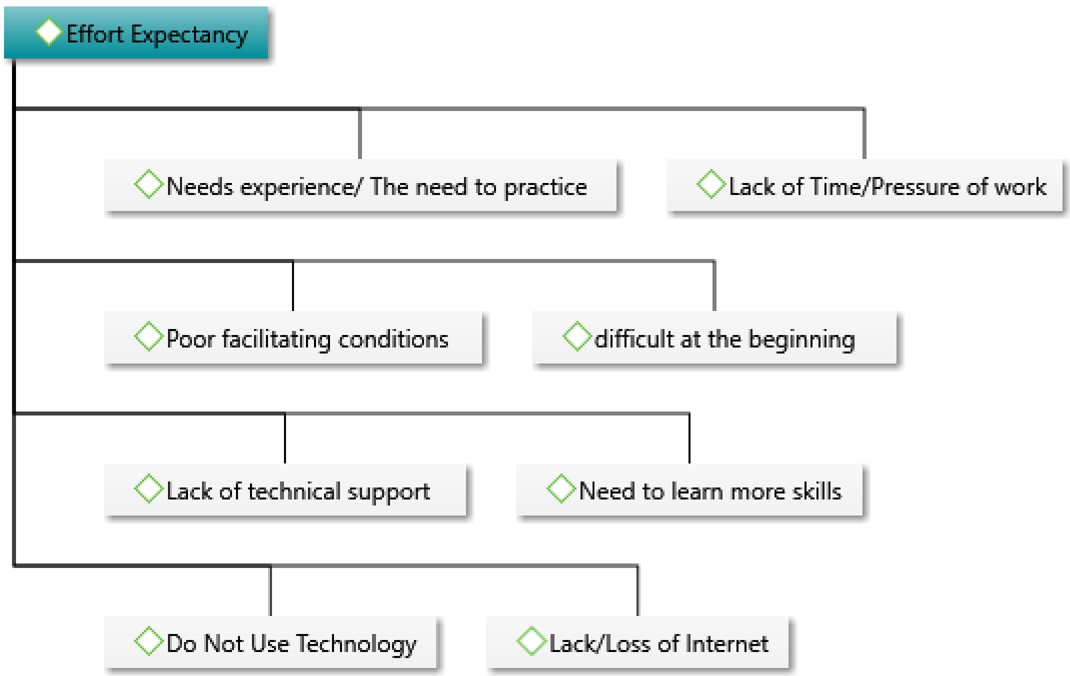


Figure 6.5 Effort Expectancy

Twelve of the teachers indicated that they needed more skills to be able to easily make use of digital educational technologies. One commented that they needed to find ways to "*use new technologies in a way that is not boring*" (T7). Another stated:

> "*… it is difficult to deal with some of the technologies such as Smart boards and I feel that I need more skills to use technology in an optimal way*" (T10)

This shows that some teachers are able to pinpoint exactly what sort of training they require.

Lack of adequate time to process information, prepare lessons and acquire skills in using digital educational technologies was mentioned by ten teachers. One teacher cited this as a reason for not using these technologies at all:

"*I do not use it because preparation with technologies takes more time and I do not use it for teaching*" (T1)

The need to practice in order for use to become easy was mentioned by six teachers and for said that the assistance of colleagues or technicians was important.

Lack of good training was a problem for six teachers. One commented that "the training courses offered by the educational supervisors are inappropriate" (T23). Poor facilitating conditions was also given as a reason why using digital educational technologies required a lot of effort by four teachers who cited a lack of internet connection; technical support and poor equipment in classrooms as the problem. However, one teacher thought that using digital educational technologies was easy "*particularly within the limits of the equipment available at the school*" (T18).This is an interesting point related to Facilitating Conditions as it shows that having a lot of state-of-the art equipment can have a negative effect on Effort Expectancy if suitable training and support is not provided.

However, one teacher commented that using digital educational technologies required less effort than traditional means:

> "*Usually, the use of e-learning technologies requires a lot less physical effort from the teacher*" (T8)

Several teachers mentioned that effort decreased significantly with practice if they were able to find the time to do this.

Like the survey participants many interviewees thought that digital educational technologies were easy to us, however, they still lacked the necessary skills to do this effectively. Lack of skills and experience meant that digital educational technologies could be time-consuming and this was exacerbated by poor facilitating conditions.

Teachers' responses related to this factor are shown in Appendix 6E

6.3.3 Use Behaviour

The teachers were asked about the technologies they used in the process of lesson preparation and teaching as well as whether they used the National Portal provided by the Ministry of Education (see Figure 6.6 below).

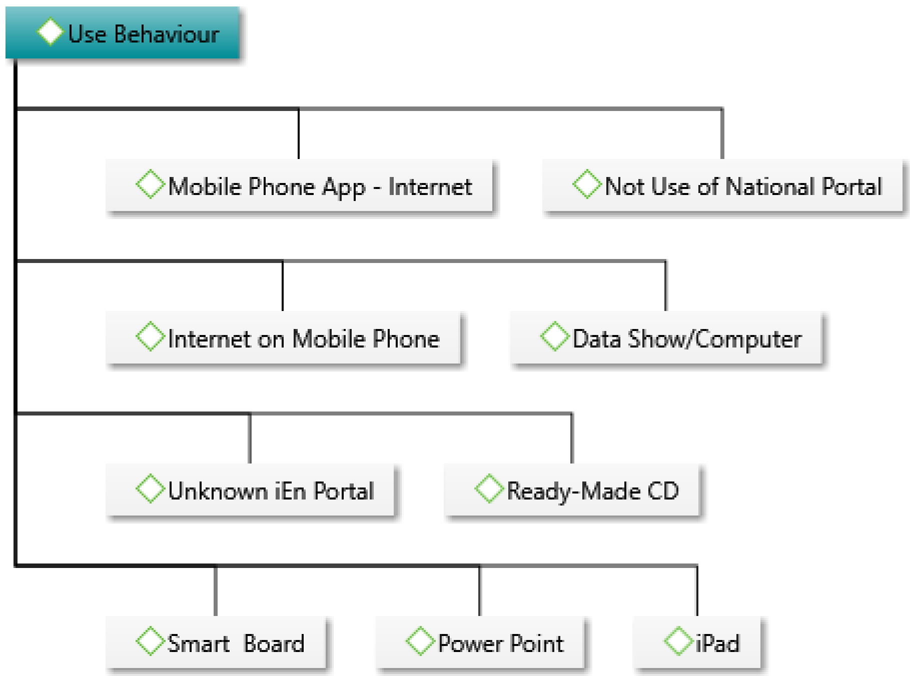


Figure 6. 6 Use Behaviour

The equipment most commonly mentioned was Data Show, Smart board and computers. One teacher said that they used no technology and two that they used it very rarely. One of the reasons for this may be poor facilitating conditions as three teachers mentioned that their school was ill-equipped.

> "*I use my own PC at school, since the Ministry does not give us computers; and I use the available means such as data show and the Smart board but I use them poorly*" (T5)

Data Show, computers and the Smart board are by far the most used, although quite a few respondents mentioned that they used their own PC at home for preparation and registering students' marks or brought their computers into the school.

The interviewer then asked about the teachers' the use of the National Portal established by the government. It would appear that teachers simply do not use the National Portal provided by the Saudi Ministry of Education. Most teachers were unaware of it and five stated that they do not use it sometimes because the lack of internet connection precludes it. There was a suggestion that the Ministry is acting on this:

"*I do not use it although a letter arrived to school encouraging teachers to use it.*" (T18).

These results are similar to that of the survey which also revealed a fair proportion of teachers reporting no digital equipment being available or poor internet connection.

The equipment used is shown in Appendix 6F.

6.3.4 Facilitating Conditions

It was felt important to investigate further the extent to which facilitating conditions in Saudi secondary schools are ready to effectively implement e-learning. Teachers were thus asked about available resources in their schools as well as the available e-resources for the curriculum. Furthermore, this section also indicates if teachers are supported in their use of technology through help and technical support; and teachers also give their opinions about the available facilitating conditions in their schools (see Figure 6.7 below). Finally, teachers commented on the social backgrounds of their students and how this affected their access to the necessary technology.

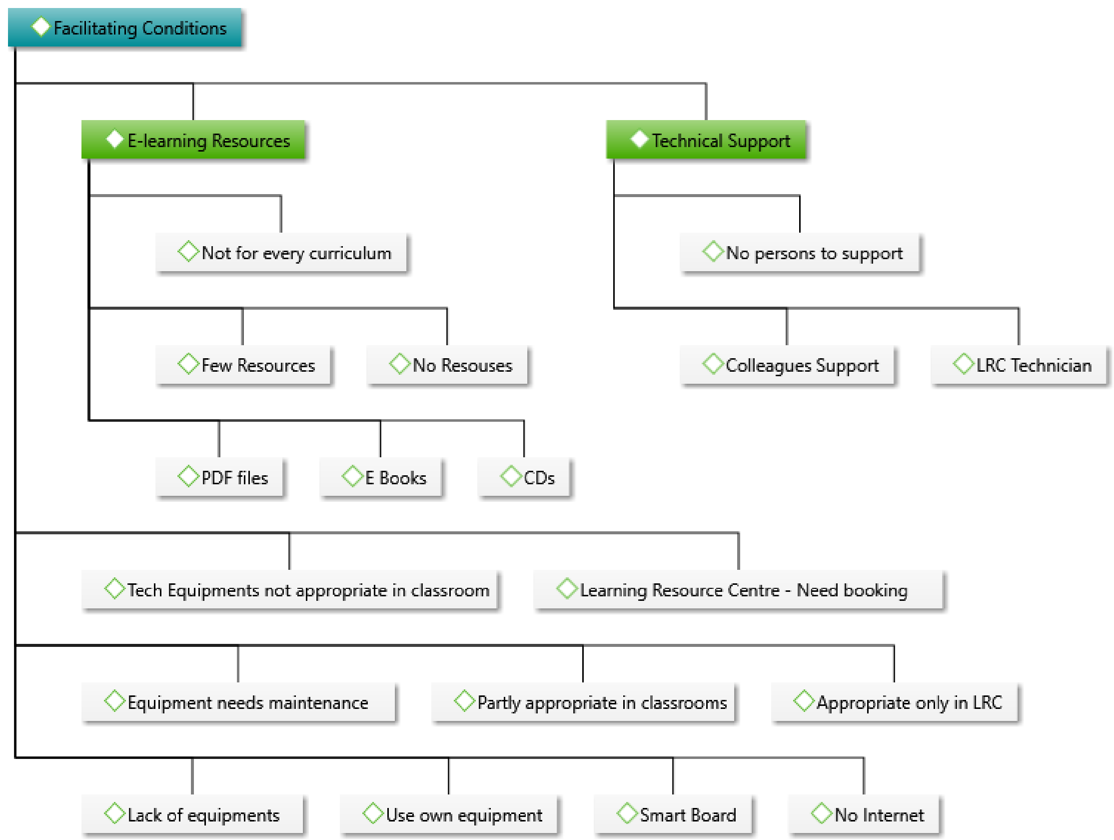


Figure 6. 7 Facilitating Conditions

The data revealed that the main focus of e-learning appears to be the Learning Resource Centres; the classrooms are equipped to some extent and some have computers and Data Show; however, some teachers indicated that even when digital equipment exists there is no internet connection and the equipment is poorly maintained or not available in all classrooms.

> "*Yes, (my school) is equipped but 70% of it (the equipment) does not work and it needs maintenance*" (T18)

One teacher lamented that his school was "*…devoid of all equipment*!" (T19)

Some teachers therefore resorted to bringing in their own equipment or working on it at home. There were also problems having access to the Learning Resource Centre as many teachers complained that it had to be booked in advance. Three teachers said that although equipment was available they did not use it, one specifying that this was because they were not trained.

More detailed questions were asked about e-learning resources connected to the curriculum (see Appendix 6G) The Ministry of Education has provided some resources such as PDF files and there are activity files related to certain subjects. All these resources are on the National Portal or as hard copies (CD/DVD)**.**

Nine teachers believed that there were no resources, and one that there were "*very few and not for every curriculum*" (T4). Others had only a vague idea:

> "*I hear that there are E-books but I do not know anything about it.*" (T1)

Unsurprisingly many teachers resorted to looking for sources themselves from the internet.

Other teachers seemed more aware of digital resources aimed at specific curricula:

> "*There are PDF files on the Ministry files as well as some mobile applications and free educational forums.*"(T26)

But they were critical of these

> "*..they are not sufficient as well as the poor quality of internet connection*" (T12)

One teacher commented

"*I've heard that the Ministry has developed the curriculum and established the pdf files for subjects, but neglected the technical side needed to teach the curriculum as there are some instructions to search the Internet for more information (but there is no internet connection)"* (T14)

Teachers were then asked about technical support. These responses are shown in Appendix 6G.

Thirteen of the teachers reported that the person responsible for the LRC generally provided support. However, nine of them had no support at all and ten just relied on their colleagues with a further two mentioning both colleagues and the person in the LRC. Only one teacher (T15) said there were '*individuals*' designated to provide support. This reflects the results of the survey where nearly half the participants said they had no technical support

When asked what they thought about the facilitating conditions for e-learning that were available in their schools (see Appendix 6G) fifteen of the teachers thought they were inappropriate. One specified that they were:

"*…appropriate in the resource room, but inappropriate in the classrooms*" (T3)

Only two teachers thought the facilities "appropriate".

The survey revealed that location might be the source of a 'digital divide' in facilitating conditions. The interviews provided an opportunity to explore whether such a divide existed in terms of students' location and social class. Questions about whether and how their students' social backgrounds affected their access to the necessary technology are shown in Table 5.12. This elicited a strong 'yes' from teachers as 21 of them stated that there was an impact, .and only one teacher (T5) believing that this wasn't an influence. A further three said that they were not sure.

Some teachers had altered their teaching to take account of this problem:

"*I do not give the students homework that requires use of technology because not all students have computers in their homes*" (T18)

"...I divided the students into groups, and each group has a student who possesses equipment at home in order to accomplish the set tasks and duties" (T6)

"*I like to see students' contributions as PowerPoint presentations, but must take into account the students who do not have the technology* "(T8).

Three teachers pointed out that this was especially the case in the villages, one teacher pointed out that social background also affected the students' access to "*other teaching aids*" (T23) and some teachers went on to explain the consequences of this:

"*I copied the lessons onto CDs and distributed them to the students… but some students did not have the necessary equipment*" (T3).

Clearly, the teachers largely agree that there was a 'digital divide' and that this impacted on teaching and learning, and this issue was also mentioned as causing anxiety.

6.3.5 Social Influence

Teachers were questioned to determine who (if anyone) they thought affected their use of digital educational technologies and how they perceived others' attitudes towards their use (see Figure 6.8 below).

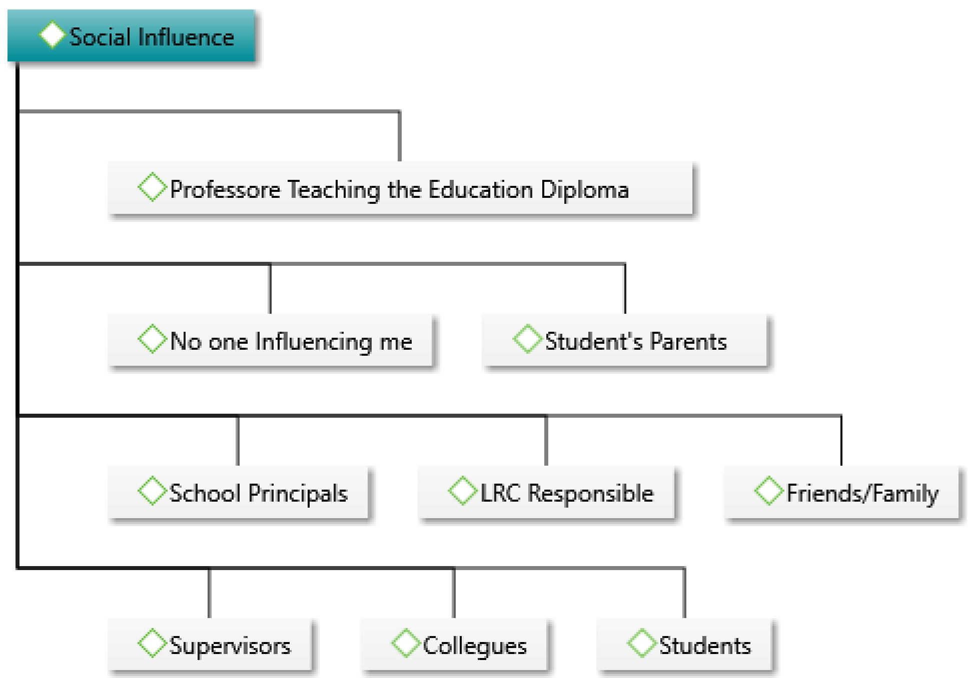


Figure 6. 8 Social Influence

Seven teachers thought that no one influenced their use of e-learning technology; however the majority mentioned more than one influence.

It is interesting to note that some teachers, who felt that there was no social influence on them, were still aware of others' behaviours in this area:

> "*No one affects me, but the principals of school are encouraging us, but with the supervisors it is just lip service, as they do not follow up their words with actions*".(T1)

School principals were most often cited and most of the people who were seen as influential were internal to the school. The one comment that the 'professors teaching the Education Diploma' were an influence is interesting as this links to the factor of 'Teacher Educational Experience'. Two of the teachers who cited parents as an influence saw them as having negative attitudes:

> "*…some parents believe that technology is a waste of time*" (T7)

> "*…the parents oppose the use of technology*" (T10)

There was some indication of formal pressure to use digital educational technologies:

"*…the educational supervisor asks us to use them as one of the evaluation items*" (T7)

> "*…the new curriculum demands the use of technology*". (T10)

And finally one teacher who believed that they were not influenced commented

> "*…competition among teachers encouraged me to use the technology*" (T12)

These results are similar to the results shown by the survey and highlight the ambivalent attitude of parents to the use of digital educational technologies. The interviews added the dimension of looking at external and internal sources of social influence and links with the Teachers' Educational Experience factor.

Teachers' perceived social influences are shown in Appendix 6H.

6.3.6 Behavioural Intention

This section illustrates teachers' intention to use digital educational technology; and if they would welcome training courses in order to enhance their use of the technology (see Figure 6.9 below).

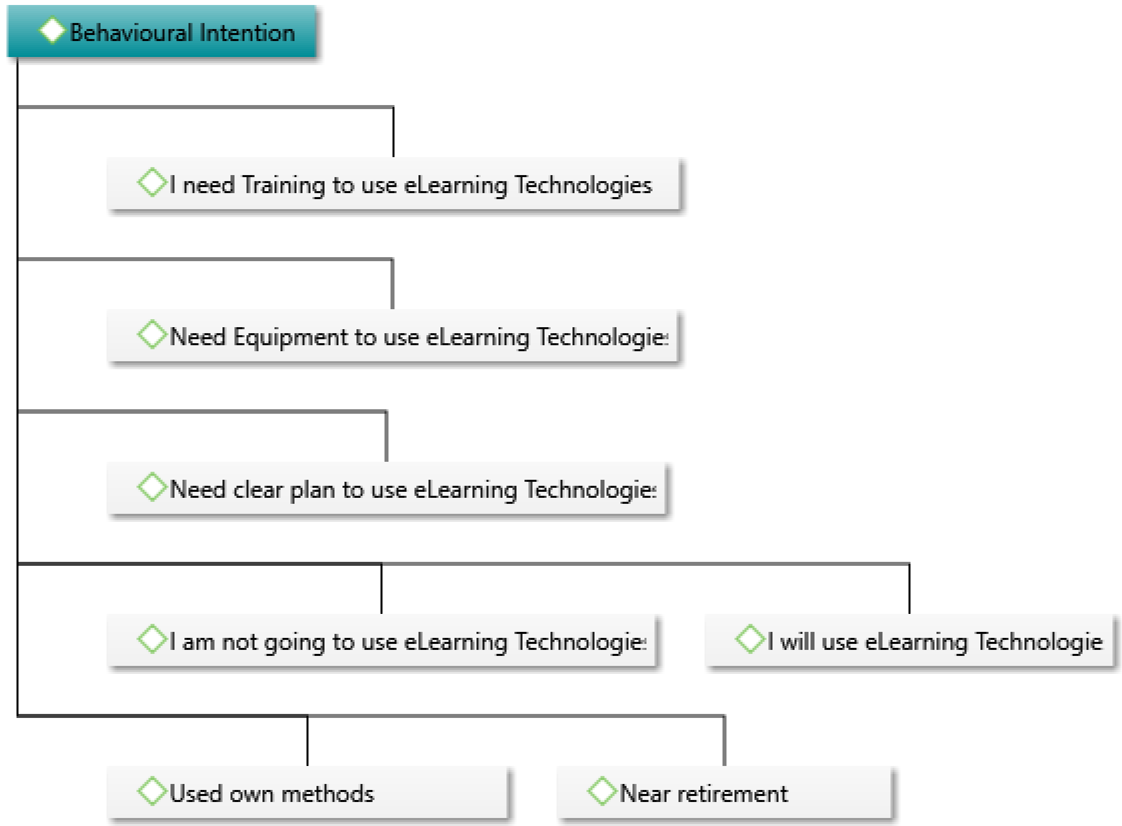


Figure 6. 9 Behavioural Intention

Only four teachers said they did not intend to use digital educational technology. The reasons they gave were linked to their late career stage; resistance to change; lack of support or training and low performance expectancy. One of these teacher commented that there was "*no difference between using and not using technology*" (T14). The remainder all said that they intended to use e-learning technology, one stipulating:

"…*because it easier and faster for teachers to access information*" (T5)

This suggests that Behavioural Intention is linked to Performance Expectancy as shown in the survey results analysis which indicated a high positive correlation between these two factors.

However, there were many provisos. These included the availability of facilitating conditions such as the necessary "*Internet connection and maintenance of devices*"

(T11) and a clear policy for using e-learning technology. Seven teachers wanted to use digital educational technologies but identified training needs.

When asked specifically about whether they wanted training (see Appendix 6I), only four teachers said that they did not. One interesting reason given for this was:

> "*…because they are useless in the absence of equipment*" (T14)

Twenty-three teachers said that they wanted training, but again there were provisos. One wanted "*qualified trainers*" (T12) and one teacher commented:

"*Yes, if the specialized courses are sponsored by companies and not by the supervisors*" (T23)

These comments suggest that there are quality issues with training in the use of e-learning. One teacher complained that training had been requested several times but "*approval (for training) did not come*" (T19) and this was echoed by another who said that there was a distinct "*shortage in training courses*" (T20); indeed eleven teachers said that they would welcome training if it was actually provided. This would suggest that this aspect of the Behavioural Intention factor is linked to Facilitating Conditions and Education Policy.

Teachers' responses can be seen in Appendix 6I.

6.3.7 Teachers' Attitudes toward the Use of Technology

This section illustrates teachers' attitudes towards the use of digital educational technologies (see Figure 6.10 below).

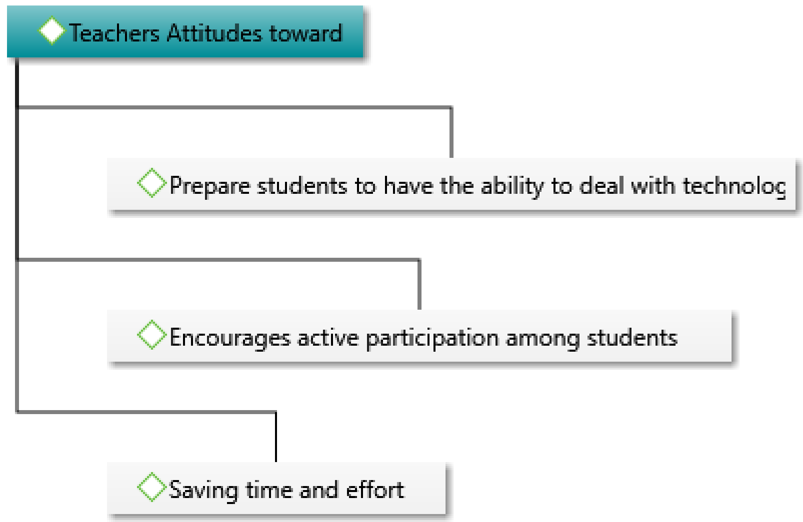


Figure 6.10 Teachers' Attitudes toward e-learning Technologies

Twenty-four of the thirty teachers said that they preferred to be able to incorporate digital educational technologies into their teaching. The reasons they gave ranged from saving time and effort to its positive effects on the students. One teacher gave reasons for this:

"…*it encourages active participation among students and the use of technology is a great way to prepare students to have the ability to deal with technology*" (T15).

Another said:

"…*because the students interact with me …"* (T23)

Another thought it increased students' understanding of the curriculum "*especially if there is integration with educational strategies within the lesson*" (T7)

Three teachers had partly positive attitudes and only three teachers had totally negative attitudes towards using technology. One saying:

"…*it adds nothing new for me*" (T1)

Just as the survey revealed, Saudi teachers generally have a positive attitude towards digital educational technologies and are able to see their pedagogic benefits although they have misgivings about there being sufficient facilitating conditions to support it.

The responses are tabulated in Appendix 6J.

6.3.8 Teachers' Anxiety

This section illustrates the extent to which teachers worry about the use of technology as well as detailing the things that cause them anxiety while in the process of using technology (see Figure 6.11 below). When asked what they thought were the general anxieties about using technology, all but one teacher (T3), who thought teachers were concerned about 'technical faults in the hardware') said that they were not sure. However, they had plenty to say about their own anxieties based on experiences in using technology.

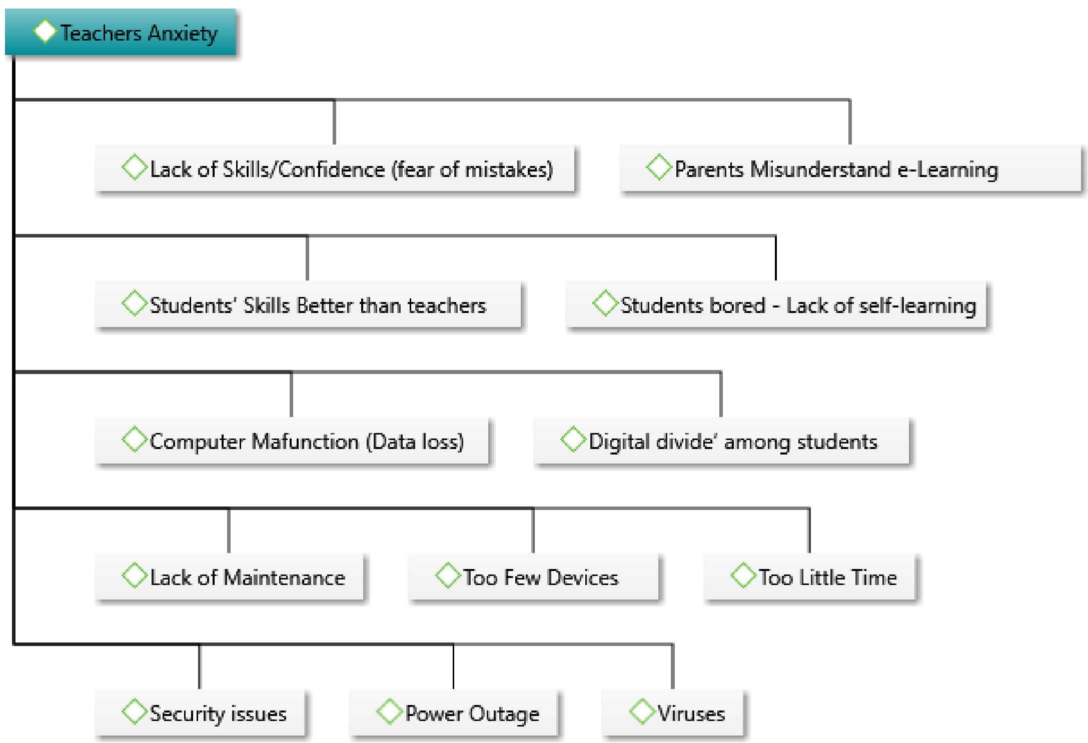


Figure 6. 11 Teachers Anxiety

Teachers' anxieties could be grouped into three main areas. Firstly, there were the worries about problems with the facilitating conditions. These included computer malfunctions with could result in crashes and loss of data; viruses and no means to deal with them; lack of or loss of internet connection and power outages; lack of security; the 'digital divide' among students and having too few devices to go round. Secondly, there were fears that centred on the teachers' lack of ability and resulting lack of confidence. These fears included fear of making mistakes; displaying IT skills which inferior to those of the students; boring the students and not being able to deal with technical problems during a lesson, such as having unwanted messages coming up on the screen. Finally, there were worries that stemmed from inadequacies in the school system. These included not having enough time allocated for planning; parents having the wrong idea about e-learning and lack of proper maintenance.

Teachers' answers sometimes provided in just a few words typical nightmare scenarios of what they felt might go horribly wrong:

> "*The students sleep through the class and the device crashes*" (T27)
> "*My lack of skills in using technology and the fear of embarrassment in front of students, the unavailability of devices among some students, some of whom are better than me at using technology… and the device crashes*" (T16)

The interviews enlarge on the survey finding in identifying teachers' anxieties and how many are rooted in facilitating conditions. The relatively high number of teachers mentioning power outages as a source of worry is an indication of weakness in the infrastructure. Also, there is a strong sense about how using technology can be seen as risky in that when things go wrong the flow of the lesson can be disrupted and the teacher can lose face. Teachers need time to be able to build experience in using digital educational technologies and to prepare for lessons that use e-learning and if this is not made available, this may be a serious barrier to the implementation of e-learning. The responses are displayed in Appendix 6K.

6.3.9 Teachers' Educational Experiences

Teachers were asked about the use of technology in their previous educational experiences to identify if and how it might affect their current attitudes to the use of technology in the processes of learning and teaching (see Figure 6.12 below).

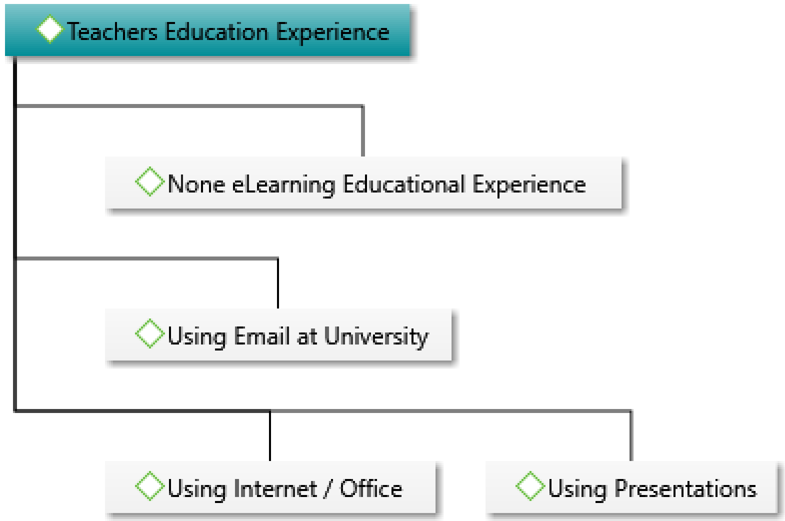


Figure 6. 12 Teachers' Educational Experiences

The vast majority of teachers said that they had no experience at all of using digital educational technologies or of their being used as part of their own education. Of those who said that they had had experience, this was mostly minimal and included "*using e-mails*" (T3) "*Internet pages and Office programs*" (T7) and "*just presentations*" (T26). A few identified the reasons for this saying that "*technology was not available*" (T11) or that "*education was mostly traditional*" (T19). A couple of teachers said that they had acquired some skills by themselves.

The result for this factor is similar to that of the survey and some light is thrown on the underlying reasons – poor facilitating conditions and an educational policy that did not prioritise the implementation of e-learning. However, there was one indication that e-learning technology was valued during teacher training:

"*I used e-learning technologies during the preparatory semester of my pre-service course to obtain a high-level assessment from my supervisor*" (T27).

Their responses are displayed in Appendix 6L.

6.3.10 Education Policy

This section illustrates teachers' answers about education policy for Saudi secondary schools. It shows whether teachers feel they receive adequate training for the use of e-learning technologies, if they received encouragement to enrol in training courses on the use of e-learning technologies, if their school principal had explain the Ministry's plan to integrate the use of e-learning technologies in schools, if teachers believe the school principal and teachers are fully informed of the Ministry of Education policies regarding the use of e-learning technologies, and to highlight the barriers to using e-learning technologies in the teaching and learning process(see Figure 6.13 below).

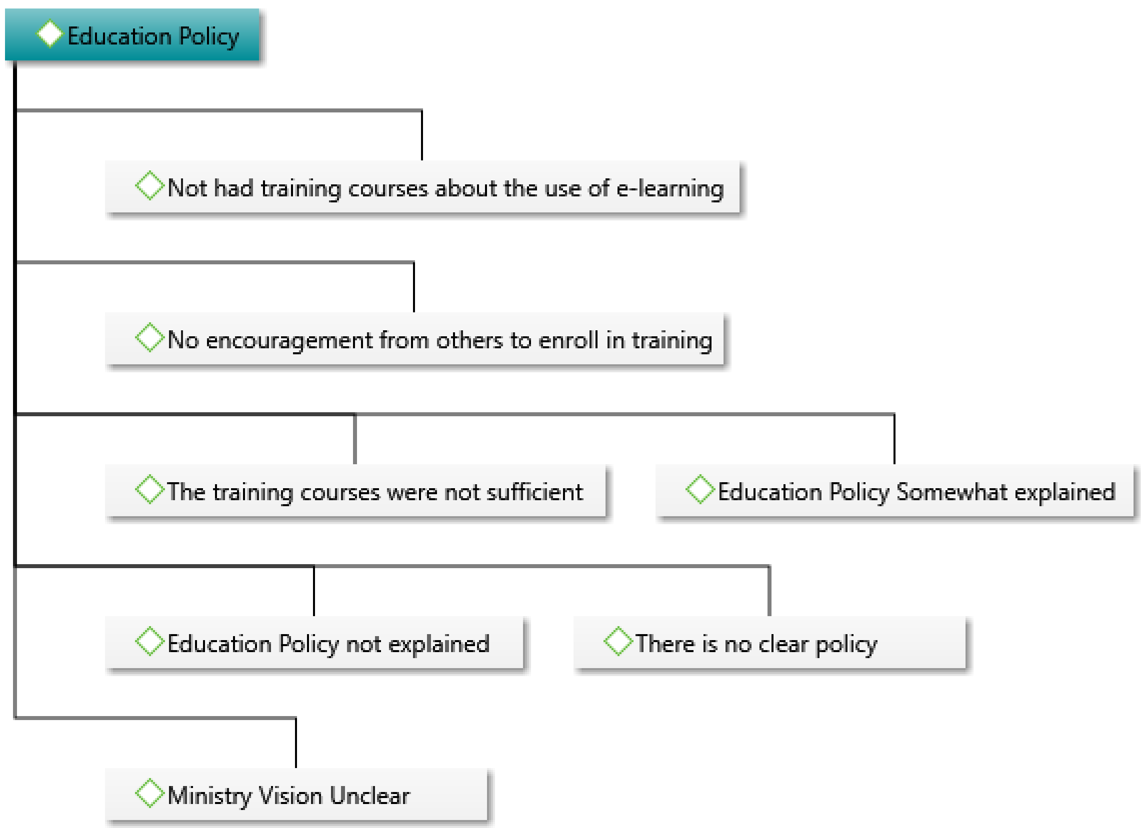


Figure 6.13 Education Policy

The majority of teachers (17) have not had training courses about the use of e-learning, with one admitting:

> *"I have not heard of training programs in the field of e-learning provided by the Department of Education"* (T24)

Those who had received in-service training indicated that these training courses were not sufficient for them to be able to integrate e-learning into their teaching. One teacher pinpointed this problem:

"*…I need to learn how to integrate new technologies with different education strategies*" (T6)

Another said:

"*I did a training course through distance learning. It was about how to use an iPad in education and professional presentation, but the problem was in the difficulty of its application in schools, because of the lack of equipment*" (T16).

Two teachers who had been trained said that this was just in using "*Office programs*" (T9) and "*virtual labs*" (T10).

Of those who had embarked on a process of training themselves, one noted the importance of making time to practice skills:

> "*…practice has had a significant role in the refinement of my talents and my ability to deal with the technology*" (T7)

Another teacher noted that external training courses tended to be rather expensive.

When asked about whether they were encouraged by others to enrol in training courses on the use of e-learning technologies, half the teachers said that they weren't; one teacher commenting that "*there are no training courses*" (T30) Several of these said that they had encouraged themselves to do it, and a further three teachers identified that encouragement was limited, with one explaining that this was due to "*the limited number of programs*" (T8). Of those saying that there had been encouragement four said that this was from the school principal and one that encouragement was from "family". This shows that the factor of Education Policy links to Social Influence in that the provision of training is not enough if teachers are not told about it and encouraged to do it by others.

When asked whether their school principal had explained the Ministry's plan to integrate the use of e-learning technologies in schools, the majority of teachers (21) said that this had not been explained. Those who said that it had also indicated that this was not adequate with comments like "*somewhat*" (T1) and that this was only done "*at the beginning of the school year*" (T30). The guidance given was felt to be wanting:

> "*The director explains generalities, but there is no clear policy or plan to follow*" (T27)

The information also came in the form of letters and circulars from the Ministry, and only one teacher mentioned "*internal awareness bulletins*" (T9). There was also a suggestion that lip service was paid as: "*The school principal reminds us from time to time of the importance of technology*" (T11).

Teachers were also asked if they believed that the school principal and teachers were fully informed of the Ministry of Education policies regarding the use of e-learning technologies. Arguably, this was not an easy question to ask as teachers may not have much evidence to go on, and most of the teachers chose not to answer the question. Eight said that they did not believe this was the case and only one answered "maybe" (T26).

Teachers' answers about Education Policy are shown in Appendix 6M.

6.4 Teachers' Ideas on Barriers to Acceptance and Use of e-learning Technologies

Teachers were shown the revised UTAUT model and told that this model had been used to structure the interview along with the results of the survey, and that these were the factors we had been talking about. Each factor was explained and the teachers were asked whether they felt there were other factors that might help to explain use of technology. Most teachers just accepted that the model was a good explanation and re-iterated the points they had already made. Seven teachers mentioned that working in rented buildings was an important factor. Having discussed the issue of technology acceptance with the teachers, all but two of whom had also completed the survey might have made them think more about the topic. For example, it is interesting that T1, who does not himself use technology, now feels qualified to comment on 'a lack of proper infrastructure'. Perhaps, having given the subject some thought he still does not want to use it himself, but feels that his colleagues should have the choice to do so.

Teachers were asked to say what they thought were the barriers to the use of e-learning technologies in the teaching and learning process. The responses of those who did answer are shown in (Appendix 6N). Reasons given for barriers to acceptance and use of technology seem to be linked to several factors in the revised UTAUT model.

Nineteen teachers cited poor or absent facilitating conditions as a barrier and fourteen saw that the barriers lay in the teachers themselves – lack of training, inexperience and too little time to devote to e-learning. These aspects arguably can link to Teacher Educational Experience and Educational Policy as causal factors and Teacher Anxiety and Attitudes as resulting factors. One teacher said:

> "*The reluctance of many teachers to use technology is because of a lack of familiarity and the fear of having a new experience*" (T29)

Six teachers mentioned unclear education policy as a barrier, saying that the Ministry of Education had provided neither the vision nor sufficient finances to properly implement e-learning in Saudi secondary schools. Only one teacher mentioned a barrier linked to Social Influence – the negative attitude of parents. Notably many teachers mentioned several barriers and so were aware that reluctance to use digital educational technologies had many causes. The following comments were typical:

- *There is no clear plan in addition to a lack of experience in using technology in education and basics to use technology*(T14)
- *The number of students in classes are large, lack of adequate equipment in addition to the lack of digital resources*(T27)

6.5 Conclusions

The interviews largely reinforce the findings of the Phase One survey, but also revealed that there were some underlying issues specific to the acceptance and use of e-learning technologies in Saudi secondary schools that further explain some of the influence of the factors in the proposed revised UTAUT model. These issues and the factors they relate to are in Appendix 6U.

School type and location were revealed to be an important issue in teachers' use of e-learning technology. The Ministry of Education, as already discussed, is planning to do away with rented schools, but currently there are still many in existence in Jazan and have inferior facilitating conditions. Schools located near the border with Yemen have been shut down for security reasons and the teachers and students re-allocated to schools in safer areas. However, they often have to use the school in the afternoon and are not given access to digital equipment. Students located in rural and mountainous areas were perceived as more likely to not have any digital resources at home, this was seen by some teachers as a reason for not using e-learning and a source of anxiety if they did.

In spite of a generally positive attitude towards e-learning, many teachers felt that they did not have the knowledge or skills to use it properly and there was ignorance about nationally available resources like the iEN Portal. The training that was available was perceived as inadequate and not necessarily useful or relevant to the proper integration of e-learning. Many teachers believed that they would be able to integrate e-learning into their teaching if they had the time to practice with the technologies and to prepare lessons with them, however a heavy workload and lack of time was cited as a reason why this was not always possible.

Teacher attitude was very central to acceptance and use of e-learning technologies. On the one hand, some teachers showed immense resourcefulness in circumventing inadequate facilitating conditions by providing their own and motivating themselves to find out more about using e-learning and discovering resources on the web. On the other hand, there were teachers who had no intention at all to use or to learn to use e-learning technologies in their teaching. These were teachers who were, by their own admittance at the end of their careers and saw no reason to make the considerable effort needed to learn a whole new range of skills.

The next chapter will explore these issues further and bring together the results of the survey and the interviews and evaluate what these findings mean in terms of answering the research questions.

Chapter 7 Discussion

7.1 Introduction

This chapter discusses the results of both phases of the current study in terms of how they answer the research questions. The current state of the use of e-learning technologies in Saudi secondary schools is discussed before making an evaluation of each factor in the proposed revised conceptual model that was based on Venkatesh *et al*'s Unified Theory of Acceptance and Use of Technology (UTAUT) (2003). Special attention is paid to other factors that were revealed to have had an influence on the teachers' acceptance and use of e-learning technologies; namely, age, gender, school environment and computer skills. Constructs in the proposed revised UTAUT model are ranked in terms of their ability to explain variance in the teachers' intention to use and actual use of the technologies. The findings are then generally reviewed in terms of the key findings that are relevant to the Saudi secondary context.

7.2 The Current State of the Use of e-learning Technologies in Saudi Secondary Schools

This was addressed by both phases of the study and details of teachers' actual use of e-learning technologies are given in Chapter 5 (section 5.5) and Chapter 6 (section 6.2). These findings showed that although there was use of certain e-learning technologies, this use was limited and echoed the findings of some studies conducted in similar Saudi contexts (Al-Aawani, 2005; Almaglouth, 2008 and Oyaid, 2009). Furthermore there was some evidence from the interviews that e-learning technologies were not being used effectively, which echoes findings in many general studies which found that teachers did not transform their pedagogy with learning technologies, but merely used it to enhance presentation of information (Leach & Moon, 2000;Cuban *et al*, 2001; Tezci, 2009and Wozney *et al*, 2006). The use of e-learning technologies in Saudi secondary schools is evaluated here in terms of the data revealed in both phases of the research and related to the relevant variables of age, gender, school environment, and computer skills. This was to address the research question: What are the processes of e-learning implementation and use in teaching in Saudi Arabian secondary education? Moreover, data was gathered to give the researcher a fuller picture of the current situation and its relationship the use of e-learning tools.

7.2.1 Age

The study found that age was related to Behavioural Intention (BI) to use technology in that younger teachers were more likely to want to use e-learning technologies than the older teachers. The group with the highest BI was 25-29. This group are more likely to have come into contact with e-learning technology in their university and pre-service courses and the 50-54 year old teachers had the lowest BI as they were less likely to have had experience of digital educational technology. This finding was supported by some findings in the literature. Older users often exhibited fewer capabilities in using IT systems as well older users finding it more difficult to change their behaviour to adjust to an IT environment (Morris &Venkatesh, 2000, Venkatesh *et al* 2003 and Burton-Jones & Hubona, 2005). Interestingly, one teacher revealed that being at the latter end of his career (and thus in an older age group) was the reason that this teacher gave for not using, or intending to use e-learning technologies. Another older teacher stated that he was used to traditional methods and found these adequate. The findings therefore suggest that, at present, age may be a factor in explaining the processes of e-learning implementation and use in teaching in Saudi Arabian secondary education, although this may change.

At first glance, these findings appear to support Prensky's notion that people who grew up without digital technology are 'Digital Immigrants' as opposed to those who were surrounded by it and are 'Digital Natives' (Prensky, 2001). The two older teachers mentioned above seem to fit into what Prensky says about 'digital immigrants; i.e. they "typically have very little appreciation for these new skills that the Natives have acquired and perfected through years of interaction and practice (and) don't believe their students can learn successfully while watching TV or listening to music, because they (the Immigrants) can't" (*ibid,* p.2). However, others have criticised Prensky on the grounds that "breadth of use, experience, self-efficacy and education are just as, if not more, important than age in explaining how people become digital natives" (Helsper & Enyon, 2009).For example, among the participants of this study, there were also older teachers who used e-learning technologies; thus, it may not be wise to make any kind of generalisation about the effect of age alone on technology acceptance and use. Furthermore, the problem is not insoluble, as training strategies aimed at older teachers with poor ICT skills is possible.

7.2.2 Gender

Evidence from the literature suggests that gender has generally not been found to be significant in explaining technology acceptance in developing countries (Baker *et al*, 2007; Lin *et al*, 2004), although the first study to use the UTAUT model (Venkatesh *et al*., 2003) showed that gender was significant. A study conducted in two schools in the United Arab Emirates with both male and female teachers, however, found that the majority of female teachers had highly positive attitudes towards technology and used a range of e-learning tools in their teaching more than their male counterparts. The study also showed that they were more experienced and knowledgeable about digital learning resources than the male teachers (Almekhlafi & Almeqdadi, 2010).

The findings of this research were similar in that the results of the survey demonstrated that gender has a bearing on Use Behaviour in that women were more likely to use e-learning technologies in spite of the fact that they scored more highly in terms of Anxiety. This was unexpected given the late introduction of ICT technologies in female schools (see Chapter One).

Scrutiny of the demographic figures showed that this result was not due to female participants being significantly younger. However, this difference in gender may be cultural rather than biological or psychological; and, in the case of this Saudi sample, possibly be due to different social conditions existing in all-female schools as compared to all-male schools. Owing to the current cultural restrictions on women travelling alone, female teachers will typically be driven to schools where they will remain all day until picked up after work. Consequently, any free periods are spent together and the teachers can informally help each other with their work, this may include showing colleagues how to use any e-learning technologies available, as some of the interviews revealed. Male teachers, on the other hand, will be able to go out of the school and attend to other matters during their free periods or go to restaurants outside the school to socialise with friends. Furthermore, there is some evidence that in Arab countries technology provides an avenue of advancement for women, who thus see it as a way of improving their earnings and status. A global survey conducted by a professional services company to examine the extent to which gender affected use of digital technologies to improve their education and employment revealed that when comparing this ‘digital fluency’ in developing countries like Saudi Arabia, women were embracing digital technologies to further their careers 80% believed that they could level the gender playing field as opposed to 62% in developed countries. In the field of education, only 44% of women in developed countries saw being connected to the internet as vital to their education, as compared to 68% of women in developing countries (Accenture, 2016). Although this was not academic research, the findings can be seen as relevant to explaining how gender affects technology acceptance and use in developing countries.

This researcher’s study has allowed comparison by having participants of both genders, which is unusual in Saudi studies owing to the cultural environment which means that most studies have been single-sex only. This comparison has revealed that gender is at present a factor in explaining the current processes of e-learning implementation and use in teaching in Saudi Arabian secondary education.

7.2.3 Computer Skills

Teachers’ computer skills had a significant influence on both BI and UB. The researcher found that the majority of teachers felt that their skills were at intermediate or advanced level and a few identified themselves as beginners or experts. Experts were more likely to use e-learning technologies, followed by advanced and intermediate level users, with beginners least likely to use, as expected. In the interviews it was shown that the majority had acquired these skills themselves and that they did not have the range of skills needed for a full use of e-learning technologies.

The literature shows that to use learning technologies competently in their teaching it is not enough for teachers to have a good level of computer skills, but rather that they can apply these skills effectively to their pedagogy. Current literature to date supports the notion that inadequate training to give teachers the skills and understanding required to use learning technologies effectively is a major barrier to its implementation (Al Asmari, 2011 and Bingilmas, 2009). Teachers may well rate themselves as having adequate computer skills but this alone may not be enough and teachers must be able to use digital technology appropriately within their specific subject area to enhance their students' learning and training must reflect this (Koehler & Mishra, 2009; Bingilmas, 2009).As has been noted (see section 1.2.3), digital literacy comprises a cluster of skills which can be thought of as comprising ICT literacy skills, which allow teachers to access services which are computer supported and available on the Internet (or intranet); technological literacy, which requires teachers to understand digital technology and have the skills required to use computers and other digital tools and information literacy, which means that the teacher can effectively locate, evaluate and process digital information (UNESCO, 2011 p.2)

One example of this provided by this study is that those teachers who designed their own materials were most likely to use e-learning technologies; those who designed their own and used ready-made materials were almost as likely to use them; whereas those who only relied on ready-made materials were not as likely to use e-learning technologies and those who accessed neither were the least likely. Making their own materials meant that teachers had thought through how to use them in class with their students and consequently were less anxious, which was borne out by the ANOVA test (see Table 5.33). Thus, possession of relevant and competent learning design skills as well as more general computer skills is another factor which explains the current processes of e-learning implementation and use in teaching in Saudi secondary education.

7.2.4 Attendance of Training Course in e-Learning

Teachers who had attended training courses in the use of e-learning technologies were more likely to be using those technologies in their actual teaching than those who had not. The interviews however, revealed that there were criticisms of these courses as being purely theoretical and many of the teachers also reported that they had relied on improving their skills by themselves.

7.2.5 School Environment

According to the literature on Saudi school environment (Bingilmas, 2009; Alhawiti, 2013) this has a bearing on teachers' ability to use digital learning technologies. Notably, this is because in Saudi Arabia resources are mostly shared and located in the Learning Resource Centres, which has to be booked in advance; and the location of the school may mean problems with Internet access and educational software is of limited availability. For example, the study by Hakami et al (2013) revealed that about 10 students share 1 computer (see Literature Review) in the Tatweer school that he studied. Furthermore, the lack of technical support in the school adds to these difficulties (Almaghlouth, 2008).

The current study has however revealed that there are also very specific regional circumstances that can have an important influence on teachers' ability to successfully implement e-learning in their teaching; as well as issues that apply nationwide. The answers about the current situation in secondary schools showed that the issue of rented schools, which are just standard houses and designed for habitation not purpose-built for education, was an important one in that they appeared to have minimal digital learning resources and, in some cases, none at all. There were also issues connected to the location of schools (urban, rural or in mountainous areas). Those teachers from urban areas were more likely to use technology followed by rural areas and mountainous areas being the least likely. Rural and mountainous areas which are common in Jazan (see Section 2.2.1) are characterised by students who are least likely to have digital equipment at home and this may be the result of lower Use Behaviour by teachers as well as poor internet connection. Interviews revealed that having to be re-located owing to the current conflict with Yemen, which borders the Jazan area or for urgent school maintenance meant that access to facilitating conditions was often impaired. Furthermore, teachers complained that moving to another school with different or poor digital equipment meant they had to change any e-learning in their practice. School environment along with education policy practised locally therefore influences the amount and quality of e-learning technologies available which is an important aspect of Facilitating Conditions which is shown in this study to be the strongest factor in explaining variances in Use Behaviour and thus school environment needs to be taken into consideration when explaining the current processes of e-learning implementation and use in teaching in Saudi Arabian secondary education.

A description of e-learning implementation and use in Saudi secondary education was obtained by both phases of the research and showed that, although some equipment and resources were available, using these was often made difficult. This and other barriers to Saudi secondary teachers' acceptance and use of e-learning technologies are evaluated below. Furthermore, age, gender, school environment and computer skills all had some bearing on the actual use of these e-learning technologies (See Figure 7.1).

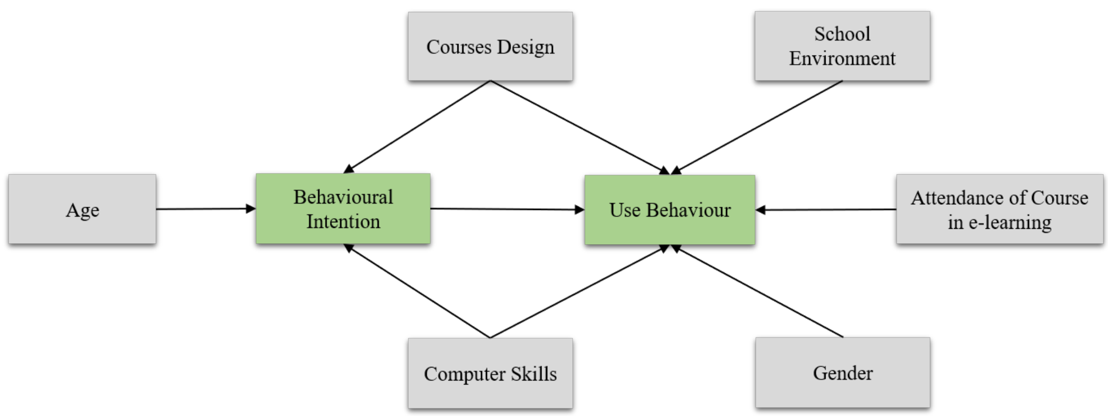


Figure 7. 1 The effect of demographic and school environment factors on BI and UB

7.3 Factors related to Acceptance and Use of e-learning Technologies by Saudi Secondary Teachers

The survey's results (see Chapter 5) revealed that the most significant of the original UTAUT model's construct when applied to behavioural intention to use e-learning technologies in the Saudi secondary context was Performance Expectancy., reflecting the positive attitudes that teachers generally reported towards e-learning. Facilitating Conditions was the most powerful influence on actual use of e-learning technologies. Of the factors added to the original model the influence of Teachers' Attitudes and Education Policy actually outweighed the influence of Effort Expectancy and Anxiety outweighed Social Influence. The added factor Teachers' Educational Experience was also shown to be significant in explaining Use Behaviour. Statistical analysis demonstrated that there are significant correlations between several factors and behavioural intention to use these technologies as well as on actual use.

The results of the interviews detailed further the issues that Saudi secondary teachers face regarding the use of e-learning technologies in their teaching practice. The answers regarding each factor are included in the section below where an analysis of each factor in terms of the findings of both phases of the research is given.

Each factor is discussed in terms of the results of both phases of the research and related to findings from the literature. The factors related to Behavioural Intention to use e-learning technologies are discussed first, in the order in which they significantly predict variance; followed by the factors directly related to Use Behaviour in order of significance.

7.3.1 Performance Expectancy

The literature shows that PE has been a significant forecaster of Behavioural Intention to use technology (Pullen *et al*, 2015; Momani &Albualkishik, 2014; Bere, 2014; Akbar,2013; Alwahaishi & Snášel, 2013; Pardamean & Susanto, 2012; Pynoo *et al*., 2011; Lowenthal, 2010; San Martin & Herrero, 2012; AbuShanab *et al*., 2010; Venkatesh *et al*., 2003)

It has also been the case that 'perceived usefulness' a parallel construct from the TAM has also been shown to have a positive impact on Behavioural Intention (Tosunta *et al,* 2015). In this study the focus was on answering the research question: **To what extent and why does PE explain variances in behavioural intention to use e-learning technologies by Saudi secondary school teachers?** In the survey, four questions were devised to test key aspects of PE, notably how teachers perceived the usefulness of e-learning technologies for teaching and learning, to accomplish tasks faster, to communicate with students and to facilitate teaching course content. The survey findings revealed that teachers were almost unanimous in their agreement that e-learning technologies were useful in their replies to all four questions, the overall mean of the PE scale was (4.5) with a standard deviation of (0.645)this was an average score indicating that the influence of PE on using e-learning technologies is high, and PE was the most significant factor to explain variances in Saudi secondary teachers' intention to adopt and use e-learning technologies with the standardised coefficient($B=0.243$, $p<0.001$).These results were reflected in the interviews, and teachers highlighted the specific ways in which they felt e-learning technologies were useful, such as virtual laboratories being safer to use and how students benefitted from these technologies in their learning. However, the interviews also revealed that using e-learning technologies could be seen as not conducive to good practice in that teachers could use it to avoid personal interaction with students, by just showing a video, for example.

This issue could well be connected to a lack of proper training to use e-learning technologies actively. A recent study into technology acceptance in higher education in Saudi Arabia revealed the relationship between PE and intention to use the technology was stronger in more experienced users (Alshehri, 2010). This attitude may also be explained in reference to findings by Blackwell *et al* (2013) that personal or 'intrinsic' barriers to technology acceptance are highly significant, even when 'extrinsic barriers' are not present. Thus one teacher (T1), who did not use the technology himself, saw it as something that contributed little 'in the improvement of (the students') education'; yet another teacher (T18) noted that the 'faith of the teacher in the importance of education' was paramount if the effect of technology was to be perceived to be beneficial and that it had to involve 'the active participation of students'.

The results of both phases of the study answers the research question by demonstrating that Performance Expectancy is a significant factor in explaining variances in Saudi secondary teachers' intention to use e-learning technologies and that the reason is that they generally perceive its potential to enhance the teaching and learning experience even though there may be reasons that make using it impractical or difficult in their schools. Some of teachers interviewed added that its value lay in teachers being able to specifically apply it to their subject area and that in order to do this training had to be relevant.

7.3.2 Attitudes towards Technology

Attitudes towards Technology are cited in many studies into technology acceptance as being an important factor in explaining technology acceptance (Parlakkılıç, 2014; Awan, 2011; Koksal, 2013). This factor is an addition to those used by Venkatesh *et al* (2003) in the UTAUT model. Thus both phases of the research addressed the question: **To what extent and why do Teachers' Attitudes towards Technology explain variances in the behavioural intention to use e-learning technologies by Saudi secondary teachers?** In the survey, teachers were asked three questions to test the extent to which they liked using e-learning technologies, e-learning technologies made their work more interesting and to what extent they believed that e-learning technologies were a good idea. Although the survey revealed that attitudes were generally very positive there were a few neutral or negative responses that it was felt would be useful to explore further in the interviews. The overall mean of the ATT scale was 4.2 with a standard deviation of 0.889; this indicates that the teachers' attitudes toward using e-learning technologies are very positive. This factor was the second most significant factor in explaining variances in Saudi secondary teachers' intention to use e-learning technologies with the standardised coefficient ($B=0.207$, $p<0.001$). Similarly, all but three of the teachers interviewed saw e-learning technologies in a positive light. Those that did not were those teachers that said they did not use e-learning technologies.

The findings of this study echo those of Al-Sulaimani who studied intermediate science teachers' use of e-learning technologies in Jeddah, also in the KSA. Interestingly, this study found that although the policy makers who were interviewed thought that teachers generally had negative attitudes to digital learning technologies, this was not the case (2013, p.2). As with this study, it was the practical impediments to effective use of ICT that the teachers perceived as barriers to acceptance. For those teachers with negative attitudes, improving those attitudes can be a starting point in increasing their likely acceptance of e-learning technologies, as suggested by Al-Fadhli (2008), Zhu *et al* (2009) and Musa & Othman (2012).

The results of both phases of the research answers the research question by demonstrating that teachers' Attitudes towards Technology is a significant factor in explaining variances in Saudi secondary teachers' intention to use e-learning technologies and that the reason is that they perceive its value to students' learning and to faster access to information as long as adequate equipment and support are present.

7.3.3 Education Policy

The literature contains several studies that stress the importance of Education Policy as a factor in explaining technology acceptance (Khan, 2014; Harley & Lawrence, 2012; Education and Culture DG, 2011). It was decided to incorporate this factor as an addition to the original UTAUT model (Venkatesh *et al*, 2003). Accordingly, the survey and subsequent interviews addressed the question**: To what extent and why does Education Policy explain variances in the behavioural intention to use e-learning technologies by Saudi secondary teachers?** To this end, the survey asked teachers five questions related to Education Policy. Three questions were about e-learning training courses in terms of their availability, inadequacy (not practical) and encouragement to attend. There were a further two questions on whether teachers believed there was a coherent policy to integrate e-learning in their school and whether the school principal and their colleagues were aware of the Ministry of Education's e-learning policy; the overall mean of the EP scale was 4.1 with a standard deviation of 1.048, this indicates that the influence of EP on using e-learning technologies is high. The results showed that Education Policy was the third most significant factor in explaining the variances in Saudi secondary teachers' intention to use e-learning technologies with the standardised coefficient ($B=0.191$, $p<0.001$). The teachers felt that the training was insufficient, as was encouragement to attend courses on e-learning; that there was no coherent school policy for integrating e-learning and a lack of awareness about Ministry of Education policy on this.

The interview revealed some of the reasons that underlay the general dissatisfaction with e-learning training and these ranged from not knowing anything at all about available training to finding it disappointing as it had not resulted in being able to integrate e-learning into their teaching. Attitudes about school policy on integrating e-learning were similarly lukewarm and Ministry policy was not perceived to be well known by school principals and teaching staff. Tondeur *et al* (2008) suggest that it is important to understand how local school policy affect technology acceptance and their study of 574 teachers in 53 schools and interviews with the principals of those schools revealed that school-related policies, such as plans to integrate e-learning and provide support and significantly affected acceptance and use of technology and that school policies were often ‘underdeveloped and underutilised’ (2008, p.212). Although this study was conducted in a developed country (Belgium) the results of the current study suggest that the same applies in the Saudi context. The Saudi Ministry of Education may well be dedicated to the integration of e-learning technology but successful integration becomes much more likely if teachers are aware of the policy and are informed of its aims and objectives and how this applies to them in particular (Kennewell *et al*., 2000).

An issue related to Educational Policy requires further discussion here. The interviews with the teachers revealed that time was an important issue for several of them, and this was linked to workload and the time needed to practice using e-learning technologies and prepare lessons. Some teachers also mentioned that, given that equipment was located in the LRC, they needed extra time to be able to take students there to use e-learning technologies. The literature suggests that not having the time to practice using e-learning technologies, go on in-service courses and properly integrate e-learning into their teaching is a significant barrier to acceptance and use of e-learning technologies and that this is regularly cited as a problem by teachers from a range of countries (Bingilmas, 2009; Jones, 2004 and Pelgrum, 2001). Saudi Arabia is no exception as on average teachers have 18 lessons of 45 minutes a week (Al-Asmari, 2011) with no established policy for managers to reduce teacher workload or create flexible timetables to accommodate the time needed by teachers to acquire the skills and integrate e-learning (Hakami *et al*, 2013).

The results of both phases of the research answers the research question by demonstrating that Education Policy is a significant factor in explaining variances in Saudi secondary teachers’ intention to use e-learning technologies and that the reason is that teachers feel the school principal and teachers need to understand the policy and be given clear guidance, encouragement, training and support to carry out its aims and objectives. To succeed, these strategies must respond to the needs and concerns of the teachers, especially in terms of their concerns about poor facilitating conditions and lack of support and how the training must be relevant to their curricula and allow them to try things out for themselves.

7.3.4 Effort Expectancy

Effort Expectancy (EE) has been identified in the literature as significant in explaining technology acceptance (Pynoo *et al*., 2011; Lowenthal, 2010 and AlAwadhi & Morris, 2008**).** It is notable however, that a study conducted in Saudi Arabia (Bellaaj *et al*., 2015) found that the influence of EE decreases with familiarity, (whereas the influence of PE increases). Both phases of the study were designed to address the question: **To what extent and why does Effort Expectancy explain the variances in the behavioural intention to use e-learning technologies by Saudi secondary school teachers?** In the survey three questions were devised to test how clear and easy to use the teachers perceived e-learning technologies to be, whether this was the case in relation to their level of skills and if they found it easy to acquire new skills. Interestingly, the teachers were strongest in their agreement that they found new e-learning technologies easy to learn, although a large majority also agreed that these technologies were clear and easy to use and that they had the skills to do this. There were a minority who did not agree, or were neutral about these points and this was further investigated by the interviews. The overall mean of the EE scale was 4.1 with a standard deviation of0.679, this indicates that teachers in Saudi secondary education generally believe it is easy to use e-learning technologies in their teaching practice. The results showed that EE was the fourth most significant factor in explaining the variances in Saudi secondary teachers' intention to use e-learning technologies with the standardised coefficient (B=0.182, p=0.001).

Many interviewees welcomed the chance to have training that would both make the tools easier to use and show them ways in which their teaching could be enhanced. The time needed for practice was an important aspect which affected teachers' perception of the amount of effort needed to use e-learning technologies. Also, that even if the tools were easy to use, it was not possible to use them in teaching if they were not available or there was a lack of technical support. Khechine *et al*'s finding highlight that EE was not a significant predictor of technology acceptance of a particular e-learning tool in their study because their target population (Canadian university students) were in a 'teaching and learning culture…impregnated with the technological trend' (2014, p.11), the students were already using technology and there was support provided. This is not the case for Saudi secondary teachers as the interview comments reveal and they are aware that with the right training and support, e-learning tools will become easier to use.

Both phases of the research answer the research question by indicating that Effort Expectancy is a significant factor in explaining variances in Saudi secondary teachers' intention to use e-learning technologies. The reason for this was more deeply explored in the interviews which showed that teachers felt e-learning technology would be easier for them to use if they had training and support and the time to practice.

7.3.5 Anxiety

A number of studies have identified that anxiety is an important factor in individuals' acceptance of technologies. Anxiety about using technologies also includes the individual's self-efficacy; that is their beliefs about their abilities to use the technology effectively as well as any fears about using technology which some studies have characterised as 'technophobia' (Buabeng-Andoh, 2012; Celik &Yesilyurt, 2012; Hennessy *et al*, 2010; Fathema *et al*., 2015 andAhmad *et al.,* 2012). If teachers are to successfully use e-learning technologies they need to be confident about using them and not hampered by anxieties about what might go wrong. Confident teachers are better equipped to be able to deal with situations where things go wrong (Gulbahar & Guven, 2008). The Anxiety factor was additional to the original constructs used by Venkatesh *et al* (2003) in the UTAUT model. The study thus addressed the question: **To what extent and why does Teachers' Anxiety about Technology explain variances in the behavioural intention to use e-learning technologies by Saudi secondary teachers?'**

The survey asked teachers no less than seven questions designed to cover a range of issues that teachers were considered to be worried about. Two questions were about performance anxiety i.e. the fear of making mistakes that could not be rectified and the fear of losing face in front of students if they struggled. This was considered important as some students could be more adept at using technology than the teacher; as young people have grown up in an era of digital technology, whereas older teachers would not.

Two questions related to fear of change and asked if teachers felt that e-learning technology was not compatible with their own teaching methods and if they preferred to teach using traditional methods. Teachers were also asked about lack of security, not having enough time to plan for and use e-learning and if they felt it did not improve teaching and learning. The overall mean of the AX scale was 2.7 with a standard deviation of 1.003; this indicates a medium level of anxiety about using e-learning technologies among teachers. Anxiety was shown to be the fifth significant factor in explaining the variances in Saudi secondary teachers' intention to use e-learning technologies with the standardised coefficient ($B=-0.113$, $p<0.05$); in that the higher the Anxiety, the lower the Behavioural Intention. There was some variation in how different aspects of anxiety were perceived by teachers. They appeared most concerned about lack of security and not having enough time to plan and prepare e-learning materials than making mistakes and losing face; and generally they felt e-learning technologies were compatible with their teaching methods, improved teaching and learning and so they preferred to use it.

The interviews revisited this factor and teachers' answers revealed several anxieties and that these can be extrinsic –such as poor facilitating conditions or intrinsic- not having sufficient skills. The top anxieties were all connected to poor facilitating conditions; this was followed by security issues and fear of losing data; teachers' own lack of skills came next and there were concerns about having lower skills than their students, and then having too little time. As with the survey, worries about students' reactions came further down the list of anxieties. However, it is clear that a combination of several of these worries means that teachers are concerned that using e-learning technology will negatively affect their classroom performance in some way if things go wrong, many lacking the confidence to deal with such situations effectively.

Both phases of the research answer the research question by indicating that Anxiety is a significant factor in explaining variances in Saudi secondary teachers' intention to use e-learning technologies. The reason for this was more deeply explored in the interviews which showed that teachers were fairly anxious about both intrinsic aspects of this factor (self-efficacy) and perhaps even more anxious about extrinsic factors such as poor facilitating conditions and lack of security as well as simply not having enough time to plan or prepare lessons using e-learning technologies. Mention was also made of the 'digital divide' among students making it difficult to use e-learning effectively as some students had no devices and also parents' negative views about e-learning.

7.3.6 Social Influence

Many studies into technology acceptance suggest that Social Influence is significant in explaining technology acceptance (Khechine *et al.*, 2014; Oye, 2012; Adegbite & Downe, 2005); others however (Escobar-Rodríguez *et al* and Pynoo *et al*, 2011) did not. Social Influence is one of the factors in the original UTAUT model (Venkatesh *et al*, 2003); and the survey and the interviews were thus both designed to answer the question: **To what extent and why does Social Influence explain the variances in the behavioural intention to use e-learning technologies by Saudi secondary school teachers?** The survey asked five questions about whether teachers thought their managers, students, and students' parents thought they should use e-learning technologies; whether colleagues had helped them to do so and whether staff in their school saw e-learning as important. Although the teachers were more likely to agree than disagree that others' attitudes towards e-learning technologies was positive (especially managers' attitudes), the results were inconclusive, especially when it came to parents' attitudes, which many teachers believed were negative. The overall mean of the SI scale was 3.6 with a standard deviation of 1.068. Although, Social Influence was not shown to be statistically significant in explaining variance in Saudi secondary teachers' Behavioural Intention to use e-learning technologies, there was a weak correlation.

These results were echoed by data from the interviews which showed that Social Influence was not perceived to be positively influencing intention to use e-learning technologies, as teachers largely saw managers as simply paying lip-service to e-learning and there were indications that it was seen as misunderstood and disapproved of by some parents. One of the most interesting aspects of this was that several teachers emphasised the importance of self-motivation in the absence of encouragement from others. Because of the lack of instructions on the policy for using e-learning and the lack of clarity of vision coming from the management; it is clear that many teachers are not given clear encouragement to use e-learning technology. Thus, it became apparent through the interviews that the use of technology in Saudi secondary education is often the result of personal efforts of the teacher and does not result from any formalised plan for training or support.

Studies conducted in schools have demonstrated that proper encouragement and support by school management and administration is a key factor in enabling teachers to make use of e-learning technologies (Kozma, 2008; Ismail, 2010 and Wong *et al* 2008); however, this seemed to be lacking in the experience of many teachers in the samples for both phases of this research. Furthermore, inadequate or non-existent facilitating conditions made it difficult or impossible for some teachers to effectively implement e-learning into their teaching despite any encouragement to do so.

7.3.7 Facilitating Conditions

Some issues related to this have been alluded to when discussing computer skills. This was one of three factors in the revised UTAUT model that specifically looked at Use Behaviour. Many studies have also identified that Facilitating Conditions influence the actual use of technology (Al Awadhi & Morris, 2008; Lee *et a*l., 2010; Tibenderana *et al*., 2010; Sumak *et al*., 2010 and Wang & Shih, 2009). Accordingly both phases of the research were designed to answer the question: **To what extent and why do Facilitating Conditions explain variances in the use of e-learning technologies by Saudi secondary teachers?**

The survey asked teachers three questions about facilitating conditions i.e. the extent to which classes were equipped with computers; they had the resources to use e-learning technologies and specific people were available for technical assistance. The overall mean of the FC scale was 2.1 with a standard deviation of 1.513; this indicates that the teachers' attitudes towards the current facilities that support their use of e-learning technologies are highly negative. Also, FC was the most significant factor to explain variances in Saudi secondary teachers' Use Behaviour of e-learning technologies with the standardised coefficient ($B=0.348$, $p<0.001$).Results showed that generally the teachers did not feel there was adequate equipment or support; and this factor was shown to be significant. These results also indicate that the infrastructure is not yet sufficiently developed to properly support e-learning in Saudi secondary schools.

This negative response was echoed in the interviews which further revealed that even when equipment was available it was poorly maintained, there was poor internet connection or they did not have the skills to use it. The Ministry of Education's Portal was barely used and there was a woeful lack of support available for many teachers. Several teachers circumvented these problems by providing their own resources and equipment. The 'digital divide' among students was also mentioned as being an important aspect of facilitating conditions. Teachers are unable to set homework using computers if some students do not have access to one.

7.3.8 Behavioural Intention

Apart from Performance Expectancy, Behavioural Intention was the only factor in the UTAUT that was identified as being consistently shown in the literature to significantly predict the acceptance and use of e-learning technologies. This was revealed to be the case in a meta-analysis of the UTAUT literature conducted by Williams *et al*, (2015). Behavioural Intention was tested in the survey and further explored in the interviews to determine whether and how it affected the actual use of e-learning technologies; and addressed the research question: **To what extent and why does Behavioural Intention explain variances in the use of e-learning technologies by Saudi secondary school teachers?** The survey contained three questions about teachers' intentions to use e-learning technologies. The first question simply asked if the intended to use the technologies but the second asked if they predicted that this would be the case. These questions were intended to make a distinction between what the teacher intended in theory and what this intention looked like in practice. The third question asked if they intended to attend any training on e-learning. The overall mean of the BI scale was 4.6 with a standard deviation of 0.6537; this indicates that the teachers' behavioural intention to use e-learning technologies and to acquire the training needed to do this effectively is very high. This factor was shown to be significant in explaining the variance in Saudi secondary teachers' use of e-learning technologies with the standardised coefficient (B=0.162, p=0.001).

Phase Two of the research reflected the results of Phase One in that the majority of teachers intended to use e-learning as part of their teaching and to do the training required. The four teachers who said they did not intend to use digital educational technology gave answers that revealed that their reasons were linked to their late career stage; their resistance to change; the lack of support or training at their school and low performance expectancy. Moreover, the provisos given in the answers of those who said they fully intended to use e-learning technologies revealed that lack of support and training was an issue as was poor facilitating conditions. The very high response rate (85%) to the survey and the willingness of subjects to be interviewed (100 offered themselves as participants) may reflect teachers' interest in using e-learning technologies.

7.3.9 Teacher Educational Experience

Many authors have suggested that Teacher Educational Experience influences teachers' attitudes about e-learning and a lack of such experience (along with factors such as inadequate facilitating conditions) can account for a reluctance to accept and use e-learning technologies (Donnelly & McSweeney, 2008; Jimoyiannis & Komis, 2008; Alexander, 2001; Wong *et al,* 2012). The survey thus addressed the research question: **To what extent and why does Teacher Educational Experience explain variances in the use of e-learning technologies by Saudi secondary school teachers?** And teachers were asked four questions about their experience of e-learning technologies in their own education at secondary school, college or university and pre-service teacher training. Results revealed that only a small number of teachers had used or seen their teachers using e-learning technologies at any educational level. This shows us the weak application of e-learning at all levels of education in Saudi schools, in addition to the inadequacy of university qualifications to prepare teachers technically. The overall mean of the TEE scale was 2.2 with a standard deviation of 1.345; this indicates a low level of teachers' experience of using e-learning technologies in their own education. This factor was shown to be significant in explaining the variance in teachers' Use Behaviour with the standardised coefficient ($B=0.123$, $p<0.05$).

The interview results were similar and shed some light on the underlying reasons – poor facilitating conditions and an educational policy that did not prioritise the implementation of e-learning during the teachers' own experience of education. However, there was an indication that this may be changing, for example, when a teacher reported using e-learning during teacher training practice to gain a good grade when being observed.

7.4 Revised UTAUT model

The answer to Research Question 3 (How can the Unified Theory of Acceptance and Use of Technology (UTAUT) model be used to better understand what Saudi secondary school teachers perceive they need to effectively adopt e-learning technologies? was addressed by using a proposed revised model of the UTAUT, which was felt to reflect the Saudi secondary context. The model was developed from the original UTAUT (see fig 7.2), and is shown with the significant factors that explain the variance in BI and UB; the standardised coefficients are shown for each (see fig.7.3). The factors are positioned in rank order of the significance of the standardised coefficients.

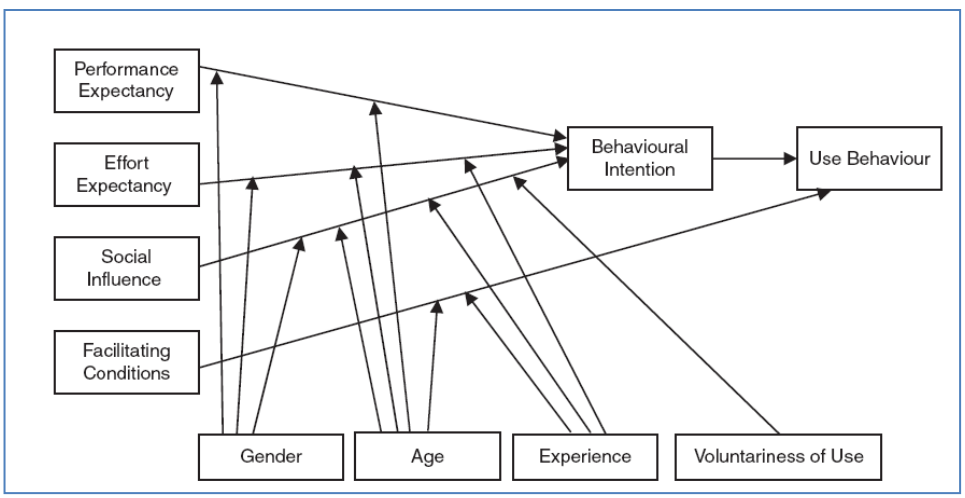
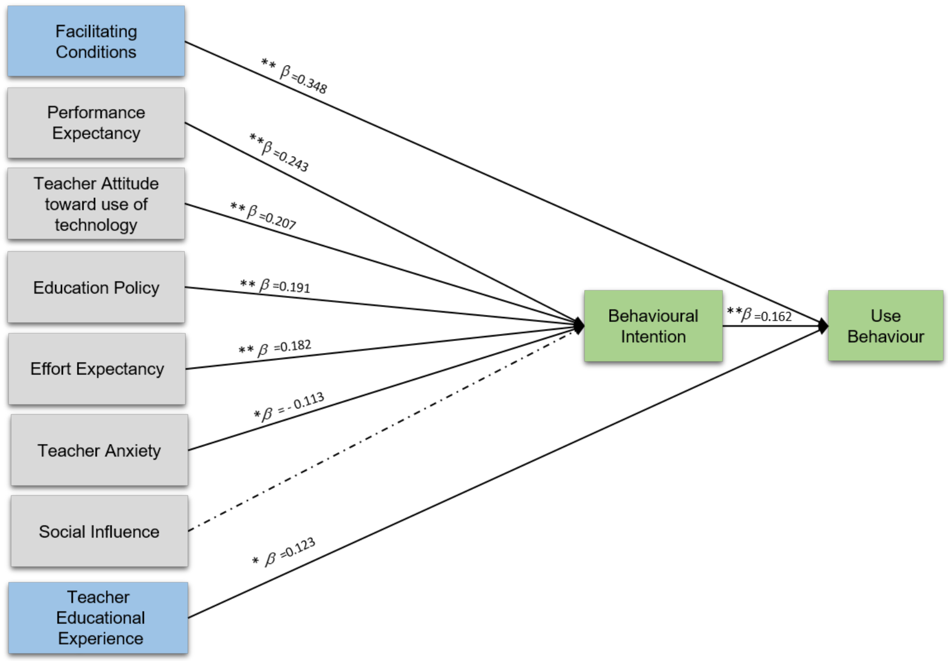


Figure 7.2 Original UTAUT model



* p< 0.05 ; ** p < 0.001

Figure 7. 3 Schematic diagram showing study findings using Revised UTAUT Model

The study has confirmed that the constructs used in the original UTAUT model are useful in explaining intention to use e-learning technologies and their actual use, especially Facilitating Conditions, which was revealed to be a powerful factor in explaining Use Behaviour in the context of a developing country which still has a way to go in providing the infrastructure and resources which most secondary education in the West enjoys. Similarly, Performance Expectancy had a high level of influence on Behavioural Intention. However, more constructs were needed to adequately explain BI and UB within the Saudi secondary context. Notably, Teacher Educational Experience was revealed as very important in determining UB and should arguably be included in models that look at teachers' technology acceptance in the context of developing countries as there may well be differences in the educational experiences of teachers depending on when and where they were educated. Also this provides an additional construct with which to explain UB, whereas the original model only had FC and BI. In terms of explaining BI, the study shows that the additional constructs were able to shed further light on teachers' intentions than the original model had and that the cultural context (which shapes teachers' attitudes) as well as teachers' perceptions of education policy is shown to be especially important.

However, both phases of the study revealed that there were further influences on Saudi secondary teachers' acceptance and use of e-learning technologies that merited consideration; notably, age, gender, school environment and computer skills. The implications of this are explored in Chapter 8.

7.5 Relationship between Constructs in the revised UTAUT Model

Further analysis of correlations between the factors in the revised UTAUT model yielded some interesting results. Each of the constructs was shown to be related to the others in terms of the statistical correlations yielded by Phase One of this study:

Some of these relationships are discussed below as they highlight areas that merit further study in gaining a deeper understand of intention to use and actual use of e-learning technologies in Saudi secondary education.

The picture that emerges from both phases of the study is that Saudi secondary school teachers have a positive attitude towards the use of e-learning technologies despite the obstacles that hinder their effective use; and their acceptance and use of e-learning technologies has been shown to be affected by all the key factors in the revised UTAUT model. However, the way and the extent to which each factor has influence are not always straightforward.

For instance, there is a relationship between Social Influence and Behavioural Intention to use, but this factor does not significantly predict variance. However, when we consider SI separately, we find that there is an impact on other factors and these effects require further study. For example, the school community has been shown to have a role in clarifying the expected benefits of using e-learning techniques, either through the guidance of the school principal or teachers' colleagues, as well as providing a clear picture of the use of these technologies, which helps to alleviate anxiety about use. Furthermore, teachers in urban areas were more positively influenced by their students' parents when it came to using digital technologies than those in rural or mountainous areas. Parents in urban areas were more likely to value and communicate with digital technologies and expect their children to use them; and the digital divide was found to be more pronounced in rural and mountainous areas, where teachers reported that their students couldn't complete homework that relied on them having a computer or access to the internet.

Performance Expectancy was shown to be very significant in explaining variance in Behavioural Intention to use; however, the expected benefit of the use of e-learning technologies in the process of teaching and learning, is affected by the level of equipment and infrastructure in schools, which impacts on the teacher's use of technologies, and helps to reduce the effort in the using. The expected benefit of using digital learning tools is also linked to the teacher's previous educational experience.

When looking at the expected effort in using e-learning techniques, it is clear from the results of this study and the correlations found, that there is more than one factor related to this, notably Facilitating Conditions in terms of the availability of equipment, support and training .Teacher Education Experience has a bearing on computer skills and an understanding of how to use digital tools in a pedagogical context which in turn affects how easy teachers will find it to use e-learning technologies. Also, if teachers perceive these technologies to be easy to use, this will enhance their Attitudes and their Performance Expectancy; conversely, if they are perceived to be difficult this will raise Anxiety.

The most influential factor on the actual use of e-learning technologies in Saudi secondary schools is Facilitating Conditions; and this turned out statistically to be related to more than one factor in this study. This demonstrates that the basic step for the application of e-learning technologies in schools is the provision of equipment and support. However, it has become clear that equipping schools with e-learning technologies alone will not be an effective factor for use unless there is also training for teachers to use these technologies, in addition to effective maintenance of the equipment and work on updating the systems. Accordingly, this factor has turned out to be linked to the school environment for example: this study shows that government school buildings are better-equipped than rented buildings, and this is considered to be the case in many developing countries. In addition, schools in urban areas are better-equipped than those in rural and mountainous areas.

Teacher Educational Experience and professional development has been shown to play a role in the use of e-learning technologies. Learning with e-learning technologies and being trained in their use in the teaching and learning process has a positive impact on later use of these technologies, in addition to knowledge about their benefits as well as being perceived as easy to use and having the ability to deal with any small technical issues. However, technologically positive Teacher Educational Experience may well mean that teachers intend to use e-learning technologies but, if no functioning equipment is available, their skills may atrophy over time. Furthermore, it was found that the older teachers were very poorly trained both in their educational experience and professional training, and therefore did not have the necessary skills to use e-learning technology in their day-to-day work.

Anxiety was shown in this study to influence most factors; it negatively affects intention to use technologies, it does this by negatively influencing PE, EE and ATT. Clearly, if teachers are anxious about using technology any benefits they perceive to have, will be outweighed by anxieties about using it. Also, equipment will not be perceived as easy-to-use if teachers are anxious about using it. Even if teachers have positive attitudes about e-learning they will not feel positive if the technology causes them anxiety. Teachers who perceived Education Policy to be unclear also demonstrated a higher degree of Anxiety than teachers who were more positive about EP.

Several factors are related to local education policy for using e-learning technologies within the organization. The current study revealed that despite Ministry of Education encouragement to use e-learning, there was a lack of clear vision among teachers about the use of e-learning technologies, in addition to the lack of necessary equipment for implementation. A lack of implementation of policy has resulted in the unevenness of equipment between schools, such that when teachers move from one school to another, they are potentially unable to use e-learning as the second school does not provide the necessary resources. This situation necessitates a return to the use of traditional methods of teaching, or teachers must provide their own equipment if they want to use e-learning.

The converse can also be true, if teachers from schools with no e-learning facilities find themselves in schools where this exists. In addition, Education Policy does not allow allocated time for teachers with heavy workloads to train in the skills of using e-learning technologies and what training there is, is not properly regulated.

7.6 CONCLUSION

Demographic and environmental factors as well as the digital literacy of the teachers have been shown to influence the current use of e-learning technologies in Saudi secondary schools in the Jazan area. It is to be noted, however, that such influences are fluid and that continued observation of the Saudi secondary context may well show changes over the next few decades.

From general findings from both phases of the study it is apparent that the most influential factor affecting intention to use digital educational technologies was Performance Expectancy. The benefits of incorporating e-learning technologies into teaching was generally appreciated by the participants and attitudes were positive, although teachers felt that more could be done by the Ministry of Education in terms of providing appropriate training and allowing teachers to have the time to do it, as well as promoting awareness of a clear policy on e-learning. If this was achieved, teachers would feel that it was easier to incorporate e-learning technologies into their practice and feel less anxious about doing so.

In view of the actual use of e-learning technologies the available facilities are the most influential factors, and these include everything necessary for teachers to be able to effectively incorporate e-learning technologies into their teaching: infrastructure, properly maintained equipment, accessible resources and technical support. Schools in Saudi urban areas are better equipped and therefore arguably teachers there are the most likely to use technology. However, many of them believe that they lack the basic skills for dealing with technical problems in the process of teaching and learning, as well as needing more courses to do this and learning how e-learning technologies can enhance their teaching. This is especially important for teachers who have not themselves had any experience of e-learning in their own education and training.

In the next chapter, the researcher outlines the recommendations that address these issues, both in terms of suggestions for further study and recommendations for strategies that could be useful in the effective implementation of e-learning in Saudi secondary education.

Chapter 8 CONTRIBUTION, IMPLICATIONS, RECOMMENDATIONS AND CONCLUSIONS

8.1 Introduction

This chapter will explore the implications of the research findings both in terms of the limitations of the study and what it implies for an understanding of the technology acceptance and use by Saudi secondary teachers. Recommendations are also made as to the direction that further investigations of aspects of the subject might take both in the Saudi context and in similar developing countries. Finally there are recommendations as to strategies that could be used by the Saudi Ministry of Education for the successful implementation of e-learning in Saudi secondary schools.

8.2 Contribution of the Study

The study has contributed to theory-building in the field of technology acceptance by proposing and empirically testing a model for explaining adoption of e-learning technologies. In this way it is contributing to academic knowledge in the field of technology acceptance in an educational context. In practical terms, it has also provided a better understanding of the issues that can promote or impede the successful implementation of e-learning technologies; and which may assist education policy-makers and school managers to find strategies to achieve this. This applies in particular to the context of developing countries where the situation in secondary education has parallels to that of Saudi Arabia and that of the area of Jazan. Specifically then, the findings from this study could be used to inform education policy initiatives undertaken by the Saudi Ministry of Education. The individual contributions are detailed below and are in the order in which they reflect the research questions of the thesis:

Contribution 1: This study has given a clearer picture of the current use of e-learning in the Saudi secondary context and highlighted the role played by demographic variables, school environment and computer skills. It is vital to have a clear understanding of what is actually happening in schools in order for the Ministry to successfully implement e-learning and sheds light on the limitations of the previous projects to introduce this into Saudi secondary education.

Contribution 2: This research has developed and tested a theoretical model of technology acceptance that has provided some understanding of the major factors that explain variance in behavioural intention to use and actual use of e-learning technologies in Saudi secondary education. The model could usefully be applied in similar contexts, such as other Arabic countries; and it can be helpful to decision-makers, such as the Ministry of Education in developing strategies to successfully implement e-learning.

Contribution 3: The original UTAUT model has been revised to suit an educational context and has demonstrated that factors such as Education Policy as well as teachers' Attitudes and Anxiety all affect teachers' behavioural intention to use e-learning technologies and that Teacher Educational Experience affects actual use. This is useful for other researchers who are interested in developing conceptual frameworks for exploring e-learning technology acceptance and use within their own educational contexts.

Contribution 4: Given the discovery of the vital role played by Facilitating Conditions by this study and its effect on Use Behaviour, these findings are useful in the field of Computer Science and Information Services in relation to what kind and quality of infrastructure and technical support is needed to successfully implement e-learning. This is especially the case in developing countries as well as countries with similar geographical features to that of Jazan which generate similar infrastructural problems. More particularly, how problems with infrastructure and technical support can be barriers to the successful implementation of such systems.

Contribution 5: To date there have not been any studies of technology acceptance in Saudi secondary education. Given the large survey sample and the details provided by 30 interviews, this research has provided a comprehensive picture of teachers' behavioural intention to use and actual use of e-learning technologies in Saudi Arabia particularly in the Jazan area. The geographical features of this area, i.e. the mix of urban, rural and mountainous areas as well as the closeness to the border with Yemen during a time of war, which necessitated the relocation of schools, meant that the study shed light on how such variables affected the implementation of e-learning in secondary schools. Researchers in the field in developing countries with similar problems may find these discoveries useful.

Contribution 6: The addition of Teacher Education Experience as a factor in the conceptual model has demonstrated the importance of this in explaining possible barriers to the acceptance and use of e-learning technologies. Researchers in the field of education can make use of these findings when considering e-learning technologies' adoption and use in the context of developing countries where teachers may not have been educated or trained with any digital tools. Teacher Training Colleges in areas where many pre-service teachers may have had little in the way of experiencing education with e-learning technologies may need to consider this as a factor when designing courses to meet new teachers' needs.

8.3 Limitations of the Study

The findings of this study need to be considered in the light of its limitations. Firstly, there are the constraints of time and expense, which meant that the samples used in both phases of the research were limited to the Jazan district of Saudi Arabia. Although Saudi education policy is nationwide, the study revealed that there were features of Jazan which had very specific effects on the acceptance and use of digital education technology, such as relocation of schools due to the war with Yemen and the mountainous areas, which were characterised by poor internet connection. Although this means that caution must be exercised before applying the findings to the whole of Saudi Arabia, or indeed to other developing countries, it shows how limiting a sample to one geographical area can both lend a particular slant to the findings and reveal interesting regional aspects that can bring further insights.

The research instruments themselves are limited by ethical considerations about exactly how much time it is reasonable to ask a participant to give up, as well as how long that participant can attend to the task of answering questions before their concentration is affected. There is also the issue of how much time it takes a lone researcher to process a huge amount of data. Consequently, limits were put on how many questions were asked in the survey and how much time was allocated for each interview. Although the survey asked several questions related to every construct in the revised UTAUT model, these were finite and only the most important aspects could be explored. Interviewing also had to be conducted with an eye on the clock, and the researcher needed to ensure that all the major points were covered. Because of this, it was not possible to fully pursue everything an interviewee said. For example, when being questioned about anxieties, an interviewee mentioned power outages. It would have been interesting to pursue this point further and ascertain the extent of power outages in the teacher's particular experience, how they affected teaching with e-learning (total chaos, or just slipping into plan B) and how this was connected to other anxieties such as the fear of losing control of the class, or losing vital data and so on. Instead, time constraints meant that the researcher simply noted the answer and moved on.

Time and cost constraints also meant that the study was a 'snapshot' of the situation in Saudi secondary education. Whilst all that can be expected of such a study is that it captures as accurate a picture as possible of the present situation, it must be remembered that this 'picture' is still an artificial one as, in reality time does not stand still and the human world and all that is in it changes continuously. Other studies (Pynoo *et al*., 2011 and Bellaaj *et al*, 2015) have already noted that the influence of the core constructs Performance Expectancy and Effort Expectancy change over time. Indeed many of the phenomena discovered by this study, for example that older teachers are less likely to intend to accept and use e-learning technologies, are almost certainly not permanent and, should this study be replicated as far as possible in five or ten years time, this phenomenon may well have changed.

Although the UTAUT model was the basis for the revised model chosen in this study, it is possible that other constructs other than the original ones and those chosen because of their appropriateness to the Saudi secondary context might have proved relevant. For instance, it might have been interesting to create a separate construct around how teachers perceived their school managers' priorities, attitudes and actions around e-learning and use of technologies to see the extent to which this influenced technology acceptance, instead of subsuming it under the constructs of 'Social Influence.' and 'Education Policy'. The questions posed by the researcher, were based on the constructs selected and thus to some extent defined the answers obtained. The process of research into technology acceptance can only continue to refine models in the light of findings and, given the ever-changing nature of the phenomenon, such models will continue to be refined by further exploration.

The purpose of this study was to explore technology acceptance in general and it did not look further into acceptance and use of specific e-learning technologies, beyond building up a picture of the factors that influence teachers' general use of a range of available tools, in order to identify what would assist them to make more effective use of these in future. However, a general picture of what technologies were in use in Saudi secondary education was obtained. For example, the Saudi Ministry of Education provides a Portal with materials to every school and the study revealed that this was certainly underused, and the interviews shed light on the reasons for this.

The findings of this study relied on self-reporting by the teachers in both phases of the research. Although care was taken to phrase questions without leading the participants, such data always needs to be approached with caution (Northrup, 1996). Given that inaccuracies and lies are linked to how threatening the question is (*ibid*), it is possible that teachers' self-reported assessments of their skills and performance might be exaggerated or underplayed. Self-reporting happened in both phases of the study, for example when teachers were asked to rate their own computer skills. In the survey (Question 22) teachers were given the choices of 'non-existent', 'beginner', 'intermediate', 'advanced' and 'expert'. However, no indication was made as to how this rating might be made and there may well have been overlap between the categories in terms of teachers' actual skills. In the interviews, some details could be acquired about the reasons why teachers gave themselves a particular rating, as the question about skills was phrased as 'How would you rate your computer skills?; this question was followed by 'What makes you think that?', and 'How did you learn these skills?' This allowed the researcher some insight into teachers' self-reporting of computer skills but was by no means an objective test.

Another limitation of the study was that, because of cultural constraints, the researcher was notable to conduct face-to-face interviews with female secondary school teachers and conducted these by phone. It was far easier to read the feelings of the male interviewees and to notice if, for example, they were uncertain about what to say and needed clarification. The interviews ended with asking teachers their views on the factors in the revised UTAUT; and it would have been useful to sit and discuss the model with a visual representation of it. In view of the fact that the interviews with female teachers were conducted by phone and so it would not have been possible to do this with them, the researcher decided not to use this strategy with the male teachers.

8.4 Implications

The revised Unified Theory of Acceptance and Use of Technology (UTAUT) model has been shown to be useful in gaining a better understanding of what Saudi secondary school teachers perceive they need to effectively adopt e-learning technologies. However, the findings suggest that there are other factors which need consideration in explaining this phenomenon. In the original UTAUT (Venkatesh *et al,* 2003), Age and Gender appear as moderating variables, however this study's findings indicated a direct influence of these demographic variables on BI and UB. However, as the implementation of e-learning technologies in Saudi secondary schools is still relatively new, this study focused on the main factors which affect acceptance and use. Arguably, the effects of age and gender are very fluid, but merit further exploration.

However, other factors like school environment are not in the original UTAUT because this was not designed just for an educational context. This thesis has demonstrated how in a context like Saudi secondary education this factor is important in terms of aspects such as school location and type of school building. Like demographic factors, this variable is fluid and requires a deeper investigation in order to ascertain the full effect of its influence.

General models of technology acceptance like the UTAUT and the TAM are simply not precise enough to be applied directly to an educational context. This study has shown how valuable constructs such as Education Policy and Teachers' Education Experience are in explaining technology acceptance in an educational context. Furthermore, that the technology acceptance model needs to be further refined to take into account the location of that educational context. As Venkatesh & Zhang (2010) pointed out, the contexts of developing countries are different to those of developed ones and any model of technology acceptance needs to take this into account. For example, it is important to consider the stage of development that e-learning is at in terms of the infrastructure, tools and resources available, whether teachers have experienced e-learning in their own education and cultural attitudes to using technologies such as the Internet. It is hoped that the theoretical framework developed by this study will serve to further understanding of technology acceptance in educational context in developing countries with similarities to the KSA.

Furthermore, this study has demonstrated how constructs in technology acceptance models such as the UTAUT can themselves be unpacked into different aspects. For example, when investigating how Anxiety affected teachers' intention to use e-learning technology, different aspects of Anxiety had to be picked out and tested (performance anxiety, security anxiety etc.). The context in which technology acceptance models are used will in part determine which of these aspects the researcher focuses on when actually questioning participants. In exploring teacher's anxieties in the Saudi secondary context, the researcher was able to draw on valuable insights gained from working in the sector as well as what teachers were saying in the preliminary informal interviews to identify the aspects that were most likely to be of concern.

8.5 Further Research

As suggested above, further investigation needs to be made of the influence of demographic and school environment variables on e-learning technology acceptance and use in the context of Saudi secondary education.

8.5.1 Age

The findings suggest that, at present, age is a still a factor that influences Use Behaviour of e-learning technologies in Saudi secondary schools. This is not so much due to age itself, but rather how age affects Teacher Educational Experience (TEE), Attitudes (ATT) and Effort Expectancy (EE). Older teachers did not grow up in a digital age and their own educational experience was traditional; they had no role models to show them how e-learning technologies could be used in teaching. Furthermore, older teachers are coming towards the end of their careers and do not have so much motivation to learn new skills and change the way they teach. Because of this, they are arguably more likely to perceive that incorporating e-learning technologies into their teaching practice requires too much effort.

The relationship between age and TEE, ATT and EE in Saudi secondary teachers needs further exploration. Also, it would be interesting to see if these relationships change over time as Saudi Arabia moves forward into a digital age and if e-learning becomes more promoted and established in secondary schools.

8.5.2 Gender

The findings suggest that gender is a factor that influences Use Behaviour in Saudi secondary teachers. This is not due to the differences in gender so much as the cultural differences that exist in Saudi Arabia which suggests that female teachers and their colleagues are always inside the school and thus may be more available as a source of information about using e-learning technologies. It would be interesting to investigate the impact of gender on acceptance of e-learning technologies further; and in particular to see if there are differences in the way in which male and female teachers interact with colleagues in terms of providing informal networks of support for using e-learning technologies. Given the current cultural constraints, a female researcher would need to go into all-female schools in Saudi Arabia to observe this.

8.5.3 School Environment

The research found that school environment has a bearing on Use Behaviour which was very specific to the Saudi Context. Education Policy with regards to renting school buildings and re-locating staff and students to other schools for reasons of war or maintenance affected the Facilitating Conditions available to teachers. Furthermore, school location (urban, rural or mountainous) had a bearing on the Facilitating Conditions available both in terms of internet connection and equipment available. More research is required to further understand whether this effect is likely to be temporary or more long-term.

8.5.4 Computer Skills

Although teachers' own rating of computer skills shows an expected effect on Behavioural Intention and Use Behaviour, the literature revealed that it is the application of those skills to e-learning that is crucial in terms of whether e-learning technologies will be successfully accepted and used. Therefore, as has been discussed before, it is teachers' overall digital literacy which is important, rather than just individual mechanical skills such as being able to type on a computer keyboard. Further investigation of how teachers make use (or not) of their computer skills would shed more light on the extent to which and how computer skills affect Use Behaviour, and what aspects of teachers' digital literacy are most influential in impacting technology acceptance and adoption.

When skills are self-reported, as in this study, there may well be variance in different teachers' assessment of their skills. In order to more precisely measure the effect of specific computer skills on technology acceptance, skills would need to be assessed by more objective measures to generate a more detailed and accurate picture of teachers' digital literacy.

8.5.5 How Factors relate to each other

The nature and extent of the influence of the different factors in the revised UTAUT model would also be interesting to further explore. The findings of this study revealed interesting correlations between many of the factors (see section 7.5, Chapter 7) and studies to understand this further would shed further light on the acceptance and use of e-learning technologies by Saudi secondary teachers.

8.5.6 Implementation of Saudi Education Policy on e-Learning

The study has revealed that this is an umbrella term which covers a number of different features such as policies about training, allocating time for training, providing digital equipment and resources, maintaining that equipment, providing technical support and providing a sound infrastructure for e-learning- in terms of internet connection, for example as well as systems of monitoring how policy is implemented.

What may need further exploration is how such policies are actually implemented on the ground and how this process influences teachers' acceptance and use of the relevant technologies. The interviews indicated that some teachers perceived that their school principals paid 'lip-service' to Ministry of Education policy on e-learning and more investigation of how local school management affects the acceptance and use of e-learning technologies

8.6 Recommendations for E-learning strategies

The government of Saudi Arabia places a huge importance on education and has already invested much into establishing e-learning. The following recommendations are based on the results of this research and suggest strategies that might improve e-learning technology acceptance and use in Saudi secondary schools.

- Best Practice Peer Observations and Workshops
- Provision of more High-Quality e-Learning Resources with Guidance
- Improvements to Facilitating Conditions
- Pre-Service Training for Digital Literacy
- The Role of Parents
- Clear Education Policy on e-Learning in Secondary Schools

These recommendations are linked to the factors which the study has shown to be significant in technology acceptance by Saudi secondary schoolteachers. The importance of each recommendation will depend on what issues are being focused on by the policy makers and educationalists.

8.6.1 Best Practice Peer Observations and Workshops

The study reveals that one of the best resources available for the successful implementation of e-learning is the secondary teachers themselves. Many participants in this study showed resourcefulness in circumventing inadequacies in facilitating conditions and there was evidence of how female teachers helped each other to use equipment and resources with good results. The study showed that having positive attitudes to e-learning technologies and believing them to be relatively easy to use significantly impacted on behavioural intention to use. Similarly, high levels of anxiety about using technology impacted negatively on intention to use.

One possible solution to remedying this is to institute a system of peer observation. Teachers who struggle to use e-learning technologies need to be given the time to attend a peer observation with another teacher who is adept at using e-learning technologies. This could be done with minimal disruption if the classes were perhaps put together and team-taught. The teacher would need to give feedback about whether the experience was useful, whether they intended to incorporate e-learning as a result and whether they needed more peer observation, possibly with them using the digital tools.

A further development of this strategy might be best practice workshops. Each education region in Saudi Arabia could identify best practice in e-learning and organise a workshop for subject teachers. The attendees could also participate by sharing their ideas and practice with e-learning. Such workshops would need monitoring by the managers and evaluating by the attendees and an effective system for doing this would need to be in place. Being able to see other colleagues who teach the same subjects using e-learning in a relevant and exciting ways could raise teachers' performance expectancy of e-learning technologies.

Batchelor *et al* (2012) suggest that it is essential that innovative teachers are given a voice in order to understand best practice in using digital learning technologies. The use of these technologies can transform pedagogical practices profoundly such that knowledge can be acquired in ways that were not possible before. Digital tools and resources can be used not just to impart information, but in ways that teachers can facilitate students to interact with the technologies and learn for themselves. Teachers can also be made more aware of the range of digital tools and resources available and select those best suited to their competencies (and those of their students), their school's facilitating conditions, the time available for integrating the technologies into their teaching and any cultural issues.

8.6.2 Provision of more High-Quality e-Learning Resources and Guidance

One of the more notable findings of the study was that many teachers had not heard of the iEN Portal, let alone used it. There were many criticisms of the Portal not least that internet connection or poor equipment sometimes made it difficult to use. Teachers in areas (such as the mountainous region of Jazan) need a system which circumvents problems with internet access. It might be possible for each school to have an Intranet system onto which materials relevant to the teachers who want to use it could be downloaded. As the materials are downloaded onto the system, reliance on the internet is avoided. The data centre would need to be regularly updated and this could be done by an internal emailing system (which did not rely on Internet connection) whereby teachers could request downloads of newly available materials and could be alerted as to the existence of such materials by the technician in charge of the Learning Resource Centre. This study revealed that currently in Saudi secondary education, all digital resources are generally located in the school's LRC and needs to be booked in advance. Having an intranet system as described above would solve this problem, if the required equipment was located in classrooms. It is essential that resources provided should be of high quality and accompanied by guidance notes as to how the material can usefully be integrated into lessons.

8.6.3 Improvements to Facilitating Conditions

The study highlighted the crucial importance of this factor in impacting on the use of e-learning technologies. One of the main areas of difficulties was the inadequacy of technical support and this meant that teachers were either unwilling to make use of digital learning tools that could break down, that they viewed as insecure and could lead to loss of data or were unable to do so as equipment was poorly maintained. In view of this, it is essential that each school should have at least one technician who can deal with these problems. Ideally, each classroom would be furnished with an internal phone from which the teacher could call the technician in the case of technical difficulty. Admittedly, certain problems might be outside the scope of the school technician; for example if a piece of equipment is irretrievably broken; or the technician may be absent and the problem urgent. In such situations, it would be useful for there to be a hotline that could be accessed and advice given. When this was not sufficient to solve the problem, technical support could be sought from a dedicated regional team. Such teams could also be responsible for auditing technical infrastructure and recommending where improvements needed to be made. On top of this, companies who provide digital equipment, such as Smart boards, should have to sign warranties for a minimum of three years and provide technical support teams for each region they supply.

8.6.4 Pre-Service Training for digital Literacy

Teachers need to be trained to use e-learning technologies by having these used as part of their own learning. This is excellent training as it demonstrates to teachers what it is like to be taught in this way and gives them a clearer idea of what such technologies are capable of. In addition to this, they need to learn how to successfully integrate such technologies into their own teaching, as this study has emphasised that having computer skills alone may not be sufficient to allow successful use of e-learning.

8.6.5 The Role of Parents

Parents need to be informed about the advantages of e-learning technology so that they are less likely to prevent the use of computers by their children; or if they do not have this equipment at home, to be encouraged to make it a priority purchase for their children. Parents could be invited to a hands-on workshop to use the materials available for their children's education where they would be able to express concerns and have their questions answered. Parents could be shown how to help their children use digital tools at home for educational purposes.

8.6.6 Clear Education Policy on e-Learning in Secondary Schools

Schools need to have a clearly written policy on the use of e-learning which is given to all teachers. The policy needs to include sections about in-service training in the use of e-learning technologies and resources, the proper evaluation of this training so that it can be updated and improved and the monitoring of teachers' progress. There also needs to be clear rules about monitoring equipment and reporting any malfunctions. This school policy would form part of the Ministry of Education's clear vision for e-learning implementation in Saudi secondary schools.

8.7 Conclusion

This study has established that, in spite of considerable efforts on the part of the Saudi Ministry of Education to implement e-learning in secondary schools, problems persist in the acceptance and use of e-learning technologies. These barriers mean that many secondary school students are not benefitting from having access to digital resources and means of learning, including the facility to access material from home if required; and that teachers are not successfully integrating e-learning into their pedagogy.

Furthermore, communication between teachers and students is restricted to non-digital means.

Although some (mainly older) teachers were shown to be resistant to using e-learning technologies, Saudi secondary school teachers in general had positive attitudes towards e-learning and expected that it would contribute positively to their students' learning and to their teaching. However, a number of obstacles meant that this positive attitude was not being translated into practical action.

The conceptual framework based on the UTAUT model and revised for the Saudi secondary context demonstrated that a lack of clarity and proper implementation of education policies regarding e-learning, and anxieties about not having sufficient skills or support to make use of e-learning technologies were negatively affecting teachers' intentions to accept and use e-learning in their practice. Furthermore, that inadequate tools, technical support and resources along with not having had adequate educational experience and training in the use of e-learning technologies were impediments to their actual use in Saudi secondary teaching.

Although the revised model shed light on technology acceptance in the specific context of Saudi secondary education, the research showed that more investigation is required of both the influence of demographic and environmental factors on use and on the effect that the factors have on each other in explaining teachers' intentions to accept e-learning technologies and to use them.

The study has highlighted the importance of listening to teachers when it comes to implementing policies, as simply taking decisions to install systems such as e-learning is not effective if this is done without taking into account what teachers need in order to be able to make use of them. Furthermore, any implementation of e-learning projects needs a rigorous monitoring and evaluation so that problems can be identified and solutions found. Doing this will ultimately save wasting precious resources.

It is hoped that the recommendations for strategies for a more successful integration of e-learning into Saudi secondary education will provide useful directions for policy-makers at both national and regional levels in countries faced with similar issues in establishing e-learning that will be welcomed by teachers and useful to students.

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APPENDICES

Appendix 4A: Types of Question Used in the Questionnaire

The questionnaire was designed in three sections and preceded by a cover letter. Section A (Questions 1–15) was designed to establish a profile of the teachers who formed the sample in Phase One. The first question asked teachers to say what 'Education State' they were in, and this acted as a filter question so that teachers outside Jazan could be excluded from the survey (Oppenheim, 1992). Teachers could easily have sent the link to other teachers falling outside the area of interest. Questions 2–15 were all closed-ended questions, making them quick and easy for participants to complete and allowing the ensuing data to be processed and compared with ease (Oppenheim, 1992). Question 5 (on level of school) could also act as a filter question, as some teachers may not have been teaching at the secondary level. Question 7, which asked about the subject currently taught, added the option 'Other' and provided a space for the teacher to specify the information. Participants who answered 'Yes' to Question 8, saying that they do work other than teaching as part of their job, were asked the open question 'Please specify what you do', which required them to write an answer. Open-ended questions, like Questions7 and 8 can be difficult to analyse and require the researcher to draw up a system of categories or coding frame (Oppenheim, 1992). In such a case, the researcher will determine what types of task are identified by participants and create an appropriate coding frame if necessary. The variables asked about in Section A of the survey are attribute variables, specifying data about the characteristics of the secondary teachers. These are important, as they allow the researcher to explore how opinions and behaviours vary between different groups of participants, such as male and female teachers, as well as checking that the sample is representative of the target population (Saunders*et al.*, 2009).

Section B (Questions 16–26) was designed to elicit data about teachers' use of technology; the questions were related to the elements of Use Behaviour and Facilitating Conditions in the UTAUT model. The questions were all closed-ended, multiple-choice questions, like in Section A, although Questions 24, 25 and 26 about the technology equipment available in school, tools used in teaching and programmes and applications used included the option 'Other'. Teachers ticking this option were invited to specify. It was considered useful to add this because it is always possible that the researcher's list is not exhaustive (Oppenheim, 1992). Questions 21, 23, 25 and 26 in this section asked about behavioural variables; Question 23in particular was designed to test the teachers' skills in designing their own material using e-learning technology.

Question 22 was an opinion variable, as teachers were asked to rate their computer skills as follows:

□ Non-existent □ Beginner level □ Intermediate level □ Advanced level □ Expert

As teachers may have different interpretations on what constitutes each level of computer skill, it is useful to match their rating with their behaviour. There was always the possibility of further exploring how their computer skills are self-rated by teachers in the Phase Two interviews, allowing any mismatch between rating of skills and use of technology to be investigated.

Section C questions (Questions27–68) were about teachers' acceptance and use of digital educational technology and directly addressed the various factors in the expanded UTAUT model that were considered to be relevant to the context. As a Likert scale with a series of statements with which the participant could agree or disagree was used, it was considered best to use statements that had already been employed in published work. Such statements were pertinent to the study, had already been empirically tested and validated and were designed to be used with participants in a reasonably similar population to the Saudi secondary teachers. All statements used in their original form are credited to the authors (Saunders*et al.*, 2009).Questions that were developed by the researcher were created as a result of the preliminary informal interviews conducted with teachers. Because these questions were designed to test factors that were added to the original UTAUT model, the literature did not yield ready-made questions that could be used in the survey.

Section C ends with the request 'Please add any comments that would encourage your use of e-learning technologies in the classroom; and/or anything you feel discourages you from using e-learning technologies'. Again, it was considered that although the data generated by this request may be complex to code, it allowed all the survey participants to 'speak' for themselves about the topic. During the course of answering the questionnaire, the teachers were expected to focus on this aspect of their work, and there may have been important things they want to say about it. Some of these answers are translated and quoted in full in the report, as this can give an idea of what the teachers have to say rather than relying on reported speech and the researcher's interpretation (Oppenheim, 1992).

Appendix 4B: The Questionnaire Covering Letter

Dear Teachers

My name is Ibrahim Zalah and I am interested in your attitudes and experiences of using e-learning technologies in your teaching.

E-learning technologies are electronic tools such as computers, Smart Boards and Tablets; which allow the use of teaching techniques such as Power Point presentations, using Internet resources and so on.

This questionnaire has been developed to enable me to collect data for my research for my Doctoral Degree from the University of Brighton, United Kingdom. The research is designed to find out the factors that affect acceptance and use of e-learning technologies in Saudi Arabia schools. Your opinions about these issues are vital for this study.

Please note that your participation in this study is confidential. Nobody other than the researcher will look at, or use, your answers to the questionnaire. Your data will be kept securely by the researcher and destroyed after the thesis is finished. I would also like to draw it to your attention that your participation in this survey is voluntary and you are free to withdraw at any point. All information will be destroyed after the study is completed, and no names will be mentioned in the study.

If you are prepared to participate in an interview for this research please indicate this at the end of the questionnaire. Thanking you in anticipation of your kind cooperation and positive participation in this study.

Yours faithfully,

Ibrahim Zalah
Mobile : 0505769857
Email: Ibrahim.zalah@gmail.com
i.zalah@brighton.ac.uk

Appendix 4C: The Questionnaire (English)

1. Education State:………………………………………………………………………..………………

Section A: Personal details

2. Gender: □ Male □Female

3. Age range (years):

□ 25-29 □ 30-34 □ 35-39 □ 40-44 □ 45-49 □ 50-54 □ 55-59

4. Number of years in teaching service:

□Less than 5□ 5 -9□10-14□15-19□ 20+

5. At what level you are currently teaching?

□ Kindergarten □ Primary Stage □ Intermediate Stage □ Secondary Stage

6. Your qualification:

□ Diploma □ Bachelor degree (non-educational) □ Bachelor degree (educational)

□ Higher Diploma □ Masters degree □ PhD

7. Subject currently taught:

□ Computing (ICT)

□ Mathematics

□ Chemistry

□ Physics

□ Biology

□ Geology

□ Science

□ Arabic Language

□ English Language

□ Social Science (History - Geography)

□ Islamic education

□ Library and Search

□ Physical Education

□ Art Education

□ Family and consumer sciences (FCS, though traditionally called Home Economics or HomeScience)

□Other: …………………….

8. Do you do work other than teaching as part of your job? single answer

□ No

□ Yes **Please specify what you do: ……………………….**

9. Currently, how many class periods do you teach per week?

□ Less than 5 □ 5-9 Classes □ 10-14 Classes □ 15-19 Classes

□ 20-24 Classes

10. Thinking about all that classes you teach, what is the average number of students in your class?

□ Less than 20 □ 21-30 □ 31-40 □ More than 41

11. Have you attended any education training programmes in how to use e-learning technology in teaching and learning?

□ Yes □ No

12. Is your current school?

□ Urban□ Rural □ Mountainous area

13. Is your school building?

□ Government owned □ Rented

14. When is your school open?

□ Morning □ Afternoon

15. What is the type of school?

□ Public School □ Private school

Section B: Use of Technology **(Some of these questions are part of 'Use Behaviour' and some are 'Facilitating Conditions').**

16. Which of the following do you have at home: (Tick all that apply)

□ Personal Computer

□Tablet

□Smartphone

□ None of the above

17. Do you have a computer at school provided by the Ministry of Education?

□ Yes □ No

18. Type of Internet connection at home: (Tick all that apply)

□ DSL □ Fibre Optic □ 3G □ 4G □ Slow Internet connection

□ I don't have an Internet connection

19. Type of Internet Connection at school: (Tick all that apply)

□ DSL□ Fibre Optic □ 3G □ 4G □ Satellite

□ Wireless □ Slow Internet connection □ Internet connection not provided

20. Type of Internet Connection in class: (Tick all that apply)

□ DSL □ Fibre Optic □ 3G □ 4G □ Wireless

□ Slow Internet connection □ Internet connection not provided

21. At school, I use the Internet connection for:

□ Official work □ Teaching □ **Both□ Neither**

22. I believe my computer skills are:

□ Non-existent □ Beginner level □ Intermediate level □ Advanced level

□ Expert

23. Presentation slides (PowerPoint) and educational programs that I use are:

□ Designed by me. □ Ready (from the Internet - colleagues - the market) □ Both

□ I do not use presentations and educational programs (PowerPoint)

24. What technology equipment is available in your school? (Tick all that apply)

□ Classroom computers

□Smartboard

□Projector

□Computer Lab

□Learning Resources Centre (LRC),

□Overhead Projector

□ Internet access in classroom

□Laptops

□ None of the above

□ Other: ……………………………..……

25. What tools do you use in the teaching process? (Tick all that apply)

□ Computer

□Smartboard

□Projector

□Computer Lab

□Learning Resources Centre (LRC),

□Overhead Projector

□Tablet

□Mobile

□ e-mails

□ iEN National Education Portal

□ None of the above

□ Other: ………………………..……

26. Which of the following programs and application do you use for teaching? (Tick all that apply)

□ PowerPoint □ Word processing □ Spreadsheets □ Graphics/drawing packages

□ Email □The Internet □ Social networks □ iEN National Education Portal

□ Specialist programmes □ None of them □ Other (please state which)……………………

Section C:

Performance expectancy **These questions are trying to find out how far you think e-learning technologies are currently helping you to do your job.**		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
27	I find e-learning technologies useful for teaching and learning					
28	Using e-learning technologies enable me to accomplish tasks more quickly					
29	E-learning increases communication between teachers and learners					
30	Using e-learning technologies make it easier to teach course content					
Effort expectancy **These questions are trying to find out how easy you currently find it to use e-learning technologies**		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
31	I find e-learning technologies clear and easy to use					
32	I have the skills I need to use the e-learning technologies in my school					
33	Learning to operate and use a new e-learning technologies is easy for me					
Social influence **These questions are trying to find out what you currently think other people's ideas are about your use of e-learning technologies.**		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
34	The principals and supervisor think that I should use e-learning technologies					
35	My colleagues have helped me to use e-learning technologies					
36	My students think that I should use e-Learning technologies					
37	Most staff in my school think e-learning is important					
38	Parents think that that I should use e-learning technologies					
Facilitating conditions **These questions are trying to find out what you think about the current facilities that support your use of e-learning technologies.**		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
39	Classes in my school are equipped with computers					
40	I have the resources necessary to use e-Learning technologies in school					
41	A specific person (or group) is available for assistance with e-Learning technologies					
Behavioural intention		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
42	I intend to use e-learning technologies in the future					
43	I predict I would use e-learning technologies in the future					
44	I intend to attend a training programme on using e-learning technologies in the future					
Actual use of e-Learning Technologies		**Every day**	**At least once a week**	**At least once a month**	**Very rarely**	**Never**
45	I use computers as part of my preparation					
46	I use computers as part of my teaching					
47	I use Data show as part of my teaching					
48	I Use PowerPoint as part of my teaching					

	Attitude toward using technology	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
49	I like using e-learning technologies.					
50	E-learning technologies makes work more interesting					
51	Using the e-learning technologies it is a good idea					
	Anxiety	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
52	I hesitate to use the e-Learning Technologies for fear of making mistakes I cannot correct					
53	I worry the students will not respect me if they see I struggle with technology					
54	I believe that e-learning technologies lack security					
55	E-learning technologies do not make for better teaching and learning					
56	I prefer traditional ways of teaching to using e-learning technologies					
57	E-learning technologies are not compatible with my teaching methods					
58	I have less time to plan and use e-learning technologies during school time					
	Teacher Education Experience	**Every day**	**At least once a week**	**At least once a month**	**Very rarely**	**Never**
59	I used e-learning technologies at my Secondary School					
60	My teachers at college/university used e-learning technologies					
61	I used e-learning technologies at college/university					
62	I learned how to use e-learning technologies in teaching during the university's preparatory course to be a teacher					
	Education Policy	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
63	There is a lack of a training course to know how to use e-learning technologies					
64	Most training programs theoretical, not practical					
65	I have not been encouraged to take a training course in using e-learning technologies					
66	There is no coherent plan and policy to integrate e-learning technologies in my school					
67	I don't think my school principal and teachers are aware of the Ministry of Education's e-learning policy					

Other comments: Please add any comments that would encourage your use of e-learning technologies in the classroom; and/or anything you feel discourages you from using e-learning technologies:

………
…………

I would like to conduct interviews with Saudi teachers to identify, more closely, their points of view about the effectiveness of e-learning. If you are willing to participate in this interview, please fill in your name and contact address below. Your name and address will remain strictly confidential.

Name:

Mobile:

E-mail:

Appendix 4D: Jazan Authorization letter

Kingdom of Saudi Arabia

Ministry of Education

Directorate General of Education in Jazan

وزارة التعليم

Ministry of Education

37365303
30/11/2015

Dear Ibrahim Zalah

This letter is in response to your letter regarding authorization and assistance to gather information and statistical data that will allow you to conduct your PhD study in the schools in our district.

We would like to inform you that we authorize you to conduct your PhD study in our schools for boys and girls, and we will provide all the necessary information and data to facilitate his study.

We acknowledge that the subject of the study is of great importance to the improvement of teachers' performance and acceptance of the use of e-learning technologies in the teaching and learning process.

General Director of

Education at Jazan province

EISA AHMED AL-HAKAMI

Appendix 4E: Interview Schedule

Interview Schedule for Saudi Secondary Teachers

Introductions, check teacher knows what the interview is about and how long it will take, ask about recording, check that the time is convenient and ascertain appropriate demographic and school details.

Questions for interview

- Do you think the location of schools affects e-learning?
- Do you think whether the school is rented or government-owned has an effect on the provision of e-learning technology?
- How would you rate your computer skills? What makes you think that? How did you learn these skills? (If appropriate)
- Did you do any work other than teaching at your school?

Performance Expectancy

- How useful are e-learning technologies in teaching and learning?
- Are e-learning technologies a positive tool in teaching?

Effort Expectancy

- How easy or difficult is it for you to use technology in your teaching?

Facilitating Conditions

- Do you have Internet connection in your classrooms? [How does this affect your teaching?]
- Do you take into account whether your students have access to technology when preparing your lessons?
- What technological equipment is available in your school? Which do you use?
- Do you have any digital resources at school?
- Do you have a support team at school to help with technologies?

Social Influence

- Can you tell me what you think other people's attitudes are about you using technologies in teaching?

Behavioural Intention to use technology

- Do you intend to use e-learning technologies in the future?

- Do you intend to attend a training programme on how to use e-learning technologies in the future?

Use Behavior

- What digital equipment do you use in your teaching? How many time do you use it in teaching?

Attitude

- Do you prefer to use e-Learning technologies? Please explain?

Teacher Educational Experiences

- Tell me about your experience of being taught with technology? Would you have liked to have been taught with technologies?

Teachers Anxiety

- Do you have any anxieties about using e-learning technology? Please explain?

Education Policy

- Have you attended any training sessions in using e-learning technology? Can you tell me more about these sessions?
- If you did not attend any training, why was this?
- Did anyone encourage you to attend a training course about using e-learning technologies?
- Has your school principal explained any plans or policies on e-learning to you?

Barriers to Using e-Learning Technologies

Remind teachers about all the factors regarding technology acceptance in the revised UTAUT

- In your experience, what do you think are the barriers to the use of e-learning technologies in the teaching and learning process?

Appendix 4F: Ethics Form

SCHOOL OF COMPUTING, ENGINEERING & MATHEMATICS ETHICS FORM

This ethics form is designed to help you quickly and easily identify how you should approach any ethical issues raised by your project or dissertation. It should be completed for ALL research projects and dissertations prior to the commencement of the project. Please do not approach any participants involved in the research until this have been completed and discussed with your supervisor (if you are a student) or member of the CEM ethics committee (if you are a member of staff).

It is worth reading the University's Guidance on Good Practice in Research Ethics and Governance. This can be found on StudentCentral in the ***Research Ethics for Projects - CEM*** section, along with the CEM ethics form and other supporting information.

For all students: You should complete the CEM Ethics Form and discuss this with your supervisor. If all responses to the questions on the form are **NO** (and this is agreed and signed off by supervisor), then you do not need to submit any further documentation. Students should include a completed and signed copy of their Ethics Form in their dissertation or thesis. If **ANY** response to any of the questions is **YES** then you need to complete the relevant sections and discuss this with your supervisor who will make a judgement as to whether or not the proposed work includes **more than a minimum level of risk.** If the **supervisor judges** that there is more than the **minimum level of risk** then your supervisor will need to email this form to the CEM ethics committee (CEMethics@brighton.ac.uk) for discussion prior to the commencement of research. This does not mean that you will not be able to do the research, but it will need to be considered by the School Research Ethics and Governance Committee (and possibly the Faculty/University Research Ethics and Governance Committees) before any work can commence. **Signed copies of this completed ethics form must be submitted with your project or dissertation. Note: the project or dissertation will not be marked if the completed checklist is not included.**
For staff: You should complete the CEM Ethics Form and discuss this with a member of the CEM ethics committee, or email it to the CEM ethics committee (CEMethics@brighton.ac.uk) for feedback. If the committee judges that there is more than the minimum level of risk then your form will be submitted to the Faculty Research Ethics and Governance Committee for discussion prior to the commencement of research. This does not mean that you will not be able to do the research, but it will need to be considered at Faculty level before any work can commence. If your research project requires formal approval to satisfy an external funding/sponsoring/approving body, then you will need to complete the CEM Ethics form and email it to the CEM ethics committee (CEMethics@brighton.ac.uk) for consideration prior to the commencement of the research. Note: staff who are conducting research as part of a research degree (MPhil, PhD) should submit as a student.

PROJECT DETAILS

1. Name of researcher/s: **Ibrahim Zalah**

2. Name of supervisor (for students only): **Dr Deshinder Singh Gill**

3. Title of project: ***Factors That Influence Saudi Secondary Teachers' Acceptance and Use of E-Learning Technologies***

……

1

4. Outline of the research (up to 100 words):

The study aims to investigate technology acceptance of e-learning technologies by Saudi teachers. The primary source research will be conducted in two phases: an online questionnaire and semi-structured interviews.
The questionnaire has been designed and piloted with academic experts and volunteer Saudi teachers to ensure that none of the questions are intrusive, offensive or difficult to answer. The survey sample will be acquired through the Directorate General of Education in Jazan, who has already agreed in writing for the study to be done. He will forward a link to the questionnaire to Area Directors of Education in different regions, who will pass the link on to teachers in their districts. Thus, the personal details of the participants will be kept anonymous.
Teachers are reassured of this in the covering letter which also explains briefly the purpose of the research. Survey participants can also volunteer to take part in the interviews.

....

5. Timescale and date of completion: **approximately Feb 2016 to April 2016 for the survey**

6. Location of research: **Primarily at Brighton, but the survey is in the Kingdom of Saudi Arabia.**

7. Course module code for which research is undertaken (if appropriate): **PhD project.**

8. Email address: **I.Zalah@brighton.ac.uk**

9. Contact address: **School of Computing, Engineering and Mathematics,**
Cockcroft Building
Lewes Road, Brighton, BN2 4GJ

10. Telephone number:

2

Please tick the appropriate box and answer the questions where appropriate.	Yes	No
1. Does the study involve **participants who might be considered vulnerable** due to age or to a social, psychological or medical condition? (*e.g. children, people with learning disabilities or mental health problems, but participants who may be considered vulnerable are not confined to these groups).* If yes then provide details of any such participants. See the University's 'Guidance on Good Practice in Research Ethics and Governance' for more details. …………………………………………………………………………………………………… …………………………………………………………………………………………………… Note: proposals involving vulnerable participants are often likely to require ethical approval from the Faculty of Science & Engineering Research Ethics and Governance Committee (FREGC).		No
2. Will **photographic or video recordings** of research participants be collected as part of the research? If yes then please outline consent and data protection procedures *(e.g. interviews cannot be overheard, details will not be accessible to others),* for the use of participants' images. Example consent and information forms can be found on StudentCentral and see guidance on data collection at the end of this document. …………………………………………………………………………………………………… …………………………………………………………………………………………………… If your data will not be confidential and anonymous then outline the justification for this decision here and procedures for mitigating against potential harm. …………………………………………………………………………………………………… ……………………………………………………………………………………………………		No
3. Does the study require the **co-operation of an individual to gain access** to the participants? (*e.g. a teacher at a school or a manager of sheltered housing)* If yes then describe the procedures that will be put in place to ensure safe and ethical direct involvement of human participants. Where necessary and as appropriate, include comments on obtaining informed consent, reducing harm, providing feedback, and accessing participants through an individual providing information such as a teacher/lecturer, manager, employer etc. Example consent and information forms can be found on StudentCentral. ***The Directorate General of Education in Jazan, who has already agreed in writing for the study to be done.*** ……………………………………………………………………………………………………	Yes	
4. Will the participants be asked to discuss what might be perceived as **sensitive topics** (*e.g. sexual behaviour, drug use, religious belief, detailed financial matters) or* could participants experience psychological stress, anxiety or other negative consequences (beyond what would be expected to be encountered in normal life)? If yes then describe the procedures that will be put in place to ensure safe and ethical direct involvement of human participants. Where necessary and as appropriate, include comments on obtaining informed consent, reducing harm, providing feedback. Example consent and information forms can be found on StudentCentral. …………………………………………………………………………………………………… ……………………………………………………………………………………………………		No

Please tick the appropriate box and answer the questions where appropriate.	Yes	No
5. Will individual participants be involved in **repetitive/prolonged testing or vigorous physical activity, experience pain of any kind, or be exposed to dangerous situations, environments or materials** as part of the research? If yes then describe the procedures that will be put in place to ensure safe and ethical direct involvement of human participants. Where necessary and as appropriate, include comments on obtaining informed consent, reducing harm, providing feedback. Example consent and information forms can be found on StudentCentral. ……… ………		No
6. Will members of the public be **indirectly involved** in the research without their knowledge at the time? (*e.g. covert observation of people in non-public places, the use of methods that will affect privacy)*. If yes then provide brief details here *(e.g. how they will be involved and, where known, the age, gender, ethnicity and location of those who will be indirectly involved)*. ……… ……… Provide details of any negative impacts members of the public will be likely to face and that would not be considered minimal impacts (e.g. invasion of privacy, harm to property, being subject to what an individual perceives to be inappropriate behaviour). Describe the risks and if appropriate explain why you believe they are only minimal. ……… ……… Describe any procedures that will be put in place to ensure safe and ethical indirect involvement of members of the public (*e.g. providing information and feedback if requested by the public*). Examples of participation information forms can be found on StudentCentral. ……… ……… Describe how you will ensure data collection is confidential and anonymous (*e.g. people will not be able to be identified by photographs or notes taken by observers*), how data will be stored and who will have access to the data. If the data will not be confidential or anonymous, outline the justification for this decision here and procedures for mitigating against potential harm. ……… ………		No
7. Does this research include **secondary data** that may carry personal or sensitive organisational information? *(Secondary data refers to any data you plan to use that you did not collect yourself, e.g. datasets held by organisations, patient records, confidential minutes of meetings, personal diary entrie).* If yes then provide details regarding any secondary data to be used that may carry sensitive personal or organisational information. ……… ……… If secondary datasets containing sensitive personal or organisational information are to be used, outline how such use will be ethically managed *(e.g. details such as anonymising datasets, ensuring protection of source agency, gaining consent of data owners, and how the data will be stored)*. See guidance on data collection at the end of this document. ……… ………		No

Please tick the appropriate box and answer the questions where appropriate.	Yes	No
8. Is this research likely to have significant **negative impacts on the environment**? (*For example, the release of dangerous substances or damaging intrusions into protected habitats.)* If yes then provide details of these impacts here (for example the release of dangerous substances or damaging intrusions into protected habitats) and …………………………………………………………………………………… …………………………………………………………………………………… Describe how you will mitigate against significant environmental harm and manage risks. …………………………………………………………………………………… ……………………………………………………………………………………		No
9. Will any participants receive **financial reimbursement** for their time? (*excluding reasonable expenses to cover travel and other costs*). If yes then provide details and a short justification (e.g. amounts and form of reimbursement). …… ……		No
10. Are there any **other ethical concerns** associated with the research that are not covered in the questions above? If yes then give details here. …… ……		No

For student research projects:
All Undergraduate and Master's level projects or dissertations in the School of CEM must adhere to the following procedures on data storage and confidentiality.

All data should be encrypted and stored securely. Documentation should be kept in a locked cabinet or desk, and electronic data should preferably be kept on a removable disk or data stick which can be locked away, or if this is not possible on a password protected computer. Confidential and sensitive data should not be emailed unless it is encrypted or password protected since emails are centrally archived.

For Undergraduate/Masters projects, normally only the student and supervisor will have access to the data (see the University's 'Guidance on Good Practice in Research Ethics and Governance for further details).Once a mark for the project or dissertation has been published, all data must be removed from personal computers, and original questionnaires and consent forms should be destroyed unless the research is likely to be published or data re-used. If this is the case a justification for this should be included where appropriate in this form and in the relevant consent and participant information forms.

Student: Please sign below to confirm that you have completed the Ethics form and will adhere to these procedures on data storage and confidentiality.

Signed (**Student**): ………………………………………………………… Date: 1st Feb 2016 .

Supervisor/staff: I confirm that the research ~~**does**~~/***does not*** (delete as applicable) include more than a **minimum level of risk**.

Signed (**Supervisor**): Oeduade Bright SU……………… Date: 1st Feb 2016

Note: If the **supervisor/staff judges** that there is more than the **minimum level of risk** then your supervisor will need to email this form to the CEM ethics committee (CEMethics@brighton.ac.uk) for discussion prior to the commencement of research.

For staff research projects:
Please now forward this form to CEMethics@brighton.ac.uk for consideration prior to the commencement of research.

Appendix 5A: Factor Analysis - Communalities and Components

	Initial	Extraction
Performance Expectancy - I find e-learning technologies useful for teaching and learning	1.000	.746
Performance Expectancy - Using e-learning technologies enable me to accomplish tasks more quickly	1.000	.723
Performance Expectancy - E-learning increases communication between teachers and learners	1.000	.710
Performance Expectancy - Using e-learning technologies make it easier to teach course content	1.000	.768
Effort Expectancy - I find e-learning technologies clear and easy to use	1.000	.744
Effort Expectancy - I have the skills I need to use the e-learning technologies in my school	1.000	.708
Effort Expectancy - Learning to operate and use a new e-learning technologies is easy for me	1.000	.597
Social Influence - The principals and supervisor think that I should use e-learning technologies	1.000	.481
Social Influence - My colleagues have helped me to use e-learning technologies	1.000	.486
Social Influence - My students think that I should use e-Learning technologies	1.000	.643
Social Influence - Most staff in my school think e-learning is important	1.000	.582
Social Influence - Parents think that that I should use e-learning technologies	1.000	.702
Anxiety - E-learning technologies are not compatible with my teaching methods	1.000	.512
Facilitating Conditions - Classes in my school are equipped with computers	1.000	.893
Facilitating Conditions - I have the resources necessary to use e-Learning technologies in school	1.000	.875
Facilitating Conditions - A specific person (or group) is available for assistance with e-Learning technologies	1.000	.850
Behavioural Intention - I intend to use e-learning technologies in the future	1.000	.743
Behavioural Intention - I predict I would use e-learning technologies in the future	1.000	.780
Behavioural Intention - I intend to attend a training programme on using e-learning technologies in the future	1.000	.656
Actual use of e-Learning Technologies - I use computers as part of my preparation	1.000	.631
Actual use of e-Learning Technologies - I use computers as part of my teaching	1.000	.807
Actual use of e-Learning Technologies - I use Data show as part of my teaching	1.000	.829
Actual use of e-Learning Technologies - I Use PowerPoint as part of my teaching	1.000	.785
Attitude toward using technology - I like using e-learning technologies.	1.000	.610

	Initial	Extraction
Attitude toward using technology - E-learning technologies makes work more interesting	1.000	.739
Attitude toward using technology - Using the e-learning technologies it is a good idea	1.000	.795
Anxiety - I hesitate to use the e-Learning Technologies for fear of making mistakes I cannot correct	1.000	.673
Anxiety - I worry the students will not respect me if they see I struggle with technology	1.000	.529
Anxiety - I believe that e-learning technologies lack security	1.000	.541
Anxiety - E-learning technologies do not make for better teaching and learning	1.000	.564
Anxiety - I prefer traditional ways of teaching to using e-learning technologies	1.000	.589
Teacher Education Experience - I used e-learning technologies at my Secondary School	1.000	.578
Teacher Education Experience - My teachers at college/university used e-learning technologies	1.000	.773
Teacher Education Experience - I used e-learning technologies at college/university	1.000	.797
Teacher Education Experience - I learned how to use e-learning technologies in teaching during the university's preparatory course to be a teacher	1.000	.593
Education Policy - There is a lack of a training course to know how to use e-learning technologies	1.000	.652
Education Policy - Most training programs theoretical, not practical	1.000	.676
Education Policy - I have not been encouraged to take a training course in using e-learning technologies	1.000	.668
Anxiety - I have less time to plan and use e-learning technologies during school time	1.000	.523
Education Policy - There is no coherent plan and policy to integrate e-learning technologies in my school	1.000	.531
Education Policy - I don't think my school principal and teachers are aware of the Ministry of Education's e-learning policy	1.000	.574

Extraction Method: Principal Component Analysis.

Appendix 5B: Factor Analysis - Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.009	19.533	19.533	8.009	19.533	19.533	3.406	8.308	8.308
2	4.245	10.354	29.888	4.245	10.354	29.888	3.267	7.969	16.277
3	3.473	8.470	38.358	3.473	8.470	38.358	3.245	7.915	24.192
4	2.568	6.263	44.621	2.568	6.263	44.621	2.882	7.029	31.221
5	2.315	5.646	50.266	2.315	5.646	50.266	2.739	6.680	37.901
6	1.612	3.932	54.199	1.612	3.932	54.199	2.725	6.647	44.547
7	1.531	3.734	57.932	1.531	3.734	57.932	2.714	6.621	51.168
8	1.322	3.223	61.156	1.322	3.223	61.156	2.379	5.802	56.970
9	1.274	3.108	64.264	1.274	3.108	64.264	2.242	5.468	62.438
10	1.111	2.709	66.973	1.111	2.709	66.973	1.859	4.534	66.973
11	.944	2.302	69.275						
12	.792	1.931	71.206						
13	.777	1.895	73.100						
14	.760	1.855	74.955						
15	.723	1.764	76.719						
16	.664	1.620	78.339						
17	.620	1.513	79.852						
18	.596	1.453	81.305						
19	.558	1.362	82.666						
20	.539	1.314	83.981						
21	.516	1.259	85.240						
22	.484	1.180	86.419						
23	.461	1.125	87.544						
24	.431	1.052	88.597						
25	.423	1.031	89.627						
26	.388	.946	90.573						
27	.383	.934	91.507						
28	.367	.895	92.402						
29	.354	.862	93.265						
30	.338	.825	94.089						
31	.329	.803	94.892						
32	.296	.721	95.613						
33	.271	.661	96.274						
34	.257	.627	96.901						
35	.230	.561	97.462						
36	.221	.539	98.001						
37	.200	.488	98.490						
38	.194	.473	98.962						
39	.170	.414	99.377						
40	.146	.356	99.733						
41	.110	.267	100.000						

Extraction Method: Principal Component Analysis.

Appendix 5C: Factor Analysis Rotated Component Matrix a

	Factor Analysis Rotated Component Matrixa										
		Component									
		1	2	3	4	5	6	7	8	9	10
Anxiety	I hesitate to use the e-Learning Technologies for fear of making mistakes I cannot correct	0.75									
	I prefer traditional ways of teaching to using e-learning technologies	0.684									
	E-learning technologies are not compatible with my teaching methods	0.677									
	I believe that e-learning technologies lack security	0.675									
	E-learning technologies do not make for better teaching and learning	0.651									
	I worry the students will not respect me if they see I struggle with technology	0.588									
	I have less time to plan and use e-learning technologies during school time	0.562									
Use Behaviour	I use e-learning technologies (Such as Computers. Smartboard, Tablet, …) as part of my teaching		0.869								
	I use Data show as part of my teaching		0.858								
	I Use PowerPoint as part of my teaching		0.851								
	I use computers as part of my preparation		0.737								
Perfor mance	Using e-learning technologies make it easier to teach course content			0.808							

	Factor Analysis Rotated Component Matrixa										
		Component									
		1	2	3	4	5	6	7	8	9	10
	I find e-learning technologies useful for teaching and learning			0.799							
	E-learning increases communication between teachers and learners			0.771							
	Using e-learning technologies enable me to accomplish tasks more quickly			0.735							
Teacher Education Experience	I used e-learning technologies at college/university				0.881						
	My teachers at college/university used e-learning technologies				0.866						
	I learned how to use e-learning technologies in teaching during the university’s preparatory course to be a teacher				0.736						
	I used e-learning technologies at my Secondary School				0.68						
Education Policy	Most training programs theoretical, not practical					0.811					
	There is a lack of a training course to know how to use e-learning technologies					0.786					
	I have not been encouraged to take a training course in using e-learning technologies					0.777					
	There is no coherent plan and policy to integrate e-learning technologies in my school					0.576					

	Factor Analysis Rotated Component Matrixa										
		Component									
		1	2	3	4	5	6	7	8	9	10
	I don't think my school principal and teachers are aware of the Ministry of Education's e-learning policy					0.517					
Social influence	Parents think that that I should use e-learning technologies						0.803				
	My students think that I should use e-Learning technologies						0.733				
	Most staff in my school think e-learning is important						0.679				
	My colleagues have helped me to use e-learning technologies						0.605				
	The principals and supervisor think that I should use e-learning technologies						0.569				
Facilitating conditions	I have the resources necessary to use e-Learning technologies in school							0.897			
	Classes in my school are equipped with computers							0.895			
	A specific person (or group) is available for assistance with e-Learning technologies							0.873			
Effort expectancy	I have the skills I need to use the e-learning technologies in my school								0.717		
	I find e-learning technologies clear and easy to use								0.679		
	Learning to operate and use a new e-learning technologies is easy for me								0.657		

	Factor Analysis Rotated Component Matrixa										
		Component									
		1	2	3	4	5	6	7	8	9	10
Behavioural intention	I predict I would use e-learning technologies in the future									0.808	
	I intend to attend a training programme on using e-learning technologies in the future									0.763	
	I intend to use e-learning technologies in the future									0.747	
Attitude toward using technology	Using the e-learning technologies it is a good idea										0.819
	learning technologies makes work more interesting										0.767
	I like using e-learning technologies.										0.521

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.

Appendix 6A: Differences between Government and Rented Schools

Response	Teachers	Total
Teachers used their own tools	T5, T10, T28	3
Reluctance to use technology	T1,T7, T11, T12, T13	5
Small Classroom	T2, T5, T7, T11, T12, T14	6
No Equipments	T2, T3, T4, T5, T6, T7, T10, T11, T12, T13, T14, T15	12

Appendix 6B: Technical Skills of Teachers

Response	Teachers	Total
Experts	T6, T7	2
Adobe programs and design programs	T6,	1
Use Office programs and video design	T6, T7, T10, T16, T22, T26	6
Self-Training -(Internet)	T2, T3, T5, T7, T10, T16, T22, T26, T27, T28	10
Limited Training	T1, T2, T10, T13, T15, T16, T23	7
Medium	T2, T3, T4, T5, T8, T10, T11, T12, T13, T15, T16	11

Appendix 6C: Other Work Done by Teachers and Related Use of Technology

Response	Teachers	Total
Cover for absent colleagues	T8, T18	2
Academic Guidance Co-ordinator	T24	1
Daily Supervision	T1, T3, T4, T6, T8, T9, T10, T12, T14, T15, T16, T17, T18, T20, T21, T22, T23, T25, T27, T28	20
School Activities	T1, T2, T5, T6, T7, T9, T10, T12, T13,T14, T15, T16, T17, T18, T20, T21, T22, T23, T25, T27, T28	21

Appendix6D: Performance Expectancy

Response	Teachers	Total
usage of technology in order to make less effort	T2, T3, T4, T7, T10, T16, T18, T24, T25, T26, T27	11
Assisting the teacher in preparing for lessons	T2, T3, T4, T5, T7, T10, T15, T16, T18, T21, T25, T26, T28	13
Improves the process of teaching and learning	T2, T3, T4, T7, T8, T10, T13, T16, T18, T20, T24, T25, T26, T27	14
Improvement the level of students' thinking	T3, T4, T7, T8, T10, T12, T14, T18, T20, T24, T25, T26, T27	13
Security and safety in scientific fields	T10,T22	2
(students) in memorizing the materials	T7,T10	2
keep in touch with everything new	T3,T5,T10	3
Improving (students') self-learning	T3,T5,T10,T23	4
Explaining items in the curriculum	T3,T7,T10,T16	4
Students love of learning	T3,T7,T10	3
The new curriculum requires ICT	T3,T7,T10,T16	4
Students interact with the lesson	T15, T23	2
Shortening preparation time	T10	1
Transforming the lesson	T13	1
Individual differences	T17, T18, T20, T21, T22, T23, T24	7
Makes teachers lazy	T1	1
Great Contribution	T10	1
Virtual laboratories	T23	1
Quantum Leap	T16	1

Appendix 6E: Effort Expectancy

Response	Teachers	Total
Needs experience/The need to practice	T6, T13, T14, T17, T24, T29	6
Lack of time / Pressure of work	T1, T8, T11, T19, T22, T23, T25, T27, T28, T30	10
Poor facilitating conditions	T3, T18	2
Difficult at the beginning	T2, T5, T9, T12, T14, T17, T21	7
Lack of technical support	T12, T15, T19, T20	4
Need to learn more skills	T2, T9, T10, T13, T14, T16, T21, T22, T23, T25, T27,T28	12
Do not use technology	T1	1
Lack/ Loss internet	T2, T6, T11	3

Appendix 6F: Teachers' Use of Digital Technologies

Response	Teachers	Total
Mobile Phone App – Internet	T8	1
Data Show/Computer	T6, T7, T8, T9, T10, T15, T17, T21, T30	9
Smart Board U	T2, T4, T5, T7, T10, T11, T13, T15, T20	9
Ready-Made CD	T20	1
Power Point	T7, T8, T13, T15, T19, T30	6
iPad	T8	1
Internet on Mobile Phone	T6. T21	2
No Use of National Portal	T3, T5, T12, T18, T30	5
iEn Portal Unknown	T1, T2, T4, T6, T7, T8, T9, T10, T11, T13, T15, T16, T17, T19, T20, T21, T22, T23, T24, T25, T27, T28, T29	23

Appendix 6G: Facilitating Conditions at School

Response	Teachers	Total
e-learning Resources		
Not for every curriculum	T2, T4, T9, T14, T17, T19, T21, T23, T27	9
Few Resources	T4, T19	2
No Resources	T2, T11, T14, T22, T23, T24, T27, T28, T29	9
Pdf Files	T6, T7, T8, T9, T12, T16, T17, T26, T30	9
e Books	T1, T14	2
CDs	T20	1
Technical Support		
No Persons to support	T2, T3, T10, T14, T16, T17, T20, T22, T23, T25	10
Colleagues Support	T5, T6, T7, T8, T11, T12, T19, T24, T28, T29, T30	10
LRC Technician	T1, T4, T5, T7, T13, T18, T21, T21, T24, T25, T26, T27, T28	13
Equipment at School		
Learning Resource Centre - Need booking	T1, T2, T3, T4 , T5, T6, T8, T10, T12, T14, T16, T17, T18, T20, T22, T23, T25, T26, T28, T29	20
Equipment needs maintenance	T2, T4, T7, T10, T11, T12, T14, T18, T21, T22, T23, T24 , T28	13
Partly appropriate in classrooms	T6, T9, T11, T13, T20, T21,T30	7
Tech Equipments not appropriate in classrooms	T1, T2, T3, T4 , T5, T10, T12, T14, T16, T17, T18, T22, T23, T25, T26, T28, T29	17
Appropriate only in LRC	T1, T4 , T5, T10, T12, T14, T16, T22, T26, T28, T29	11
Lack of equipments	T3, T4, T7, T9, T10, T12, T18, T20, T24, T26, T27, T30	12
Use own equipments	T1, T4, T6, T16, T17	5

Response	Teachers	Total
Smart Board	T8,T13	2
No Internet	T1, T3, T4, T8,T10, T13, T15, T20, T21	9

Appendix 6H: Teachers' Perceptions of Social Influence

Response	Teachers	Total
Professor Teaching the Education Diploma	T26	1
No one Influences me	T1, T4, T5, T12, T16, T17, T28	7
Student's Parents	T3, T6, T10, T15	4
School Principals	T2, T5, T6, T7, T9, T10, T11, T14, T15, T19,T20, T21, T22, T23, T24, T26, T29, T30	18
LRC Responsible	T3, T18	2
Friends/Family	T6, T10, T13, T21, T24, T25	6
Supervisors	T6, T7, T8, T10, T14, T15, T19, T20, T21, T22, T23, T26	12
Colleagues	T3, T6, T10, T19, T20, T21, T22, T23, T24, T26	10
Students	T3, T8, T10, T15, T10, T20, T21, T22, T23, T26	10

Appendix 6I: Behavioural Intention

Response	Teachers	Total
I need Training to use e-learning Technologies	T1, T10, T12, T19, T26, T29, T30	7
Need Equipment to use e-learning Technologies	T3, T4, T7, T8, T11, T13, T18, T23, T28, T30	11
Need clear plan to use e-learning Technologies	T6, T21, T23	3
I am not going to use e-learning Technologies	T1, T6, T9, T14	4
I will use e-learning Technologies	T2, T3, T4, T5, T7, T8, T10, T11, T12, T13, T15, T16, T17, T18, T19, T20, T21, T22, T23, T24, T25, T26, T28, T29, T30	25
Used own methods	T6, T14	2
Near retirement	T1, T9	2

Appendix 6J: Teachers' Attitudes towards the Use of Technology

Response	Teachers	Total
Prepare students to have the ability to deal with technology	(T2, T3, T4, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T23, T24, T25, T26, T29)	24
Encourages active participation among students	(T3, T7, T8, T12, T15, T23)	6
Saving time and effort	(T3, T4, T8, T9, T11, T19, T20, T21, T23, T24, T29)	11

Appendix 6K: Teachers' Anxieties about Using Digital Educational Technologies

Response	Teachers	Total
Lack of Skills/Confidence (fear of mistakes)	T8, T10, T13, T15, T16, T17, T18, T19, T21, T22, T23, T24, T28	13
Parents Misunderstand e-Learning	T10	1
Students' Skills Better than teachers	T12, T16, T17, T26	4
Students bored - Lack of self-learning	T27, T3	2
Computer Mafunction (Data loss)	T2, T4, T9, T11, T13, T14, T15, T16, T17	11
Digital divide' among students	T18, T23,T29	3
Lack of Maintenance	T4, T10, T12, T14	4
Too Few Devices	T6, T10, T16, T23	4
Too Little Time	T5, T8, T10, T13, T14, T17, T20, T21, T22	9
Power Outage	T7, T9, T14, T15, T19, T20, T21, T30	8
Viruses	T2, T4, T5, T10, T17, T21	6
Security issues	T1, T5, T25, T28	4

Appendix 6L: Teachers' Educational Experience

Response	Teachers	Total

None e-learning Educational Experience	T1, T2, T5, T6, T8, T9, T10, T11, T13, T14, T15, T17, T18, T19, T20, T21, T23, T24, T25, T28, T29, T30	22
Using Email at University	T3	1
Using Internet / Office	T7	1
Using Presentations	T26	1

Appendix 6M: Teachers' Responses about Education Policy

Response	Teachers	Total
Not had training courses about the use of e-Learning	T5, T6, T11, T12, T14, T17, T18, T19, T20, T21, T22, T24, T25, T26, T28, T29, T30	17
No encouragement from others to enrol in training	T1, T5, T6, T7, T8, T10, T14, T15, T16, T17, T18, T20, T23, T25, T26, T28, T29, T30	18
The training courses were not sufficient	T1, T3, T6, T8, T9, T12, T14, T15, T16, T17, T18, T20, T21, T22, T23, T25, T27	17
Education policy Somewhat Explained	T1, T2, T14, T27, T30	5
Education policy not explained	T3, T4, T5, T6, T7, T8, T10, T12, T15, T16, T17,T18, T19, T20, T21, T22, T24, T25, T26, T28, T29	21
There is no clear policy	T6, T21, T23	3
Ministry Vision Unclear	T5, T6, T10, T14, T28	5

Appendix 6N: Teachers' Responses about Barriers to Acceptance and Use of Technology

Barriers	Teacher	Total
Infrastructure	T1, T4	2
Maintenance	T2, T7, T11, T21, T24	5

Training	T2, T11, T12, T16, T18, T20, T22, T26	8
Equipment	T4, T7, T9, T12, T18, T20, T24, T26, T27, T30	10
Power Outages	T21	1
Ministry Vision Unclear	T5, T6, T10, T14, T28	5
Teacher Inexperience	T6, T20, T29	3
No LRC	T9	1
Negative Parental Attitude	T10	1
Lack of Time/Pressure of Work	T13, T21, T30	3
Financial Constraints	T16	1

Appendix 6U: Issues Revealed by Interviews and Related Factors

ISSUE	FACTORS RELATED TO
School type and location	FC and EP (UB)
Inadequate training	FC and EP (UB)
Lack of knowledge about e-learning and iEN	FC and EP (UB)
Lack of time/workload	PE, EE, FC, and EP (BI and UB)
Students' digital divide	FC and AX (BI and UB)
Stage of Career	PE, EE and ATT (BI)
Teacher Resourcefulness	PE, FC and ATT (BI and UB)