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THE DEVELOPMENT OF AN ADAPTIVE ENVIRONMENT (FRAMEWORK) TO ASSIST THE TEACHING, LEARNING AND ASSESSMENT OF GEOGRAPHY WITHIN THE OMANI SECONDARY EDUCATION SYSTEM

by

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Abstract

Owing to particular historical reasons, the Sultanate of Oman emerged into the modern world only in 1970 and launched its state education system in 1972. Less than thirty years later, the Sultanate recognized that a major overhaul of state education was needed to face the challenges that globalization posed to its population and to its economy. The policies for the transition to the *Basic Education* (*BE*) system stipulated that students should receive training in information technology (IT) and English from Year One. These provisions were implemented from academic year 1998/1999, so that by the commencement of academic year 2010/2011 three cohorts of students had received a full ten years of schooling in IT.

This research investigated the effects of integrating IT into the geography curriculum in Cycle Two of the *BE* system. Despite an extensive and painstaking search, no previous published study was found that dealt with the pedagogic use of IT in the Omani *BE* system. One study (Osman 2010) surveyed users of the Oman Educational IT Portal, but it was a *general* attitudinal survey of *all* users and did not progress beyond use of a questionnaire. Therefore, this study is the first to conduct fieldwork research in Oman to develop indicators to measure Omani students' performance in and reactions to eLearning. The study also includes two *dedicated* surveys covering Omani students' and teachers' opinions of and attitudes to eLearning. *This is therefore the first study of this type that has been conducted in or for Oman.*

The findings support the importance of integrating eLearning into the curriculum in Oman, to enhance the delivery of a range of curriculum subjects through the pedagogical use of IT. Through a comparison of responses from teachers and students in Oman and two other countries, this study also explores issues emerging from a comparison between cultures (Gulf Arab and Western) in terms of the varying effects that cultural and other factors can exert on teachers' and learners' acceptance of educational technology in different countries. Again, it is a feature of this research that it is the first to conduct such a comparative study on such a scale involving Gulf Arab students and teachers. This study raises issues surrounding the optimization of acceptance include (1) the necessity of increasing the internet speed in Oman; (2) the current inadequacy of e-learning resources; (3) the proper management of eLearning integration; (4) the need for enhancement of eLearning training and skills issues for both teachers and learners; (5) the further relationships inherent in the interaction of culture and the acceptance of technology.

Dedication

I dedicate this thesis:

TO the souls of my father and my nephew (Hussain)

TO my mother

TO my beloved husband

TO the rest of my family

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Abbreviations used in this document

ADSL	Asymmetric Digital Subscriber Line
BE	Basic Education (*the current state education system in Oman*)
Becta	British Educational Communications and Technology Agency (UK)
BIS	Department for Business, Innovation and Skills (UK)
CExp	Core Experiment
CG/CGs	Control Group/Control Groups
DfE	Department for Education (UK)
DfES	Department for Education and Skills (UK)
DfID	Department for International Development (UK)
EG/EGs	Experimental Group/Experimental Groups
ELF	eLearning Framework
ER	Educational Region (inOman)
FE	Further Education (*post-secondary but not tertiary level*)
GCC	Gulf Cooperation Council
GIS	Geographical Information System
HE	Higher Education (*post-secondary, at tertiary level*)
HFE	Higher and Further Education; *also* Higher and/or Further Education
IC3	Internet and Computing Core Certification
ICDL	International Computer Driving Licence
ICT	Information and Communications Technology
IT	Information Technology
ITA	Information Technology Authority (Oman)
ITTF	Information Technology Task Force (Oman)
ITU	International Telecommunications Union (a UN agency)
JISC	Joint Information Systems Committee, UK
LMS	Learning Management System
MOE	Ministry of Education (Oman)
MOI	Ministry of Information (Oman)
MONE	Ministry of National Economy (Oman)
NAACE	National Association of Advisors for Computers in Education (UK)
Oman 2020	*Vision for Oman's National Economy: Oman 2020*
ODE	Open and Distance Education; *also* Open and/or Distance Education
ODL	Open and Distance Learning; *also* Open and/or Distance Learning
Ofsted	Office for Standards in Education (UK)
PDA	Personal Digital Assistant
PExp	Pilot Experiment
PLATO	Programmed Logic for Automated Teaching Operations
Q&A	Question and Answer
TAM	Technology Acceptance Model
TG/TGs	Test Group/Test Groups
THE	Technological Horizons in Education
TICCIT	Time-shared, Interactive, Computer-controlled Information Television
UAE	United Arab Emirates
UK	United Kingdom
UN	United Nations
www	world-wide web

Glossary of Terms

The following terms are used in this thesis with the meanings defined below.

Attitude survey(s)/attitude scale(s)
A questionnaire-type survey of attitudes towards eLearning with responses on a five-point Likert scale. This survey was administered to the Experimental Group for the Core Experiment before they began their participation, and was administered to the EG again after they had completed the participation in the CExp.

Basic Education—*BE*
In Oman, the current state education system is called the *Basic Education* system. It is divided into two full cycles, the first cycle (Primary) covering pupils of ages 6–9 (Years/Grades 1 to 4), and the second cycle (Secondary) covering those aged 10–15 years (Years/Grades 5 to 10).

Blended learning
A combination of a certain amount of traditional face-to-face teaching conducted in the classroom with the assistance of computers/ICT technology, together with a fully online teaching environment that was available for students to use as they wished.

Control Group(s)—CG/CGs
The group(s) of students who studied the same units of the tenth-grade *Basic Education* geography curriculum as those studied by the Experimental Group(s), but in the case of the Control Group(s) the pedagogic approach employed was the traditional classroom teaching method.

Core Experiment—CExp
The second of the two experiments carried out during the fieldwork, using two Test Groups of students. This experiment constituted the main experiment of the research, and its purpose was to investigate the learning performance of an Experimental Group that used a blended learning approach including eLearning. This experiment also investigated the EG's attitudes towards eLearning before and after participating in the experiment. A second Test Group, which did not make use of eLearning, acted as a control in order that comparisons might between the learning performances of the two Test Groups.

eLearning Framework—ELF
The eLearning environment *specifically constructed for this doctoral research* to help examine the eLearning performance and attitudes of students. It was presented in web-page format on CD to a group of students in the Pilot Experiment, and later presented in actual website format to another group of students in the Core Experiment.

Experimental Group(s)—EG/EGs
The group(s) of students who studied the same units of the tenth-grade *Basic Education* geography curriculum as those studied by the Control Group(s), but in the case of the Experimental Group they studied the units by means of a blended learning approach (*see page 77*) that included the extensive use of an eLearning framework constructed by the Researcher.

Fieldwork
The fieldwork for this study was divided into three phases.
Phase One: first questionnaire survey of students and teachers (in Oman), and the Pilot Experiment;
Phase Two: the Core Experiment;
Phase Three: the second questionnaire survey of students and teachers (in Oman, the UAE and UK).

Further Education—FE
Education received after having finished secondary school (high school). FE refers to post-secondary education that is not necessarily at a higher academic level, such as *tertiary* level.

Gulf Cooperation Council
An association of States that lie on or in the Arabian Gulf; founded in 1981—the member states are (from north to south of the Gulf) Kuwait, Saudi Arabia, Bahrain, Qatar, UAE, Oman.

General Education
This is the term that was used to label the original state school system—with primary, preparatory and secondary levels—that was founded in 1972 and is now being phased out as the *Basic Education* system is being phased in.

Higher Education—HE
Education that leads to academic qualifications at a higher level than secondary education. Such education and qualifications are often described as being at *tertiary level*. Examples of academic qualifications at this level include Bachelors and Masters degrees and Doctorates, but also include post-graduate certificates and diplomas.

Oman Vision 2020
Short title for the policy document/policy programme *Vision for Oman's National Economy: Oman 2020*. This initiative was launched in 1995, outlining Oman's economic, social and developmental pathway for the next 25 years, from 1996 to 2020. The major objectives are to gain economic and financial stability; to revise the role of Government in the national economy; to extend private sector participation in the economy; to diversify Oman's economic base and sources of national income; to globalize the Omani economy; to upgrade the skills of the Omani workforce; to develop the human resources of Oman. The outcome of these objectives is that even greater importance than previously is placed on the expansion of education and training, together with lifelong learning, to optimize the development of Oman's human resources.

Pilot Experiment—PExp
The first of the two experiments carried out during the fieldwork, using two Test Groups of students. The Pilot Experiment had two purposes: (1) to act as a rehearsal run for the Core Experiment, to identify and address any operational problems that might otherwise affect the CExp; and (2) to make final adjustments to the eLearning Framework before the CExp was begun.

Pre-run/post-run
Pre-run = before the commencement of an experiment/**post-run** = after the completion of an experiment

Pre-test(s)/post-test(s)
Tests measuring the learning performance of members of both Test Groups for both experiments. The pre-tests were administered before the TGs began their participation activities, whilst the posts-tests were administered after the TGs had completed their participation activities.

Primary education/primary school
In most countries around the world, the structure of the education system provides for the entry of children into the first cycle of school education when they are aged between five and seven years. This first cycle is known as primary education, although other terms that have been used to label the cycle include 'elementary' and 'preparatory'.

Secondary education/secondary school
In most education systems around the world, students begin studying secondary education in secondary schools after completing their primary education, normally when they are aged between ten and twelve years, depending on the country concerned.

Social media
In this thesis, this term refers to electronic hardware and software applications that enhance communication. The hardware includes such things as digital cameras, camcorders, pocket video cameras, portable media players, mobile phones, camera-phones, smartphones and the like. The software includes electronic (especially online) artefacts such as YouTube, electronic newspapers, video-clips and audio-clips.

Social networks
In this thesis, this term refers to online artefacts (especially interactive ones) that facilitate the speedy exchange of communications through forums and blogs, and through proprietary channels such as Facebook and Twitter.

Test Group(s)—TG/TGs
The group(s) of students participating in the Pilot and Core Experiments during the fieldwork: there were four TGS—one CG and one EG for the Pilot Experiment, one CG and one EG for the Core Experiment.

CHAPTER ONE: INTRODUCTION

This chapter presents the background to the present study. It deals with the historical development of the teaching methods and technology that have contributed to the current styles of teaching and learning that are based on digital electronic technology. It also introduces the concept of technology acceptance. A description is then given of the development of the education system in Oman and also the wider programme of electronic services being rolled out in that country. This is followed by an overview of educational ICT in the UK and the UAE. The chapter closes with a statement of the significance of this study and a description of the structure of this thesis.

1.1 Extending the Access to Learning

From the mid-19th century, the use of correspondence courses by post introduced educational opportunities to those who were unable to use the traditional facilities provided by a school or college. Besides financial issues, obstacles to attendance typically stemmed not only from constraints imposed by the distance to be travelled, but also from the *amount* of time and the actual *timings* available to the individual (Dinsdale 1953; Hjeltnes & Hansson 2004). For many persons, pursuing their studies at a spatial/temporal remove from the formal learning environment was their only option. In *reducing* the obstacles of spatial and temporal distance, correspondence courses catered to a student's needs by *distance education*, and this practice became and to this day remains a highly popular way in which people pursue their learning-goals (Keegan 1996; Hjeltnes & Hansson 2004).

From the 1950s changes in social and economic conditions, including increases in general affluence and social mobility, generated new opportunities for distance education, leading to the incorporation of contemporary technology—sound-recordings, radio, television, video-recordings, the telephone—into the repertory of resources (Holmberg 1994; Keegan 1996). These social/economic dynamics have been an important component in driving the extension and modernization of teaching/learning practices in general, and in distance learning in particular, giving rise to innovations in this field that have empowered students to pursue their education more effectively (Lewis *et al.* 1997; Philips *et al.* 1998; Roberts 2002). The various developments in distance education have generated certain outcomes that are applicable to the range of challenges arising from the process of integrating Information Technology (IT) into pedagogic practice for proximate and distance-based education, thus contributing to the development of the approaches and practices of present-day electronic-based education (Harasim 2000; Arafeh 2004; Bates 2005). However, despite some points of close connection, it is to be noted that distance education and electronic-based education are two completely different phenomena (Guri-Rosenblit 2009).

1.2 Electronics in Education

Computers have been in use for longer than most people might imagine, and they have made possible the development of online education. The use of computers in education actually began when the first computers were built: historically, the first machine used in education was the abacus, which was a calculating machine (Rushby 1984). This machine assisted learners and teachers to carry out basic arithmetic operations such as addition and subtraction. The abacus was succeeded by logarithmic calculators, which performed a wider range of arithmetical functions (Molnar 1997). The first major computer-based machine was the "tabulating machine", which was later merged with machines from IBM to create tallying machines (Tokola 1999). The idea of computer-based learning began in the 1960s when the University of Illinois produced the second-generation computer PLATO, creating a large computer instructional system. This was followed by IBM's *Coursewriter*, a programming language developed to prepare instructional materials on IBM computers (Tokola 1999). Later in 1972, Brigham Young University along with MITRE Corporation developed TICCIT, for students' study lessons presented on normal coloured televisions, with an interactive phase based on a modified typewriter keyboard controlled by a micro-computer (Rushby 1984; Molnar 1997). These early projects gave rise to further research and development aimed at producing computers and programs that would support normal classroom teaching and learning. Each research project carried out has attempted to overcome proven challenges and take advantage of the positive aspects of computer-based education (Becta 2006). It can thus be seen that educational developments based on computers and digital technology have been in progress for at least the last forty years.

1.3 The Importance of the Internet and eLearning

eLearning (also spelled e-learning, as well as in other ways) refers to the various forms of teaching and learning that are supported electronically: this activity can be computer-based (networked or non-networked), or web-based; it can also be conducted through laptop computer and hand-held devices such as PDAs and mobile phones. Therefore, eLearning simply refers to the way in which the teaching/learning process is conducted by means of a range of computer, digital and internet technologies and software applications for the purpose of delivering pedagogical solutions. The express purpose of eLearning is to enhance performance in the acquisition and active use of knowledge (Rosenberg 2001). According to Rosenberg, eLearning is based on "networking, which allows for instant updating, retrieval, distribution and the sharing of information, delivered to end-users through computers via the internet, and it focuses on learning that goes beyond traditional paradigms of training" (Rosenberg 2001:28). eLearning has proved to be flexible, with many contributors to the literature indicating that eLearning increases and improves the quality of learning; that students are prepared better thereby to perform in a knowledge-based society; and that it offers life-long learning chances, and supports critical thinking, communication, problem solving and interaction (Jonassen 1996; Johnston *et al.* 2005; Appana 2008).

The rapid uptake of the eLearning concept and adoption of eLearning practices has become a worldwide phenomenon that owes its development to the role played by digital technology and the internet in modern life (Hasan & Ditsa 1999). The internet has spread at a phenomenal rate to exert what approaches an all-pervasive influence on individual and social activity, both in work and leisure (DiMaggio *et al.* 2001). Owing to its function as a window onto the world, the internet is able to offer highly-significant educational and social benefits to people whose lower-income status and/or location at a distance from urban areas might make access to education, knowledge and experiences much more difficult (ALA 2003). Issues surrounding access to/exclusion from the internet often arise in different countries, not *necessarily* because of poverty or other social issues but owing to problems arising from the spatial configuration of the country and/or its population (Daly 2005; Yusuf 2005). Such is the case in Oman. But in any case, for users world-wide in a whole range of differing circumstances, the internet has become a conduit that has increased the availability of learning materials and opportunities delivered by the web. This conduit thus offers increased interactivity and flexibility of instructional design to learners and teachers (Brown *et al.* 2007).

Prensky (2001) observes that education has been changing dramatically since the mid-1990s owing to the rapid developments in technology and the present digital age. Currently, students spend a major part of their time surrounded by computers, video-games and cell-phones, which form their main teaching/learning aids. This illustrates how present-day students are currently gaining and processing information quite differently from their predecessors, since they have been immersed in the technology since birth (Greenfield 2008). Picciano (2002) describes how previously the introduction of technology into the field of education began only slowly, owing to the cost of purchasing computers and the fact that educators did not begin to embrace technology immediately. Despite these challenges, technology—especially computers—has become a basic fixture in the educational landscape worldwide (Ali *et al.* 2009). Limitations imposed by time and space no longer pose significant problems to accessing education (IICD 2008). ICT makes it easier to promote female education in countries where barriers have previously been raised by issues of gender-based and/or economic inequality (Kramarae 2001). ICT offers students considerable flexibility in organizing their activities and timings for learning, and it is the ways in which pedagogy interfaces with learners' needs that best define the importance and role of an eLearning environment (Di Leo & Jacobs 2004).

1.4 Culture and the Acceptance of New Technology

Part of the remit of the present study is to investigate the attitudes of Omani teachers and students towards the new styles of educational activity that are made possible by technological innovation, specifically eLearning. As digital technology and eLearning artefacts are produced by societies that are very different from Omani and Gulf Arab societies, it is possible to class these products as being of a non-domestic (*i.e.* alien) culture. One generally accepted definition of culture is that it is a common behaviour that is learned from the society into which one is born—or in which one becomes embedded—and consists of norms, beliefs and customs (Gay 2000; Scupin 2008). Moreover, it reflects the common set of values that characterize a society in the forms of family, education and the system of social organization (Tweed & Lehman 2002; Thomas *et al.* 2003). Any particular society or community might accept certain values whilst rejecting others owing to the nature of any particular individual or grouping of individuals, as well as for reasons arising from the social, intellectual, religious and political background of the wider society/community (Kennedy 2002; Thomas *et al.* 2003). The interplay between values based on the attitudes of an individual or distinct group, and any change that occurs in the aforesaid values, tend to have consequential effects on the behaviour of such an individual or group (Li 2003; Thomas *et al.* 2003; Gales 2008).

Several studies have emerged over the last thirty years to illustrate the relationship between cultural factors and the uptake of technology (*e.g.* Hofstede 1980; Del Galdo 1996; Trompenaars & Hampden-Turner 1997; Hasan & Ditsa 1999; Tse *et al.* 2004; Barton 2010). These show that cultural background plays a significantly important role in affecting the uptake and use of technology. In the case of ICT, most information systems have been developed within the western world and thus are seen as culturally biased in terms of those societies, and even in terms of the mainstream cultures within those societies (Hill *et al.* 1998; Lynch *et al.* 2002). As western culture has played a major role in the development of these new technologies, ICT may be presented to non-western societies in forms that are not necessarily appropriate for non-western cultures. Collis (1999) makes the argument that culture is a crucial factor that influences how humans accept, use and react to the internet. Arenas-Gaitán *et al.* (2011) refer to the numerous cross-cultural studies, in which the adoption and use of new technologies in different cultures are compared in terms of specific cultural dimensions and subjective norms (Van Raaij & Schepers 2008; Yuen & Ma 2008). According to Hofstede (1991), national differences may be understood in relation to the distinctive features of any particular national culture. The conceptual model employed in this regard posits that national cultures are constructed along four dimensions or continua; these are (a) individualism/collectiveness, (b) power-distance, (c) uncertainty-avoidance, and (d) femininity/masculinity. Other scholars include additional dimensions, including the adoption of computer self-efficacy (Yuen & Ma 2008), perceived playfulness (Zhang *et al.* 2008), and cognitive absorption (Zhang *et al.* 2006). Moreover, system features have characteristics that are in effect cultural, and therefore constitute part of the 'mix' of factors affecting the acceptance process. These features affect personal interaction with the system and arise in issues surrounding computer anxiety, gender, motivational factors, personal innovativeness, technical support, perceived credibility, and compatibility (Van Raaij & Schepers 2008).

Certain studies have examined the relationship between technology acceptance and cultural factors in developing countries, more particularly in the Arab World. Hofstede (1991) was amongst the first to investigate cultural dimensions and users' technology acceptance in Arab countries, and the findings revealed a high degree of uncertainty-avoidance among Arab cultures, with people avoiding changes in their life—in this case, with regard to new computer technology. In addition, they tend to resist this kind of uncertainty continually, as they see it as posing new risks in an already uncertain world. In the same context, Hill *et al.* (1998) highlighted Arabs as displaying a particular cultural feature whereby Arabs prefer the traditional ways of communication (*i.e.* in real-time mode, thus including the use of telephones and radio) rather than using ICT to support their communication. Other studies have tended to corroborate these findings, although with differences in the details depending on the part or parts of the Arab World surveyed (Straub *et al.* 2001; Loch *et al.* 2003; Akour *et al.* 2006; Khushman *et al.* 2009).

Overall, Arabs tend to be unwilling to change their habits, traditions, and values in their lives and interactions (Alkadi 2005; Khushman *et al.* 2009). Rose & Straub (1998) investigated the role of various factors as they affected the ways in which technology (specifically ICT) was adopted in five Arab countries. For that study, Rose & Straub (1998) employed the *Technology Acceptance Model* (TAM) that was first elaborated by Davis (1986) and which is described in Chapter Two. In a subsequent journal article, Davis (1989) described how the TAM was based on a theory that relates adopted innovations to perceived ease of use and perceived usefulness. Within the TAM, perceived usefulness related to the degree to which a person believes that using a particular system will enhance their job performance (Davis 1989). Rose & Straub (1998) found that generally within the culture of the Arab World, individuals tend to be more collective and family-oriented, to the extent that they view websites and the internet as possible threats to family and social life (Alkadi 2005). Following on these findings, serious attempts have been made by interested scholars to investigate how cultural factors in Arab countries might influence user acceptance and adoption of new technologies, as a specific focus in the larger issue of the importance of technology transfer into the developing countries (Fandy 2000; Khushman *et al.* 2009). However, it is to be noted that worldwide the new technologies are generally being adopted by the younger sectors populations, for social rather than formal purposes (Becta 2008).

This trend played a pivotal role in the rise and spread of the *Arab Spring* that began at the end of 2010 (Stepanova 2011). The political establishments in Tunisia, Libya and other countries were overwhelmed as the new technology enabled people to communicate directly with each other and to bypass official channels, when calls appeared on Facebook and Twitter pages to protest against the corruption and monopoly of power in those countries, and even to overthrow the regimes (Allagui & Kuebler 2011). These social networks were the medium through which protesters spread their discussions within and across groups, enabling them to participate in the political process more effectively and to maintain contact with those sharing the same opinions (DeLong-Bas 2011). Social networks and social media opened the door for forbidden political attitudes to be expressed openly over the internet and they created an immediate interaction between opposition leaders and people to react against the *status quo*, using different kinds of media and technology to broadcast their beliefs, to show their circumstances and to organize their activities (Beaumont 2011). Mobile phones, digital cameras and the internet bridged the gap between these countries and the rest of the world. Millions of people were able to watch events unfolding inside those countries through the videos uploaded to You Tube and via the shared links and clips on the social networks. Technology has extended freedom of expression to many of those previously deprived of it, by inventing a cyber-world in which new opportunities are available to inform oneself and express one's opinions and attitudes regardless of affiliations (DeLong-Bas 2011). Technology is seen by the younger Arab generations as the new cyber battlefield for changing their world (Beaumont 2011). The use of ICT in the Arab Spring since 2010 may play a powerful role in gaining acceptance for ICT amongst those in the Arab World who might be less willing or even be positively hostile to accepting 'technology' and innovation.

1.5 The Education System in Oman

1.5.1 Historical Background

Upon his accession in 1970, His Majesty Sultan Qaboos bin Said immediately identified the development of an education system as one of the most urgent priorities for his country (Skeet 1992). At the very outset, whilst detailed plans were still being formed, developments in the education sector began with the expansion of education activities from the existing Quranic schools and Masjid workshops—which had always been the traditional institutions of learning—to newly-built schools that offered similar courses covering Arabic and Islamic studies. However, as the detailed plans were put into operation, the education sector began to develop away from traditional Islamic education and adopted formal education with a more substantial secular element. An extensive school-building programme was launched, and a range of subjects was introduced by the government through a planned curriculum, with courses and materials and courses developed and delivered by professional teachers (Al-Bulushi 2010). Since 1995 educational developments in Oman have been driven by the strategies published in the policy document *Vision for Oman's National Economy: Oman 2020*—the blueprint for national development from 1996 to 2020 (MONE 1995)—which assigns a central role to education training for national development. Current policy is driven by the challenges of globalization, the expansion of global knowledge, as also by transformations in the economy, information technology and the development of human skills (Issan & Gomaa 2010). The programmes have been subjected to critical scrutiny by His Majesty as well as by those delegated by him, in accordance with his continued affirmation that an educated population is the nation's ultimate human resource (Al-Abri 2010).

The major developments in Oman's education system were guided by a series of five-year plans that began in 1976. The first stage of development (1976–1980) focused on the rapid quantitative development of the education system, providing educational facilities first of all in the major centres of population, and then extending the process to other parts of the Sultanate. In the second, third and fourth stages (1981–1995), in addition to the continuing spatial expansion programme, Oman's Ministry of Education (MOE) began to introduce measures to improve quality of delivery. The development policies aimed at achieving two important goals. The first was to arrive at a balance between the provision of educational quantity (in terms of spatial dissemination, numbers of subjects on offer) and the quality of delivery. The second was to attempt the balancing and rationalization of investment and provision for the various educational levels (primary, secondary, higher/tertiary). Following the publication of *Oman Vision 2020*, the fifth stage of educational development was launched in 1996 (Issan & Gomaa 2010), in which the extension of educational services to cover *all* settled areas was continued, whilst educational policy focused increasingly on the process of qualitative improvement.

1.5.2 State School System Reforms

The fifth Five-Year Plan (1996–2000) aimed at keeping pace with the changing circumstances and modernization occurring in most aspects of Omani social life. The goal of the educational reforms has been to ensure universal education for all Omani citizens and to provide them with lifelong skills to help them participate in and benefit from the move towards a modern society (Issan & Gomaa 2010:19). From the academic year 1998/1999 the MOE commenced the introduction of the *Basic Education* programme (*see* Figure 1.1).

Figure 1.1: Overview of the Omani Education System (Porcaro & Al-Musawi 2011)

The Basic Education (*BE*) restructuring programme is intended to gradually replace the *General Education* system—with primary, preparatory and secondary levels—founded in 1972. The *BE* system is divided into two full cycles, the first cycle covering pupils of ages 6–9 (Years/Grades 1 to 4) and the second covering those aged 10–15 years (Years/Grades 5 to 10). After the second cycle, an additional two years of post-*BE* tuition are taken to prepare students for the world of work or for higher/further education (MOE 2004:14). There are seven Educational Regions (*ER*s) into which Oman is (*see* Figure 5.1, Chapter Five). The integration programme of the *BE* system has progressed well, but owing to the history of Oman the highest concentrations of population are to be found in three contiguous *ER*s—Muscat, Al-Batinah North and Al-Batinah South. These three *ER*s consequently had the highest concentration of eligible schools suitable for taking part in this study's fieldwork.

Issan & Gomaa (2010:21) describe how the Omani government had been considering reforms in the secondary-school sector for many years. Under the General Education system, there existed various discrepancies between schools in different parts of the country regarding the years for admission and discharge of students. Therefore, following the introduction of the *BE* pattern into the primary schools, the MOE in 2000 proceeded to synchronize the system. The secondary-education reforms began with a series of seminars and workshops, where experts presented three models for delivering the reforms: (1) the Multiple-Path Learning-Centre Model (MPLC), based on competency-based mastery learning; (2) the Essential Skills Learning-Centre Model (ESLC), which is based on business communication and is applied to the real world; and (3) the Guided Independent Learning-Centre Model (GILC) for equipping people to be lifelong learners, offering generic knowledge and skills. With the decentralization of school administration and the introduction of school-based management, individual schools would be able to select from the three models the one that was considered to be most appropriate to the school's individual circumstances (Issan & Gomaa 2010:21–22). The MOE has thus begun to introduce this new system, which aims to meet current and developing demands by (a) enhancing education delivery in terms of curriculum, syllabus, and content; (b) improving the quality of teaching and human resources; and (c) reducing costs with a focus on the importance of securing a significant return on educational investment.

In the sixth Five-Year Plan (2001–2005) the continuation of the Ministry's policy of the qualitative development of education focused on the cumulative expansion of the Basic Education model for the enhancement of educational delivery at all levels, without losing sight of the need to cater to the educationally-challenged members of society. The seventh Five-Year Plan (2006–2010) included measures to implement the further development of education at post-compulsory (post-Basic Education) levels by a two-year programme in Grades 11 and 12, preparatory to developing the post-compulsory sector that corresponds to what in the UK is called the Higher/Further Education or *HFE* sector (Issan & Gomaa 2010:23). The development of an eLearning framework (ELF) should therefore be designed to fulfil these development goals in accordance with the needs of the learners and those of Oman's education system. The adaptive ELF incorporates the characteristics identified by the MOE as being requisite for running the education programme for the *BE* second cycle; these include curriculum and assessment standards based on learning outcomes and the authentic assessment of learners; learner-centred activity; the development of understanding and problem-solving abilities; adaptation to individual differences; as also adaptability and flexibility for schools to adapt to changing needs in the community (Issan & Gomaa 2010:21).

Al-Lamki (2010) describes how the government's efforts to establish the state education system have resulted in the rapid and dynamic expansion of pre-tertiary education, so that today, thirty years later, the demand for higher education has increased to such an extent that demand has outstripped supply. Oman has achieved a dramatic decrease in child-mortality levels, from 242 per 1000 live births in 1970, to 15 per 1000 live births in 2011—a level that is lower than that of many countries in Europe (CEE 2012). There has been a consequent increase in the numbers of young people attaining school-leaving age. The nation has seen unprecedented numbers of secondary-level graduates competing for a limited number of education and training vacancies at post-secondary level. The Government has previously stimulated the expansion of capacity in the HFE sector by encouraging the establishment of private-sector institutes. In its eighth Five-Year Plan (2011–2015), the Government is also seeking to stimulate expansion in the numbers of job vacancies by encouraging private-sector initiatives in the non-petroleum sectors of the economy. Not only is this in line with the policy of economic diversification, but also provides for an increase in job vacancies by promoting economic activities that have a greater labour-intensive element (including tourism, manufacturing industries, food processing, agriculture and fisheries) and which thus generate larger numbers of job vacancies (Omaninfo 2012).

1.5.3 Integrated eLearning in Oman

The world currently has many powerful tools and methods to connect people at the community level and in the education sector. The development of the ICT sector in Oman is not a recent project but a development strategy that has spanned the last decade. At the turn of 2000, mobile and wireless devices were widely in use not only in developed countries but also in developing countries such as Oman. The Sultanate has fully supported developments efforts through ICT, and therefore rolling out mobile technologies such as the internet, PDAs, WiFi and wireless networks that offer to users the benefits of information access, messaging and communication (Donegan 2000; Clarke 2001; Al-Sabbagh & Molla 2004). According to the Ministry of National Economy (2007), over half of the Omani population possess mobile devices, and mobile infrastructure provides coverage to 95 per cent of the country. Pupils at higher levels of secondary education are able to retrieve their grades through short text-messages, by texting their registration numbers to the MOE.

According to Naqvi & Al-Shihi (2009), the ICT sector in Oman is still under development, as the government has undertaken comprehensive plans to develop the sector, through the National Committee for Information Technology, chaired by the Minister of National Economy. An Information Technology Authority was established in 2006, and the Information Technology Task Force (ITTF) has developed an ICT vision for the country for "the leveraging of Information Technology & Communications in providing collaborative services to public and private sectors and citizens through electronic means, as being the driving force to move the Sultanate into the knowledge-based economy, to achieve sustainable development" (Naqvi & Al-Shihi 2009:818). Focus is centred on the use of information-technology tools to conduct teaching and learning processes independently of the traditional classroom environment. eLearning systems are increasingly offering new ways for teachers and learners to interact by overcoming distance, time and economic constraints (Nelson & Kellogg 2008).

For Oman, the creation of an educational ePortal is a major step to the provision of electronic services to offer a customized experience for users (Osman 2010). The efficient integration of educational technology helps to improve learner performance (Wideman & Owston 2003). According to Elango *et al.* (2008:32), eLearning in Middle Eastern countries has been boosted owing to the internet and world-wide web (www), both of which supply a platform for the creation of virtual-learning centres on computer networks that offer online education. The eLearning market has increased in Oman as more students enrol for online educational courses. Oman's eLearning system is supported by the government through the MOE, whose main objective is the fostering of efficient and effective communication, offering diverse data-driven decision-making that cuts across geographical distance (Osman 2010). In Oman, eLearning is provided within an interactive *virtual classroom* environment via the internet, as well as through self-learning activities within the formal classroom setting (MOE 2010; Porcaro & Al-Musawi 2011). The creation of such a system requires effort, time, financial resources and qualified personnel. It was estimated that the Gulf Cooperation Council states (Kuwait, Saudi Arabia, Bahrain, Qatar, UAE and Oman) spent up to US$72 million in 2004 on eLearning systems, and that the figure would be US$240 million by the end of 2009 (Elango *et al.* 2008:32). The rapid pace of eLearning is attributed to the provision and development of wireless networks, which provide learners with opportunities to connect with teachers and fellow-learners from a variety of places, through an online system in a way that was not possible previously with computer networks that were dependent on landline communications. Wireless networks drastically reduce the *locational dependency* of learners in accessing information and learning resources, thus meeting and expediting the demand for accessible education (Frohberg 2006). Thus the great increase in the uptake of eLearning in Oman is the natural outcome of the introduction of wireless technologies, which has overcome the locational difficulties that the geography of the country has previously imposed on the use of landline-based computer systems.

eLearning systems, with their gateways (educational ePortals) consist of three main components: a body of knowledge, community of practice and services (Hawryszkiewycz 2002). The ePortal acts as a vehicle to provide the user with access to a number of services that present information from a number of sources that are independent. As an interactive learning and digital environment, the educational ePortal serves to link up the various components of the educational process—students, teachers, parents, schools (and, in Oman, the *ER*s and the MOE). The ePortal thus facilitates the educational process and presents the various components in an effective and interesting format. It also facilitates free teacher/teacher, teacher/learner and learner/learner interaction, and in addition helps teachers to organize and follow up the administrative work by making the various system-elements more compact and organized, through a system of correspondence and electronic archiving, including the filing of official forms and reports with the MOE and other authorities (MOE-IT 2011; MOI 2011:154–155).

It has not been easy to introduce eLearning into an educational system that in the case of Oman was almost completely at the pre-digital stage. It has required the positive cooperation of all educational institutions to furnish an effective response to the Ministry's initiatives (Porcaro & Al-Musawi 2011). Besides the state schools—as evidenced by the presence of computer labs seen in most schools that have switched to the Basic Education model—various other educational institutions have also begun to adopt the Ministry's plans. In addition, the Ministry seeks to stimulate and encourage educational researchers and students to pursue research and projects that will contribute further to this development (MOE 2010). Consequently, the present research-work aims to develop a learning-environment to improve geographical educational delivery in terms of teaching, learning and assessment. Additionally, it aims to measure the effectiveness and efficiency of computerizing geography instruction. Geography as a curriculum area embraces many skills and types of information that would benefit from presentation through digital media, reflecting positively on the educational process, in terms of developing the delivery of curriculum on the one hand, and of improving the technological innovative skills of staff and students on the other (Balderstone 2006).

1.5.4 Oman.net, Government Organizations and eActivities

A United Nations report (2005) describes the Omani government's efforts to successfully create an eSystem allowing it to improve its services significantly. The development of online services in Oman began with a stimulus plan by the government to provide internet services in

1997. According to Sahu *et al.* (2009), the introduction of the internet and the establishment of the Digital Oman Initiative in 2003 enabled the government to formulate an ICT strategy that would make it possible to deliver to the population enhanced eServices, eProcurement and privacy (ESCWA 2007). The government and its agencies have in recent years extended the infrastructure necessary for eGovernment by establishing the Information Technology Authority (ITA). Since its inception in 2006, this body has seen several eServices being implemented, such as ePayment, eLearning, eBilling and eProcurement (Sahu *et al.* 2009). This is coupled with the development of an online strategy to introduce and create a digital society in the country. The ITA (2006) has published its so-called *e.Oman* strategy to move Oman forward into a knowledge-based economy, as shown in Figure 1.2.

Figure 1.2: e.Oman strategy
(Source: http://ita.gov.om/itaportal/ITA/strategy.aspx?NID=646&PID=2285&LID=113)

Thus, in implementation of the *Oman 2020* policy document, the government in rolling out provision of and support for eServices across the economy, in accordance with its focus on the development of the ICT sector (Sahu *et al.* 2009).

1.6 Overview of Educational ICT in the UK and UAE

1.6.1 Educational ICT in the United Kingdom

ICT in the UK was initially taught by individual schools, but was later introduced into the national curriculum, where most UK students can access free ICT training to GCSE level. In response to the growth of ICT, the National Council for Educational Technology was founded in 1967, to evaluate and promote the use of information technology in schools (Leask &

Pachler 1999). This body was superseded in 1997 by the British Educational Communications and Technology Agency (Becta), which was mandated to oversee the development of educational ICT networking in the UK (Vanderlinde *et al.* 2010). The UK government had been active in promoting ICT in schools and had created an eLearning strategy. The UK Department for Education & Skills in 2003 noted that "eLearning and eDelivery have the potential to offer complete and personalized support for learners' needs throughout the learning process, from information, advice and diagnostics through to an electronic learning log at the completion of a course" (Beetham 2006:3). Under this strategy it was planned that learners would be encouraged to use ePortfolios, as these introduce the learner to a range of digital resources that can help the individual learner to make progress in achievement though informal as well as formal learning activities. Through the active involvement of the learner in managing the portfolio-building process, more opportunities can be created for the individual learner to review and reflect on personal development. This reflective process has the potential to encourage learners to practise social skills by accessing other parties such as fellow-learners, teachers, prospective employers and various relevant bodies (Beetham 2006). Such an eLearning environment can be directed towards the achievement or support of several processes, including summative assessment, presentation, learning and 'learning to learn', as well as pursuing professional and personal development plans (Beetham 2006).

To implement this campaign Becta worked with Joint Information Systems Committee to develop the necessary ICT strategies (Young 2008). One of the ICT initiatives that promoted the growth of educational ICT networking in the UK was *Curriculum Online*, which operated the *eLearning Credits Scheme* (ELCS) that sought to introduce more ICT and multimedia resources into schools throughout the country. This initiative ceased in 2008 (CAI 2009). With the effects of the international financial and banking crisis growing ever stronger, the UK government decided to introduce various spending cuts. As a result of the financial reviews and the feeling that it had become redundant, it was decided that Becta would close on 31 March 2011. Consequently, ICT networking in the UK's state schools underwent a major shake-up, with stakeholders giving divergent opinions on the future role and effects of ICT in the educational sector. Concerns were expressed on many sides concerning the future effects upon the provision of ICT in state schools (MJO 2010). Some stakeholders such as Bernadette Brooks of the educational ICT association *NAACE* (National Association of Advisors for Computers in Education) asserted that the UK government had long lacked the emphasis that the UK's competitors laid on the need to invest in educational skills in the education system. Brooks cited the policy statements of countries such as the United States, UAE and Hong Kong as those in which educational ICT has been identified as "a key component for a 21st century education" (Hitchcock 2011). Brooks also asserted that, although it was a positive step for the government to promote freedom for individual schools to invest in ICT, cutting funding and abolishing advisory agencies such as Becta created new challenges for the inclusion and growth of ICT in the education system.

The spending-cuts introduced by the UK government and the vacuum caused by the closure of Becta imposed limitations on the abilities of schools to invest in ICT. Schools have had to seek new ways to raise funds to develop their ICT sector (Collie & Lewis 2011). However, schools have been able to raise funds under new government schemes, as well as with the external support of suitable agencies and groups offering financial assistance and/or giving advice regarding standards and best value (O'Hara 2012). Furthermore, a commitment was made by the Department for Education (DfE) and Department for Business, Innovation and Skills (BIS) to continue certain key areas of Becta's work (Driscoll *et al.* 2012). Recent trends have also seen a growing critique of the way in which ICT is taught within UK state schools, with calls for a shift away from previous practice towards placing greater focus on ICT as a computer science in its own right (Cellan-Jones 2011; Burns 2012). In January 2012 the Department for Education announced that ICT would be replaced by a more rigorous Computer Science syllabus (DfE 2012).

Despite the challenges that have affected the ICT and eLearning sectors in the UK, the literature has proved that eLearning is effective when it is combined with traditional classroom-based learning—the approach known as *blended learning* (Heinze & Procter 2004; Graham 2005). Through an empirical study, Childs *et al.* (2005:20) showed that eLearning fails when it is beset with challenges such as inadequate technology, poorly designed learning-packages, time-sensitive issues of eLearning, anxiety regarding computer use, and the need for large amounts of face-to-face teaching-time. They recommend various strategies for overcoming such problems in the attempt to create an effective eLearning environment. Their proposals included the incorporation of standardization wherever possible, independent funding strategies to supplement official disbursements, the adoption of blended teaching (typically in the form of an integrated combination of online teaching and face-to-face teaching), the formation of mutual support networks between schools, the careful selection and adoption of user-friendly packages, skills training programmes for teachers as well as students, the formal integration of eLearning into the school curriculum, and the allocation of dedicated time on the eLearning system for each individual student (Childs *et al.* 2005:20).

1.6.2 Educational ICT in the UAE

Contrary to the situation in the United Kingdom, the United Arab Emirates (UAE) has established a fund to promote information and communication technology in their educational system. Indeed, the US$25 million allocated for the year 2011 not only targeted the education sector but also new business start-ups (ECSSR 2012). Such initiatives are managed by the ICT Fund, a UAE government agency based in Dubai, which particularly targets educational ICT research and development within the borders of the UAE, as well as supporting ICT scholarships and laboratories overseas. Bodies such as the ICT Fund have been helpful in the promotion of digital progress in education systems by financing research centres as well as through entering into partnerships with institutions such as high schools, colleges and universities (Inoue 2007). Additionally, the ICT Fund had a mandate to receive domestic proposals regarding ICT research and projects from all over the country and in line with this mandate, UAE students and researchers were encouraged to present their ICT ideas for funding consideration until September 2011 (AbdelMohsen 2011).

One of the benefits that the ICT Fund has brought to the UAE's education system is the *National Research and Education Network*, which is a complex network of several public and private schools, colleges, universities, and other institutions of learning and research in the UAE. These institutions also have research, development, educational and training links to other international institutes (Moussly 2012). In addition to the ICT Fund, there are projects that the government has initiated to support the introduction and use of ICT in schools (Sowa & De La Vega 2009). Through the combined efforts of the UAE Ministry of Education, the Abu Dhabi Education Council and the Dubai Education Council, the project was launched with the organizing of a three-day ICT training workshop for ICT teachers across the country (MOE/UAE 2009). Among the subjects covered in the training sessions were ICT tools for education, such as eLanguages and Global Gateways (Gaad 2010). These advances in technology are transforming education (Oblinger *et al.* 2001), as changes lead to a broader use of digital course-materials (Chick *et al.* 2002). Technological features such as videoconferencing and multimedia devices have been associated with the enrichment of eLearning as compared to face-to-face instruction. On the other hand, eLearning has benefited from technologies such as local-area networks, wide-area networks and the internet, which offer opportunities for interaction between teachers, learners and learning materials (Hadengue 2004).

1.6.3 UK and UAE: Comparison

The important role played by ICT in education systems in the contemporary world cannot be overemphasized. Countries such as Oman, the UK and the UAE are among those seeking to embed ICT in their education systems. Although the UK is considerably advanced in incorporating ICT in its education system, some stakeholders regret the abolition of Becta, the agency that provided funds, support, and advice on best-value ICT and standards. The UAE on the other hand continues to invest heavily in educational ICT to ensure that it remains sufficiently competitive with competitors such as the UK as far as ICT growth and development is concerned. Overall, the effective use of ICT in schools can have an immediate positive impact on the school learning environments. This was described by the OECD (2006:6) as "the creation of a dynamic interaction between learners and teachers, increasing collaboration and team work in problem-solving activities, stimulating creativity in both students and teachers, and helping students to control and monitor their own learning... Further, the successful use of ICT in schools can help students to develop skills, both specific to ICT and more generally, that will be useful to them in their future academic and professional lives". The use of ICT also enables teachers and learners to interact with each other more effectively, through the powerful range of tools developed for imparting knowledge, using information and giving feedback. The ways of teaching and learning are transformed wherever ICT is introduced. A constant stream of new studies seeks to incorporate the latest technological innovations into education, specifically in the three key components that make up the educational process: teaching, learning, and assessment.

1.7 The Importance of this Research

The importance of this research can be summarized under three main headings, according to its applicability. In first place is the immediate topic of geographical pedagogy in Oman, as this research is focused on the area of teaching expertise of the author. Beginning from the base of geographical eLearning, it is hoped that this research will extend to other subject-areas in the Oman second-cycle education system. In the second place, this research seeks to raise wider issues regarding educational innovation and eLearning in Oman. In the third place, all competent research should be able to act as a seed-bed for further academic endeavour and for professional development. These three themes are elaborated in Chapter Eight, in various research ideas relevant to the education system in Oman and other Gulf Arab countries.

1.8 Research Questions

This research aims to answer three main questions. The first relates to the fieldwork, the second addresses wider issues of technology acceptance, and the third addresses the wider relevance of the research.

Research Question #1 (eLearning for Geography in Oman)

Regarding the effectiveness of developing an adaptive learning environment based on the electronic teaching of geography... to what extent is this dependent upon the achievements and attitudes of tenth-grade *Basic-Education* students in Oman?

There are certain points that are relevant to posing and answering this question:

Q.1.1—What are the difficulties that might face the introduction of a geographical eLearning framework in schools in the second cycle of Basic Education at the tenth grade?

Q.1.2—What are the quality and interactive aspects of an eLearning framework that can assist the teacher to reduce learner resistance to eLearning and technology?

Q.1.3—What are the specification-requirements for developing an eLearning framework to support geography teaching/learning?

Q.1.4—How can the development of an eLearning framework for teaching, learning and assessment contribute to improving the progress and learning outcomes of *BE* tenth-grade students in Oman?

Research Question #2 (Use of the TAM)

How can we utilize the Technology Acceptance Model to understand the factors that affect teachers' and students' acceptance of eLearning systems and websites?

Q.2.1—What is the relationship between the technology-acceptance factors and teachers'/students' attitudes towards using eLearning?

Q.2.2—To what extent can developing a learning environment influence students' attitudes towards using technology within the *BE* tenth grade?

Q.2.3—How do we utilize a Technology Acceptance Model for evaluating eLearning?

Research Question #3 (Comparative Study)

How do we contrast two different cultures, to see if social and cultural differences can affect the acceptance of eLearning—through a comparison between teachers/students in the UK (western culture) and two Arab countries (Middle Eastern Arab culture)?

Q.3.1—What factors are identified in the literature for comparing different cultures for Technology Acceptance?

Q.3.2—How to assess social and cultural factors and to explore the relationship between these and the teachers' and students' acceptance of eLearning?

Research Hypotheses

There are also three Research Hypotheses, which are described at the beginning of Chapter Four in order to highlight the methodological aspects that are mentioned in them. Here, suffice it to say that they refer to the statistical levels of significance between the results for pre-tests and post-tests in respect of the experimental and control groups of students.

1.9 Structure of the Thesis

This thesis addresses both theoretical and practical issues. The theoretical part will focus on eLearning, the concept and practice and other activities that relate to the teaching/learning environment. The capacity of cultural factors to affect technology acceptance in the same environment is also explained. The practical part concentrates on applying the virtual learning environment as a case study for this thesis.

Chapter One explains the role of eLearning in the classroom environment with an overview of the development of the education system in Oman, the status of educational ICT in the UAE and UK, and the relationship between technology acceptance and cultural factors. It also sets out the importance of the research and states the research questions.

Chapter Two examines the literature relating to educational theory and its bearing on eLearning in its various aspects, the development of eLearning practice and assessment. It also focuses on issues such as the role of cultural/local factors in the learning process and the acceptance of technological innovation. It also reviews relevant eLearning software.

Chapter Three describes the conceptual frameworks of the thesis that provide the foundation and organization for the eLearning framework (ELF) in this study.

Chapter Four presents the research approach and strategy to collect and analyze data.

Chapters Five and *Six* review the methods of surveying learners and teachers, and describe the experimental parts of this study.

Chapter Seven discusses the data gathered in the two experiments and the questionnaire survey results for learners and teachers.

Chapter Eight summarizes the important points of this study and suggests further ways for collecting new information discovered that can be helpful to build new approaches. It also includes recommendations for further work.

CHAPTER TWO: LITERATURE REVIEW

This chapter reviews a range of literature dealing with the various aspects of educational theory and practice relative to eLearning. After discussing various general and specific issues surrounding eLearning in its various aspects, the review turns to the literature relating to the assessment and evaluation of learning outcomes. Then there follows a discussion of various factors (cultural and otherwise) that influence the users of technology, and the effects that these factors exert upon the learning process and the acceptance of innovation. The concept of the *Technology Acceptance Model* (TAM) is introduced and discussed. Finally, the chapter deals with eLearning as it affects the teaching of geography, and reviews developments in eLearning computer software specifically relevant to the present study.

2.1 Educational Theory and eLearning

Theory enables one to survey the panorama of a subject and to view practices from a broader perspective. According to Wilson (1997) there are three functions of educational theory. Theory assists in building on what is already known, in visualizing new approaches, and in discovering new techniques in practice. A review of the literature shows that whilst many educational theories have been advanced to explain learning, the major approaches are derived from behaviourist, cognitivist and constructivist theories (Palmer 2001). The diversity can be seen in the way that for eLearning various education theorists have recommended Kolb's experiential learning cycle (1984), Jarvis's reflection and learning model (1987), Barnett's framework for HE (1990), as also Laurillard's conversational framework (2002). It is clear that the field of education has been trawled widely, as these established theories offer focus and emphasis on different specific theoretical perspectives (Jones & Mercer 2003).

Pedagogy is the educational discipline that was generally adopted in school teaching prior to the rise of computer-based education, and pedagogy stills forms the foundation for much of the educational processes that take place in schools today. It is characterized as a type of educational process that is teacher-focused, whereby the teacher bears the responsibility for developing learning content as well as for other aspects of the learning process. There are three broad approaches to learning that have been applied to pedagogy—behaviourism, cognitivism, and constructivism. Behaviourism traditionally underlies the instructivist approach to teaching, in which 'packets' of information are set before the learner to be assimilated into the memory for retention and subsequent use. According to Lefrançois (1988:29), behaviourist theories "make use of one or both of two principal classes of explanations for learning: those based on contiguity (simultaneity of stimulus and response events) and those based on the effects of behaviour (reinforcement and punishment)". According to Jones & Tanner (2002), the behaviourist model focuses on the teaching environment, with the teacher as the driver of knowledge and understanding. In this model, the learner acts solely as recipient of what is imparted by the teacher. In contrast, Piaget (1957) advocated a different model of learning—one which takes greater account of the individual student's mental processes and experience—the cognitive and affective aspects of learning (Wadsworth 1996). Cognitivist theory focuses on how human memory works to promote learning—the ways in which a learner sorts and encodes information and events into short-term and long-term memory (Kirschner 2002; De Jong 2010). Thus, for the cognitivist, the focus should rest more on how the learner engages in knowledge acquisition through the organization of personal cognitive mental structures (Ravenscroft 2001). Cognitivism highlights how the learning process is different for each person in consequence of the individual's background and previous learning experiences.

The relativist position that is an essential part of the cognitivist approach is further developed in constructivist theory, which has long been viewed as being especially relevant to eLearning (Jonassen *et al.* 1993). Newby *et al.* (2000) have sought to associate constructivist educational theory with eLearning, by building on the social learning theories of Bandura (1973, 1977) and Vygotsky (1978). Indeed, the social aspect of learning is one of the fundamentals of constructivism. The constructivist view is that knowledge is first constructed in a social context and is then appropriated by individuals (Wertsch 1985, 1991; Cole 1991; Bruning *et al.* 1999). Constructivist theory assumes that knowledge is a dynamically subjective and adaptive process, where realities are often liable to change; consequently contemporary structures and linkages are the basis on which knowledge should be built (Bednar *et al.* 2002). Within a constructivist framework the teacher/instructor becomes a facilitator of the learners' self-directed learning, whilst both facilitator and learners are equally involved in learning from each other (Glasersfeld 1989). In this approach the learning experience is both subjective and objective—thus requiring that the instructor's personal *habitus* (i.e. culture, values and background) becomes an integral part of the interactions that take place in the constructivist process. The knowledge is thus attained or 'constructed' by a social process, and it is also appropriated by the individual learner through a social process. The individual learner makes a comparison of his/her version of knowledge with those of the instructor and fellow learners, by a sort of 'mental mapping' process. The outcome is a socially-tested version of knowledge (Hung & Nichani 2001). Educators who are critical of the self-directed approach to learning hold it essential for teachers to have a more actively directive role, in order to challenge those learners who would otherwise not participate actively or who would take the path of least effort. The capacity for critical engagement tends to diminish in cases where educators are reduced to the capacity of non-interventionist facilitators (Salmon 2004). Besides the voicing of certain reservations on a practical level regarding the constructivist approach, constructivist theories have been challenged on the grounds that an examination of their theoretical foundations reveals the basic assumptions of constructivism to be flawed (Meyer 2009).

Behaviourism, cognitivism and constructivism have been the three dominant theoretical approaches used in the delivery of pedagogy and the creation of teaching environments. It has been noted that these theories were developed before technology began to have a transformative impact on education and learning. It is true that since the second half of the twentieth century technology has reorganized how people live and communicate and, in many cases, how people learn (Grabe & Grabe 2007). Papers by Downes (2005) and Siemens (2005) put forward the view that existing learning theories have become outmoded. They offered 'connectivism' as a paradigm of learning theory for the digital age. They developed their ideas on the basis of the concept of 'distributed knowledge' (Halpern & Moses 1990; Fagin *et al.* 1995). "Loosely, 'distributed knowledge' is knowledge that is not possessed by any single mind, but 'belongs to' a group of interacting agents, somehow emerges from the aggregation of the (possibly tacit) knowledge elements of the individual agents, and can be mobilized for productive purposes" (Foss & Foss 2002:1). They took the concept further by positing the creation of new learning and knowledge by exploring and exploiting the linkages between bodies of existing knowledge—the network as generating knowledge (Stein & Stren 2001). In this approach there is no place for a figure of authority to direct the learning process or adjudicate on points requiring clarification. Questions have arisen regarding the suitability of connectivism for aspects of learning such as the traditional classroom, open and distance education (ODE), and eLearning (Kop & Hill 2008). The lack of any directive element external to the learner in this model has caused concerns about the lack of critical engagement online (Norris 2001). Especially (but certainly not exclusively) amongst younger students, the temptation to engage with less challenging transactions can be strong. The lack of critical engagement by a tutor entails a high level of learner autonomy that might not be beneficial to the learner (Kop 2008).

Certain educational theorists (*e.g.* Sfard 1998; Paavola *et al.* 2004; Paavola & Hakkarainen 2005) have described the divisions existing between the metaphors of learning and knowledge in terms of *acquisition* and *participation*: **learning** can be seen in terms of the process of acquiring information, whilst **knowledge** is then seen as acquisition leading to *possession* (having *contributed* to the *creation* of such knowledge). On the other hand, learning can also be seen in terms of the participation of the learner, as knowledge is a part of practice, activity and discourse (Sfard 1998; Hargreaves 1999; Anderson *et al.* 2000; Paavola *et al.* 2004; Paavola & Hakkarainen 2005). Hence, with regard to an adaptive framework of pedagogy (as in eLearning), it is possible to view learning as proceeding from the learner's participation, thereby leading to the creation of knowledge.

Moreover, Bruning *et al.* (1999) have identified instructivism as also being a relevant educational approach that, although normally associated with traditional classroom instruction, also has bearing on eLearning. The instructivist approach ensures that students acquire knowledge quickly to a certain level (McKenna & Laycock 2004). This prepares them for the more lengthy process of discussion and reflection. Within an eLearning environment, the instructivist approach is used to build up learners' background knowledge. By providing a core set of course-content units for compulsory study, the knowledge thus made available to all the learners ensures that there is 'common ground' for the process of constructivism to take place (Herrington & Standen 1999). In other words, an instructivist sub-model can be lodged within a constructivist framework (Savery & Duffy 1995). In the case of the present study, it was soon realized that the use of an instructivist approach alone would most likely create a boring online experience; therefore, instructivist and constructivist approaches were combined. It is for this reason that the proposed ELF depends on the teacher to impart knowledge and act as director while incorporating a learner-centred approach.

The importance of considering educational theory in designing an ELF stems from the realization that elements of these theories and approaches can link eLearning content to effective teaching/learning processes (Grabe & Grabe 2007). However, if the elements are not coordinated into a harmonious whole, they can impede the processes they are supposed to facilitate (Johnson & Liber 2008). The cultural dimension in schooling has also to be taken into account for effective learning (Thomas 2000), as well as for technology acceptance. Indeed, various researchers have tried to show that the eLearning process is drawn on theoretical positions such as those of constructivism, but they have not conducted sufficient investigation into the embodied principles and values of those approaches (Oliver *et al.* 2002). The conclusion to be drawn is that researchers need to adopt a controlled and pragmatic approach in selecting elements of the theories for incorporation into their research exploring the eLearning process. For the current research work it has been found advisable to design the ELF with a pedagogical foundation built on elements of behaviourist, cognitivist and constructivist learning theories that are important features for teaching and learning in practice. The research for this study indicates that a theoretically consistent learning approach can be based on the inter-relations of the features of the various learning theories, and on the mapping of these with relevant resources and tools. Based on these pedagogies, the present research has identified an eLearning environment model that is founded on a modified behaviourist approach employing teacher-centred learning activities. This takes into account the demonstrated need for the teacher to be actively directive or even interventionist, to achieve an optimal experience for the inexperienced learner. This type of pedagogic experience is linked to the total teaching and eLearning environment, in which the teacher is the centre of all the processes. The insights of behaviourist theory can also be seen in various features of the ELF design. For instance, ICT tools and eLearning applications have been installed to help the system manager (the teacher) to monitor observable teaching and learning outcomes. This is certainly an instructivist-oriented approach. However, to the requirements of the present study, and in general terms for assessing the effectivity of innovation in educational delivery, this is not only desirable but necessary. Other features incorporated in the ELF enable users to make adaptive responses to teaching and learning tasks, with programs alerting users to assessment (including self-assessment) and feedback opportunities.

The literature provides this study with evidence that a mixed pedagogical approach is particularly suited to an interactive environment for building knowledge and solving problems. For this reason, features characteristic of an interactive environment as described in the literature have been factored into the experimental ELF. Additionally, the application of the theory makes it possible for this ELF to focus on teaching and learning activities that are task-oriented, encouraging self-direction and hands-on activities. This approach has been used since it is highly applicable to a geography curriculum, which requires structured learning environments especially where simulated tools are used to construct conceptual geographical structures. Cognitive pedagogical theory has been employed to help the ELF to focus teaching and learning activities on the internal cognitive structures of the learners, focusing on the transmission and processing of information through problem solving, inference and explanation.

2.2 eLearning Pedagogy: Further Considerations

A review of the literature has so far shown that there is a steady stream of innovations and technology, which have given rise to new possibilities and concepts in education, as web-based education and electronic learning are increasingly becoming prominent forms of education. Regarding claims that eLearning courses can be run along the lines of traditional teaching, the research shows that a rigidly uniform eLearning system cannot satisfactorily handle a diverse range of users who have different prior knowledge, backgrounds, interests, attitudes and learning styles (Cooze & Barbour 2007). Therefore, there is need to create instructional content that takes into account the cultural, social and pedagogical characteristics of prospective target learners.

Constructivism proposes that true learning occurs only when there is interaction and discussion of content, through a *community of learners*. Newby *et al.* (2000:13) found that social interaction challenges learners to improve their critical thinking and deepen their learning as they discuss topics. Constructivism encompasses the community-centred concept that encourages interaction between participants in eLearning environments. The constructivist approach has been applied to the present research, as measures have been taken to encourage interaction between learners, teachers and content by incorporating social media and discussion boards into the experimental ELF. This particular feature of eLearning also figures as an essential element in the educational approach of collaborative theory, which focuses on the interaction occurring between the operative components of the learning process—teachers, students and content (Koschmann 1996; Bernard *et al.* 2000). The basis of the interaction is identified by the literature as student/student, student/content, student/teacher, and teacher/content (Moore 1989; Anderson 2002, 2003). The researches of Anderson (2002, 2003) developed a framework to show the relationship between the different interactions in a typical eLearning environment, and these are detailed in Figure 2.1

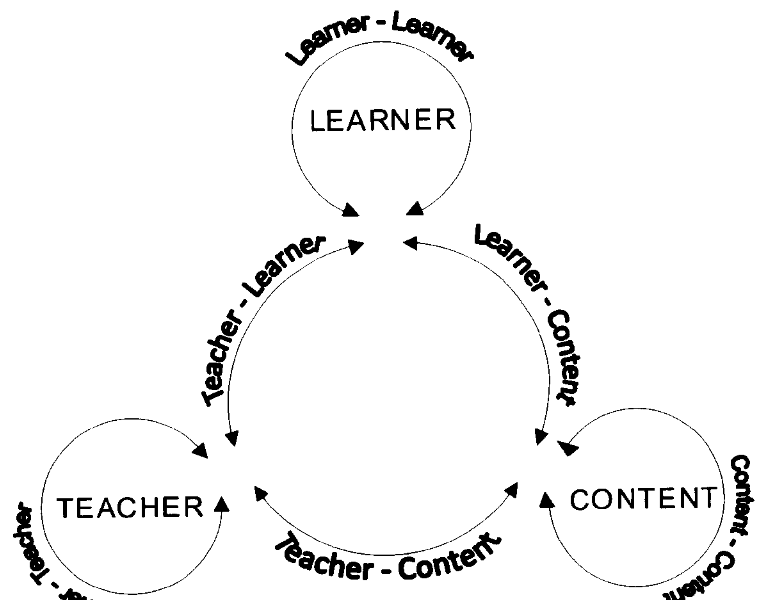

Figure 2.1: Educational Interactions (*based on* Anderson 2003)

The educational theory of pedagogy embraces two areas of operational significance—general educational practices and specifically childhood-focused educational practices. According to Knowles *et al.* (1998:62), pedagogy is apposite for school-age learners as it assigns to the teacher the responsibility of making decisions regarding learning. Therefore, in this approach all the knowledge required for the geography syllabus is sourced by the teacher—using the instructivist approach to establish common ground amongst the learners and to prepare the way for constructivist interaction. Pedagogic theory and practice have evolved over the years to embrace constructivist trends (Lehman & Chamberlin 2009). Thus there is little if any tension in practice between the older and newer approaches. In eLearning systems designed for students such as K-12 learners in the USA, reliance is placed initially on the knowledge of the teachers and on the direction they offer to the learners. Dede (2006) identified an educational need created by the spread of technology. He concluded that modern conditions required that pedagogical approaches should be adapted in order to develop the learning processes of pupils both inside and outside school, so as to engage their interest in gaining the knowledge and skills relevant for a knowledge-based society. This pedagogical approach has been taken into account in the design of the experimental ELF, to develop critical thinking skills in Omani secondary-school students. The goal is that the ELF should be firmly focused on promoting learners' thinking-skills in geography course work and design, rather than simply expediting the students' acquisition of the content and knowledge provided by the teacher. Jones & Tanner (2002) describe the teacher-centred approach as typically focusing the concerns on the teacher's perspective and experiences rather than those of the learner, so to mitigate this bias the eLearning environment should include features that promote online socialization, access and motivation, information exchange, development and knowledge construction (Jones & Tanner 2002).

Overall, the present study makes use of educational theories that meet the goal of the research to produce an effective ELF for this purpose, by considering the need for incorporating key components of the educational process, which include teaching, learning, and assessment. Moreover, this research posits the importance of designing an ELF built on a pedagogical foundation but which also incorporates elements of behaviourist, cognitivist and constructivist approaches. This entails models of three learning theories whose characteristics form an important feature of teaching and learning. The conceptual framework thus creates a learning environment founded on the behaviourist approach (having foundations identical to the instructivist approach) which entails teacher-centred learning activities. This pedagogic model is introduced into the overall eLearning environment, where teaching and eLearning content are created and directed by the teacher for the benefit of the first-time eLearner. The desire is to produce a framework that can accommodate the particular needs of second-cycle students in Oman, whilst also promoting increased interaction and independent learning among them. From an initial approach in which learners are closely guided, the end-goal is to encourage them to construct new ideas by testing acquired knowledge through the solving of problems.

2.3 The Concept of eLearning

Many definitions and descriptions have been put forward for eLearning. Most of them refer to its functional association with the internet, which for the teaching/learning process offers a broad array of technologies that enhance knowledge and performance (Morri 1997; Rosenberg 2001; Cross 2004; Mason & Rennie 2006; Clark & Mayer 2011). To a very large extent, the concept of eLearning involves networking and the delivery of information to the end-user through computers via internet technology, as well as focusing on a wide view of what learning is and what it entails (Rosett & Sheldon 2001; Mason & Rennie 2006; Clark & Mayer 2011). eLearning environments have evolved considerably from the original content-design model that consisted simply of basic learning materials produced as page-turner documents, which offered no interaction or opportunity for the dynamic exchange of elements (Dark & Perrett 2007). Currently, efforts are directed towards the development of high-quality and interactive programs that can assist teachers in addressing resistance on the part of learners who have had unfavourable computer-related experiences.

Theorists such as Garrison & Shale (1990) treat eLearning as a distinct subset of learning, and define the provision of an effective eLearning environment as being based on the convergence of four 'lenses' of focused endeavour—learner-centred, knowledge-based, assessment-centred and community-centred. According to Rourke & Anderson (2002) the learner-centred lens necessitates awareness of learners' cognitive structures and understanding, in terms of prerequisite knowledge and cultural attributes. Without prior learner input into the database, eLearning technology cannot offer the teacher opportunities to identify and work with learners' background experiences. Consequently, an effective system needs to be installed that allows the teacher to initiate the process by offering incentives and opportunities to learners to share their attitudes, cultural orientations and understandings through social forums/surveys. For McPeck (1990), effective learning does not occur in a vacuum, but rather in grounded knowledge and skills. Therefore, computer-based learning should allow learners to reflect on their thinking, their capacity, knowledge and skills in relation to the eLearning content. To Freire & Pereira (2007:181), the cognitivist approach requires that content be presented in multiple modalities, through the duplication of information through auditory and kinaesthetic forms, with the structuring of information to be absorbed in sequence. Under cognitivism learning occurs through the absorption of information by multiple senses, and by the storing of this information in multiple structures of the memory, for easy retrieval of knowledge. Therefore, it is argued, content must be developed and ordered in a manner such that it is easy for the learner to absorb, store and retrieve (Lusk *et al.* 2009). Additionally, Bransford *et al.* (1999) identify assessment as a necessity in the eLearning environment, especially formative assessment that seeks to motivate participants, to provide feedback to teachers and learners, and to be informative to all.

The community-centred concept of education expects an eLearning environment to utilize social cognition to take account of learners' needs so as to help them create knowledge through collaboration. The 'four lenses' or concepts of Garrison & Shale (1990) can be broadly categorized with reference to the theories of pedagogy, instructivism, constructivism, and andragogy (or adult learning theory). According to Bruning *et al.* (1999:215), constructivism deals with "the learner's contribution to meaning and learning through individual and social activity". This is very relevant to the ELF developed in the current study, which seeks to offer geography students a learning experience that is situated in real life, giving them the opportunity of participating in hands-on activities, by creating dialogue between teachers and learners, and offering guided learning and authentic assessment (Harlen & James 1996). According to Freire & Pereira (2007), the social perspective inherent in constructivism predisposes designers of eLearning systems to support the group-based construction of knowledge. Students interact by making use of technologies such as discussion forums and file-sharing applications that allow them to assemble knowledge on a topic area (Freire & Pereira 2007:181). Additionally, eLearning systems embody certain perspectives of the pedagogy of cognitivism (Freire & Pereira 2007). On the other hand, eLearning also incorporates elements influenced by the experiential perspectives of behaviourist theory, which explains the emphasis in practice on the ways in which learning occurs through participative interaction with the eLearning content, interactive activities, hands-on practice and simulations (Banks 2006; Freire & Pereira 2007).

It has long been recognized that telecommunications can have the paradoxical effect of encouraging users to become more isolated rather than more connected with other members of society (Short *et al.* 1976). Concern has been raised regarding the amount of time that youngsters and even grown-ups spend in front of television and computer screens (BBC Online 2012; Mail Online 2012). One only has to think of the way in which computer "geeks" spend long amounts of time sequestered away with their computer, either playing computer games, or play-living in one of online the fantasy worlds such as *Hero Universe* and *Shadow World*, or spending their time communicating with others through social sites such as Facebook. Where medical opinion tended to be sceptical as recently as twelve years ago (Griffiths 2000), the trend is now towards accepting computer and online addiction as being of the same nature if not the same degree as other addictions (Hellman *et al.* 2012). It is here argued that the reasons for promoting the social element in eLearning are therefore not only educational but also pastoral, and the benefits of engaging with real-world knowledge rather than with fantasy games and constructed worlds are not only academic but psychosocial.

According to Alexander (2001:240), the focus of most of eLearning activities centres on the development of resources and courses. However, for any learning to be successful, it must take place within a system that interlinks the learner's experience of learning with the teacher's input of planning, thinking and development of strategies, as well as with the overall context. Guided by these considerations, any endeavour to develop an adaptive eLearning environment should be centred on the creation of a system that integrates the various elements of strategies, planning, thinking, context, and constructive learning experiences. Mason & Rennie (2006) have identified an extensive inventory of elements that underpin and constitute eLearning. A selection of these elements is shown by way of example in Table 2.1 below.

The current research work is based on the fact that eLearning has been developed into an array of educational artefact systems that harness modern technology to produce delivery programmes that are able to utilize a teacher's learning and teaching strategies within a framework that can accommodate various learning styles (Alexander 2001).

Table 2.1: Part-inventory of eLearning elements (*after* Mason & Rennie 2006)

Conceptual elements	Accessibility; agency; active learning; activity-based learning; asynchronous learning; collaborative learning; constructivism
Activity elements	Assessment; authentication; blogging; brainstorming; computer-based training; conferencing; feedback
Pathways and groupings	Bulletin board; chat-room; communities; computer-mediated assessment (CMA); computer-mediated communication (CMC); interactive whiteboard
Software and applications	Animations; audio/video clips; Blackboard; Bluetooth; browser; Broadband; courseware

Certain scholars have proposed that an effective eLearning environment operates in accordance with communal constructivist theory, whereby learners *create* knowledge for themselves in a contextualized setting by a synthesis of their own experiences, together with their interactions with others and the environment (Zhang *et al.* 2004; Van Raaij & Schepers 2008; Ghauth & Abdullah 2010). Others take the view that communal constructivism is better considered as a framework that makes the most of what the technology current at any particular time has to offer, whilst avoiding the deterministic overtones discerned in the theory. By this understanding, constructivism is seen as an approach that facilitates new pedagogical approaches, rather than being a new or updated learning theory (Aspden & Pountney 2002; Pountney *et al.* 2002). This framework can successfully facilitate the synergy of the different techniques through the use of ICT to support learning, especially in a communal constructivist environment (Meehan *et al.* 2001). Accordingly, it is considered vital that in the creation of an effective ELF for teaching geography in Oman, the framework should employ those constructivist learning concepts and approaches that have in practice been shown to be useful and effective. The core goal is, of course, to ensure that the learning environment thus formed allows learners to create their own knowledge and understanding of geographical principles within a computer-based environment. However, the wider goal is to enable learners to adapt to the continual reconstruction and shaping of learning that is a necessary skill in the present-day world. This requirement is particularly urgent for education systems that are in transition from previous approaches involving a model of uncritical assimilation and retention of knowledge (rote-learning) and towards the present-day models of learning that lay greater emphasis on skills of critical assessment, handling and application of knowledge (Mayer 2002).

2.4 The Importance and Role of eLearning

The types of teaching and assessment techniques that are employed in a course have a powerful influence on the learning process (Smart 2005; Harwood & Asal 2007). Furthermore, the continual advancement in technology is an important trend affecting education, with the increase in computer processing-speed, the reduction in costs, and the expansion of the high-speed network (Cetron & Davies 2003). In a knowledge-based society, the integration and use of ICT continues to increase. Instant information, digitized and networked, can provide a vivid description of events happening anywhere in the world. This means that limitations imposed by time and space are significantly overcome. Time and place are no longer necessary conditions affecting the transformative role that ICT plays in the educational system. ICT enables students to choose their preferred activities and timings for learning, and this capability of choosing time, place, and activity means that education becomes more individualized in the new society, thus posing new challenges to the existing education system (Di Leo & Jacobs 2004).

It is the combination of the characteristics and the features of the ways in which pedagogy interfaces with learners' needs that best defines the importance and role of an eLearning environment. A major aspect of education is knowledge, which has traditionally been associated with the giving and receiving of content. However, recent educational scholars have defined knowledge as that which is generated or constructed by an individual. In this description, the role and responsibility of both teacher and learner in the learning environment undergo change. A learner is no longer embraced as a passive recipient of knowledge, but as a contributor to knowledge through constructive collaboration (Gulati 2004; Fischer & Sugimoto 2006). The teacher on the other hand, is no longer the sole creator and disseminator of knowledge, but can be seen as the facilitator of knowledge construction. Batool (2006) describes this as the key paradigm shift that has led to new movements in education, such as child-centred education, open education, and problem-based learning. This then introduces the concept of a knowledge-based society (Lyotard 1984). However, when the providers of 'learning-services' (*i.e.* pedagogical/educational services) base their strategies on modern knowledge-based concepts, then previous ideas concerning the identity of the 'end-users' of educational services once more undergo modification. In an ironical twist of circumstances, the introduction of ICT can be seen as marking the return of education to the focus of Victorian utilitarian values. The logical outcome of the knowledge-based approach is that end-users other than the pupils will begin to insist on having a greater say in the educational process. Labour-market stakeholders such as employers and other players will put pressure on schools to shift their focus increasingly towards imparting that sort of knowledge that is applicable to work-situations, whilst the schools will want their students to make sound decisions that are independent of commercial pressures and market interests (Briggs & Sommefeldt 2002:15–32).

It is the knowledge-based concept of learning that in recent years has been the driver for education to respond to the demands of society, thus influencing the method and mode of dissemination of educational programmes and materials (Lyotard 1984). One of the features of knowledge-based education that society expects to see as an outcome in learners is the ability to respond positively to and to interact with technology (Tatković *et al.* 2006). Technology, especially ICT, is one of the most important drivers of the on-going process of globalization. In its turn, globalization makes the acquisition of technological skills not only desirable, but increasingly necessary in the same manner as literacy and numeracy (Martin 2003). Many argue that for nation-states and the individual citizen alike, in future the possession of such skills will be indispensable for economic viability; that is, for the individual to compete in the job-market, and for nations to compete in the regional and world economies (Martin 2003; Ali *et al.* 2009). Consequently, this drive has boosted the importance of technological uptake as one of the major trends affecting education (Cetron & Davies 2003). In order to respond to the changing world, educational institutions are increasingly being compelled to adopt technological tools. The need to incorporate technology into the educational process has led to the transformation of the classroom environment, with significant changes in teaching and learning styles, as well as in the modes of assessment. Wang & Hwang (2004) have defined an effective eLearning process as one that is created and delivered by an electronic medium that supports learning. In the event, education has adopted the online learning environment as a medium in which learners are encouraged to take upon themselves a greater amount of responsibility for their own learning (Attwell 2007). However, the success of web-based learning is dependent on the sensitive application of learner theory, thus implying that an important aspect of the adoption of eLearning is its reliance on the adoption of such theory and its implementation in practice (McFarlane 1997; Chiu & Wang 2008).

Empirical research has revealed that expectations regarding effort and performance, computer self-efficacy, as well as the utility, attainment and intrinsic value of eLearning, are all important determinants of a person's intentions to continue making use of a web-based learning environment (Conrad 2002; Rovai 2002a, 2002b; Rovai & Barnum 2003; Chiu & Wang 2008). Therefore, an effective eLearning system must factor in these aspects and elicit them during the learning process. The development of an eLearning system must take cognizance of the fact that the process of knowledge- and skills-transfer is dependent on the quantity *and* quality of interaction between the various components and elements, which include learners, teachers, as well as the curriculum, resources, educational policies and physical conditions present in the eLearning environment (Volery & Lord 2000; Christensen *et al.* 2001; Curtis & Lawson 2001; Koehler & Mishra 2005). On the other hand, studies have confirmed the basic fact that the success of eLearning implementation also depends on the underlying pedagogy (Govindasamy 2002; Mayes & de Freitas 2004; Webb & Cox 2004; Siadaty & Taghiyareh 2007; Mentis 2008).

2.5 eLearning: Theory and Practice

eLearning involves various modes of engagement that are often categorized in terms of frameworks of practices, skills and theories. These frameworks govern the various teaching and learning processes involving the teacher, the learner and the system. However, a complete understanding of educational theory and practice is not easy, as scholars and professionals often encounter difficulties in defining educational theory and practice, and their respective boundaries (Saugstad 2002; Van de Ven & Johnson 2006). Often, educational scholars find that there is a wide gap between theory and practice, owing to the fact that different professionals frame theory and practice in different ways (Winkle-Wagner *et al.* 2009). Van de Ven & Johnson (2006:802) found that this gap is often presented as a problem relating to the transfer of knowledge—where knowledge proceeds from teaching. In this view, knowledge-transfer is presented as a process of production and communication involving a one-way path, from teacher to learner. In an eLearning environment the various theoretical approaches lay stress on the development of a collaborative learning environment, in which most pathways are interactive in nature (that is, two-directional) and there tends to be a large number of pathways of action/interaction (Bernard *et al.* 2000). These circumstances have created various distinct approaches to theories and models of learning that are set in an eLearning environment.

Modern educational theorists such as Hakkarainen *et al.* (2002) have been working on models of learning in which eLearning is seen as driving the creation of knowledge. In these models, knowledge and skills are seen as being created by cultural practices. Additionally, other theorists propose that in an eLearning environment, the theoretical and practical aspects are mediated by the social (*i.e* real-time) interaction of the participating actors. Regarding the interactions in which the learner engages within an eLearning environment, Kaptelinin & Cole (2002:303) regard all of them—not only the social ones—as being external modifiers. Thus, the external modifiers would be the teachers *and* the eLearning system, including any other participants. This theory then implies that in an eLearning system—especially one created for geographical pedagogy—learning will be generated by the interactions (both real-time and computer-mediated) of the learner with the teacher, the system, and fellow-learners. Vygotskian theory adopts the view that learning, activity and interaction with a social system are not independent processes but different aspects of the same phenomenon, whereby learning occurs through social interaction with people and through internalization by the individual (Valsiner & van der Veer 2000). For the adaptive ELF to be designed for the present research, emphasis will be put on the interactions taking place—between the learner and the teacher, the system, other learners and resources—through the mediation of collaborative activities that enhance the creation and transfer of knowledge.

For the environment of an eLearning system, Holmes & Gardner (2010:8) identified key practices including collaboration, discussion, analysis, understanding, application, synthesis, creation, exploration, selection, and testing. Overall, regarding the intellectual skills outlined in Bloom's taxonomy of educational objectives (Bloom *et al.* 1956; Ormell 1974; Travers 1980; Krathwohl 2002)—including knowledge, comprehension, application, analysis, synthesis and evaluation—education theory generally accepts the need for resonance between these (at least in their modified forms) and the framework of eLearning practices as identified by Holmes & Gardner (2010). Indeed, there appears to be a considerable overlap between the two inventory-lists. For this reason, the adaptive ELF constructed by the Researcher incorporates elements of teaching (knowledge, analysis, and creation), learning (knowledge, comprehension, synthesis) and assessment practices within the framework in order to reduce possible gaps that may exist between theory and practice. The research-work seeks to propose and develop a framework that offers opportunities for teachers and students to interact more effectively through tools that expedite the exchange of knowledge, information and feedback. Accordingly, key components of teaching, learning and assessment are facilitated by incorporating technological tools that can put into effect the various educational or pedagogical processes (Zhang *et al.* 2004).

2.6 Education and the eLearning Experience

Cruthers (2008) explains that eLearning enhances the teaching and learning processes, as it goes beyond the rigid pattern of the teacher/classroom environment. He describes how an eLearning environment facilitates the acquisition of learning that is self-paced and individualized, allowing learners to raise queries/doubts and to receive feedback without delay, whilst also enabling slower learners to participate more fully by offering them longer response times. Additionally, the eLearning sessions are readily available for learners to revisit whenever they wish and as many times as desired. Studies such as that by Boulton (2008) show that during the eLearning process students are required to develop many ancillary skills simultaneously, such as managing the pace of their learning, taking responsibility for their learning, and engaging in autonomous learning. The development of these skills is (or *should be*) one of the primary goals of teaching: an effective teaching/learning process is one in which learners are able to learn on their own and to develop skills from the knowledge gained. It is in light of this argument that this research seeks to create an ELF that encourages secondary-school students taking geography to become more autonomous in their learning process, to build capacity in solving problems, and to create their own knowledge and skills from the educational process. These optimal outcomes typically occur in an interactive environment, which eLearning systems are well-placed to offer through technology-based features such as blogs, discussion forums, video-conferences, virtual meetings (Appana 2008).

The literature shows how eLearning systems are based on the concept of the social construction of knowledge, and demonstrates how the features of eLearning act to encourage learning through interaction (Gunawardena *et al.* 1997). Teachers and students have the opportunity of interacting with the system and with each other, and of doing so at times and at a pace of their choice that are not restricted to the formal lesson-session in the classroom (Murphy *et al.* 2002; Appana 2008). Thus the availability of a multiplicity of pathways and time-opportunities has the potential of enhancing learner support and creativity, and of creating a synergy between teachers, learners and the learning environment that would not otherwise be possible. The indications thus arising from the literature are for teachers to use these technology-based features. By raising interaction among the participants, the use of an eLearning system tends to raise the quality of educational delivery. Berge (2002:185) proposes that a "comprehensive eLearning framework must define Atsusi Hirumi's three levels of planned eLearning interactions". Hirumi's (2001, 2002) three levels are:

- Level #1, learner's self-interaction (*i.e.* self-motivation and self-regulation);
- Level #2, learner's outside interactions (*i.e.* learner/content, learner/instructor, and learner/learner interactions);
- Level #3, evaluation, assessment, and feedback.

These interactions are the cornerstones of learning activities and thus form key elements in effective eLearning system design (Bermudez & Hirumi 2000; Berge 2002). Therefore, it is evident that the teaching/learning process in eLearning needs to utilize such interactive variables to fulfil the objective of incorporating learner behaviour together with the acquisition of knowledge and skills so as to create a synergy in the learning experience. In any teaching/learning process, the variable agents—teacher, learner, curriculum, and any other variable in the learning environment (classroom or whatever)—need to interact in an organized and systematic manner to gain predetermined goals (Gagné 1985; Gagné *et al.* 1992). For the ELF to be effective in teaching geography to Omani secondary-school students, it will be necessary to make use of interactive applications in order to encourage these students to extend their studies of geography on their own. There are many interactive applications associated with eLearning systems—including Blackboard, discussion boards, audio- and videoconferencing, blogging, bulletin boards, chat-rooms—as well as others that provide valuable support and feedback to encourage students to engage in active learning and collaborative learning (Appana 2008). To achieve these goals, it is necessary to incorporate a positive social element into the framework.

2.7 eLearning and the Social Dimension

Research has found that an effective eLearning process cannot occur without the *active* participation of all participants (Repman & Logan 1996; Palloff & Pratt 1999). Muirhead (2000) researched interactivity in the eLearning process and found that communication, participation and feedback were important features for an eLearning system. Moreover, the literature reveals that for effective teaching and learning in an eLearning environment both teacher and learner need to participate actively in the relevant academic exchanges. Murphy *et al.* (2002) commented that the teacher should be an active participant by informing the eLearning process consistently, by responding to discussion blogs, and by being a constant participant in the virtual community. Northrup (2001) defined this interaction in terms of a framework of strategies that would facilitate interaction, comprising: (1) interaction with content, (2) conversation, (3) collaboration, (4) performance support, and (5) intra-personal interaction. Accordingly, teachers need to acquire appropriate levels of understanding regarding the structure and facilitation of interaction in the online environment. The new discipline of eLearning requires them to show commitment by developing and constantly updating their own competency levels. The consequence of adopting eLearning is that practice moves away from the traditional set-up in which only the teachers create resources and courses, and migrates towards the development of a framework in which learners not only *experience* but also *contribute to* the process. But for this to happen, they need the initial support of their teacher. In a truly interactive learning environment, learners will be enabled and encouraged to make contributions to any or all of (1) development of the learning process, (2) teacher's planning activities, (3) reflection on contents and learning, (4) learning strategies, and (5) overall context of the eLearning activities.

Distance education has always been affected by the drop-out (or 'attrition') of students (Brown 1996) and the same problem affects online learning today (Rossett & Schafer 2003). Educators have recognized that feelings of isolation might not encourage the learning process or social development in students (Nichani 2000; Cavanaugh 2001; Martinez 2003). However, studies to address the need for a social presence in the formation of online learning approaches (Collins & Zane 1996; Abrahamson 1998; Brown 2001; Rava 2001; Rovai 2002a, 2002b; Martinez 2003; Rovai & Lucking 2003) led to the development of *social presence theory* (Gunawardena 1995; Tu 2002; Lowenthal 2009) which was then applied to the practicalities of introducing socializing elements into eLearning approaches and frameworks (Tu & McIsaac 2002; Falvo & Solloway 2004; Dawson 2006; Laffey *et al.* 2006; Yang *et al.* 2006; Kehrwald 2008; Lowenthal 2009). Apart from creating an interactive learning environment with discussion boards, live chats and group projects, it has been recommended that teachers should also foster interaction by seeking to create new ways that engage the learner online, thus leading to the forming and maintenance of online communities (Rava 2001; Aycock *et al.* 2002; Martinez 2003; McArdle *et al.* 2008) including for this purpose the use of blended learning (Mitchell & Honore 2007). This then introduces another type of eLearning concept—online communities, or *communities of practice*, certainly not a recent concept (Lave 1991; Wenger 1996, 1998; Palloff & Pratt 1999; Linehan & McCarthy 2001)—which is introduced into the experimental geography ELF for the current research work.

Overall, many of the publications examined by this study represent the eLearning process as focusing on individual learners and the use of technology systems to support a constructive social interaction (Nichani 2000; Aycock *et al.* 2002; Appana 2008) and that it can work best if combined with face-to-face experience (Sharpe *et al.* 2006; McArdle *et al.* 2008). This study seeks to create an ELF that augments the teaching and learning process of the traditional face-to-face classroom environment that currently forms the basis of geography education in Oman. By increasing the learner's involvement in the learning process, it is posited that this framework will serve to increase secondary-school students' interest in geography, helping them to learn how to create knowledge and skills from their experiences, as well as preparing them for the broader community and for work in a knowledge-based economy.

2.8 Open/Distance Education in the Digital Age

It is true that institutions of higher/further education (HFE) are expanding their portfolios of open and distance education (ODE) courses to increase their accessibility for students, to increase enrolment of non-traditional students, and hence to increase graduation rates. However, the spin-offs generated by this movement in the HFE sector have repercussions and benefits for learners in all sectors of education, including primary and secondary schools. Engagement with the development of open/distance learning (ODL) requires users to acquire the ability to understand and use information in multiple formats from a wide range of sources. This is especially applicable when the channels of information are computers and other digital media (Gilster 1997). Accordingly, courses in ICT literacy and eLearning skills are needed to familiarize users with the tools and procedures required for accessing and processing information, as well as communication skills using the whole range of digital electronic means (Steiner & Lewis 2004). On the other hand, ODE is instructional delivery that does not constrain the student to be physically present in the same location as the instructor. It is important to note that ODE is not simply the addition of technology to instruction; instead, it uses technology to make possible new approaches to the teaching/learning process. Schleicher (2006) emphasizes the need to make sure that technology is effectively integrated into communities, institutions and societies, and used by citizens in order to engage in meaningful social practices. It is noted that the development of ODE in Oman began in 2000, with the government fully supporting efforts through ICT, promoting the diffusion of the internet and of mobile technologies such as PDAs, Wi-Fi and wireless networks that offer users the benefits of information access, messaging, and communication (Donegan 2000; Clarke 2001). ICT provides the incentive for students to become equipped with knowledge and skills from the perspective of lifelong learning and a learning society. Owing to the complexity of today's globalizing world, learning can no longer be restricted to the period of formal schooling, but has to be embraced as a permanent dimension in a person's life (Gelpi 1984; Fischer 1999; Aspin & Chapman 2007; Jarvis 2007:1–11). There is also a need to avoid learners being overloaded with irrelevant or outdated information/data and being stimulated only with regard to the development of lower-level intellectual skills. Consequently, learners need to become acclimatized to present-day learning requirements and to acquire habits of lifelong learning as soon as they can.

Developing ICT literacy skills (eLiteracy skills) is essential for teachers and support staff in order that they may be able to fully engage and exploit teaching resources in eLearning systems. Engaging with academic staff to develop their own skills also makes them more likely to appreciate the value of building these skills into their courses for students (Soby 2003). Whilst they are building their own capacity in eLiteracy, teaching staff will need to play an important role in delivering this type of skills training to their students. ICT-literacy skills for staff might include awareness of the range of resources available in the digital world, such as constantly updated knowledge of the course materials that are currently available in electronic format (Soby 2003). It would also be beneficial for members of staff to learn how to compose online teaching materials on their own initiative and to add stable links to the electronic education resources they post online. Competence-levels of ICT literacy might even entail staff members acquiring the skills to construct their own eLearning frameworks and to link up with others. ICT literacy *most certainly* involves knowledge regarding copyright and licensing arrangements for electronic resources, what Soby (2003) terms the 'moral' issues. So teaching staff would have to receive guidance and support on issues such as which resources are licensed to allow legal downloading for use in the virtual learning environment.

Extending the scope of this discussion, it is to be noted that school and college libraries are now also facing challenges and opportunities presented by the ever-extending reach of eLearning and the internet. The increasingly technological orientation of environment in which most libraries now find themselves calls for rapid change, with academics increasingly adopting digital scholarship. Specifically, ODE may entail submission of articles, peer reviews and publications all done electronically. Likewise, ODL now regularly involves using either purely or blended electronic means for the evaluation and assessment of academic work. Likewise, there is a rapidly growing trend for collaborative research to be conducted by electronic means (Stueart 2006). In this regard, the other emerging technology that is influencing ODL especially with regard to information and knowledge management is the digital library. Digital libraries make information more available, raise its quality, and increase its diversity (Okiy 2004). Digital libraries offer many benefits, including greater user satisfaction, several ways in which they can improve services while reducing costs, besides providing instantaneous access to online information and 24/7 access to information so long as the requisite infrastructure is in place. Finally, they overcome the problem of deterioration over time associated with physical media (DLF 1998).

Youngman (2007) notes how the rise of digital libraries has created the need for the establishment of professional information institutions to provide the resources and to set the standards required for running them. Digital libraries now have to recruit information professionals to provide the specialized skills for selecting, organizing and facilitating intellectual access to collections of digital works, as also to interpret and distribute them, to preserve their integrity and to ensure the persistence over time of these collections. The purpose is to ensure that they are readily and economically available for use by a defined community or set of communities. Similarly, Sutherland (2003) suggests that—owing to drastic changes in technology, increased customer expectations, service competition, changing organizational values, interdisciplinary studies, eLearning and the demand for digital resources—it is critical that libraries become learning organizations. With the rise of digital libraries, the incorporation of 'cyber-libraries' is now becoming a common feature of eLearning systems.

ODE courses should be aimed at supporting rigorous learning outcomes, the effective use of available technology to improve pedagogy, and providing student satisfaction and support. In addition, the institutions should ensure support for instructors in conducting and publishing research related to online learning and teaching. Currently, education research into ODL mainly focuses on the pedagogy, technology and instructional system designs aimed at delivering education to formally-enrolled students who are not physically in the classroom. However, although most commonly associated with schools, HFE and corporate training, eLearning should encompass learning at all levels both formal and non-formal where an information network is used—the internet, an intranet (LAN) or extranet (WAN)—whether wholly or in part, for course delivery, interaction and/or facilitation (Rusten & Hudson 2002).

2.9 Computer-based Education and eLearning

The availability of computers with access to the internet in schools is steadily increasing. Wells & Lewis (2006) reported that in the USA the ratio of state-school students to computers with internet access had improved from 12.1:1 in 1998 to 3.8:1 in 2005. Currently, classrooms primarily use that technology for tasks that fall outside the delivery of instruction (Zhao & Frank 2003; Hayes 2007). In their study, Zhao & Frank (2003) discovered that teachers across nineteen different schools used computer technology mainly to address their immediate needs and in ways that did not place extra demands on their time (such as communicating with parents and colleagues). Wells & Lewis (2006) surveyed the technology coordinators at 1,012 schools and found that computers were predominantly used to access online assessments and assessment data. These uses of technology undoubtedly improve the workload of teachers, but are far from student-centred approaches to ODL.

The challenge remains how to realize the full potential of eLearning as a driver of productivity and performance, thus integrating it into organizational strategy and operations. In many institutions, there still remains the need to create a supportive policy environment that encourages access to eLearning. Since eLearning offers increased opportunities for attaining and developing the skills necessary for good jobs and economic growth, building a successful eLearning future should be a priority in both the public and private sectors. The cost-savings are real and the benefits are quantifiable. In this regard, eLearning should not be seen as a problem. Rather, the validity and value of its potential for broadening access to high-quality education and training is compelling.

Relatively little attention has been paid to the challenges of ICT-driven ODE since the benefits are seen to outweigh the disadvantages. It may therefore be easy to think that because of the perceived potential of ICT, there will be no serious challenges in the implementation of an ODE programme that uses modern technology in secondary schools. Early in the process of the introduction and development of computer-based education and eLearning in any institution, the focus should be directed towards the development of information and communication infrastructures. The reason for this is that the centres offering ODE are expected to use technology extensively to carry out their ODL activities. Rajesh (2003) describes the need for the libraries to teach eLearning students how to access and retrieve information on the internet. It is beneficial for library talks and orientation sessions to be arranged for newly enrolled distance-learning students so that they are made aware of the available information in print and/or electronic format. In the development of computer-based education and eLearning, Stuart (2003) also suggested the need for the libraries to prepare or direct distance-learning students to web-based modules that may guide students through the research process as well as how to use internet meaningfully. ODL is often seen as a way of providing learning opportunities that are characterized by the separation of teacher and learner in time or place, or both time and place. In this case learning that is characterized in some way by an institution by use of variety of media, including print and electronic.

Saba (2005) indicates that designing and facilitating online courses in most fields of study has tended to be concentrated in the HE sector. It is predicted that greater numbers of students and teaching-staff will be involved in online learning owing to several societal factors including the competition existing between traditional HE institutions and various for-profit organizations; the increase in the enrolment of non-traditional students demanding the convenience and flexibility of online courses and programmes; as also the increased demand generally for online courses. Moreover, the commercialization of HE, increasing competition, and expanding online enrolment is driving the increasing need for effective quality assurance (Wang 2006). According to Rajesh (2003), eLearning can help create unprecedented opportunities, productivity, and prosperity for individuals and organizations. However, the inevitable corollary is that educational institutions must address the continuous challenge of increasing the performance and capabilities of their instructors in relevant areas of educational technology. This implies that in order maximize the potential of eLearning, a range of issues must be addressed by the leadership of the institution (as well as the persons in charge of the eLearning programme), including on-going monitoring of advances in the field and the introduction of broad changes in education policies to eliminate barriers to the use of eLearning. If these are addressed, the production of an optimum eLearning environment is closer to being achieved. Accordingly, this study seeks to create an ELF that employs a blended computer-based approach based on the third and fourth teaching styles (Priyanto 2007). The ELF includes initial face-to-face teaching supported by computer use and an intranet into which the teacher loads teaching materials from an external drive. After induction into this type of eLearning, students are gradually introduced to a full online web-based teaching environment.

2.10 Assessment and Evaluation of Learning Outcomes

Berge (2002) carried out research to discover the most effective eLearning model and identified several features of this model, including learning activities, learning goals, evaluation and feedback. Research has shown that teaching outcomes and learning outcomes are two of the features that must first be formulated when planning and designing assessment and feedback for an eLearning system (Hanson *et al.* 2001). Knowledge of learning outcomes is useful since it provides guidance to learners regarding on what they should know, understand, and do with the knowledge gained. Teaching outcomes, on the other hand, assist the teacher to determine what is to be evaluated at the end of the learning process or course (Compton 1997; Berge 2002). Accordingly, the creation of an eLearning system should take into consideration the roles played by assessment, evaluation and feedback in determining what might be the successes and failures of learning and teaching outcomes for the teacher and the learner (Van der Kleij *et al.* 2012). In their study of eLearning systems, Iahad *et al.* (2004) pointed out that the development of evaluation and assessment features was essential for the future success of organizations offering online learning materials. Huba & Freed (2000) had already highlighted the importance of the role played by assessment and feedback in the learning process, particularly regarding the paradigm shift from teacher-centred to student-centred learning. Berge (2002) linked feedback, evaluation and assessment as integral elements of Hirumi's (2001, 2002) third level of interaction in an eLearning environment. The reason is that, in order to achieve effective communication of course content in any learning environment, learner feedback is required (Hills 1996; Compton 1997; Raskin 2000).

In eLearning environments, there is an even greater need to have feedback from all participants in order to make an informed assessment of content and evaluation of content outcomes (Compton 1997; Berge 2002; Brennan 2003). Owing to the additional complexity of the interactions in eLearning environments, feedback, evaluation and assessment are key elements that are essential for the effective conduct of learning activities. The process of assessment and evaluation within teaching/learning situations in general is used to diagnose problems in learning and to promote further learning outcomes (Baron 1991; Black & Wiliam 1998; Gibbs & Simpson 2002). This takes on even greater importance in the learner-centred context (Rudner & Schafer 2002). Feedback is an important part of the learner-centred assessment process (Huba & Freed 2000; Weeden 2005), especially owing to the complexity of the eLearning process, which actually makes feedback essential (Berge 2002). Gibbs & Simpson (2004) showed how this feedback plays an important role in the eLearning process depending on the purpose of the assessment process. Assessment can be either *summative*, which is used for grading or ranking student outcomes, or *formative*, which promotes learning by offering personalized feedback to the learner in an interactive manner (McAlpine & Higgison 2001). Since a major objective of eLearning systems is to obtain feedback from learners regarding knowledge and skills gained from the content, a well-constructed adaptive system for learning will incorporate an element of formative assessment (Compton 1997; McAlpine & Higgison 2001; Berge 2002).

Mandinach (2005) observes that it is difficult to realize effective evaluation strategies without distinguishing between the different types of learning. The challenge most researchers face is achieving a balance between quantitative and qualitative evaluation methods, as well as various other approaches, such as experimental and ethnographic designs (Hounsell 1999; Attwell 2006). The remarks by Mandinach (2005) related to the effectiveness of evaluation for learning, theory and evidence. She defined three major dimensions: (1) internal validity *versus* external validity, (2) summative *versus* formative, and (3) quantitative *versus* qualitative approaches. The evaluation process that is selected should be meaningful and relevant to eLearning participants (Garrison & Anderson 2003; Galloway 2005). By the same token, one aim of eLearning system development should be to increase the flow of feedback between teacher, learner and system content. Such feedback could then be used to produce the formative and summative assessments delivered by the teacher to the learner at the end of each session or course (Oliver & Conole 2002; Garrison & Anderson 2003). With sufficient feedback, it should be possible for teachers and learners to use the assessments to gain valuable insights into the level of learning and the value of content. Despite the greater complexity of feedback involved in eLearning systems, there exist relevant programs that can collate and analyze such feedback without causing undue difficulty (Cruthers 2008). Such programs can present assessment in terms of quantitative values to indicate level of learner performance, and in qualitative values to indicate the level of understanding and the ability of the learner to interpret learning content (Oliver & Conole 2002; Oliver *et al.* 2002).

One major factor under consideration by Mandinach (2005) is external validity *versus* internal validity, which Iahad *et al.* (2004: 2) identified as the third element in the assessment matrix, and which relates to the ability of the teacher to ensure that in eLearning environments learners have the opportunity to gain experiences inside and outside the confines of the course. This occurs where the teacher exposes learners to a set of assessment techniques that teach the learner how to put theoretical skills into practice, thereby gaining acceptable levels of knowledge-based experience (Garrison & Anderson 2003; Iahad *et al.* 2004). As already stated, research has proved that an effective eLearning environment must incorporate communication and feedback between the participants as an element essential to good functioning. Berge (2002:186) identified several goals for this feedback within the eLearning context—(a) to ensure the accuracy of content performance, understanding, and acquisition; (b) to offer coaching, guidance, and modelling of learning goals; and (c) to facilitate social interaction and relationship building. Additionally, this author identified other goals such as an increase in learners' motivation and the maintenance of their focus on learning activities; the linking of course learning goals to relevance; offering reliable evidence for certification; and yielding information useful in the improvement of the course content (Berge 2002: 186).

The literature generally represents the feedback as flowing along various channels—teacher/learner, learner/teacher, and learner/learner—all of which can occur *either* within the eLearning process *via* pathways between system-content and learner, system-content and teacher, *or* in real-time contexts by personal communication outside the eLearning system. The configuration of the eLearning system itself obviously has a significant effect on the extent to which system-users will benefit from feedback (Pituch & Lee 2006).

2.11 Cultural/Local Factors in the Learning Process

Advances in ICT have enhanced teaching and learning practices, whilst opening up many new opportunities for ODE (Dhanarajan 2001; Rumble 2001). At the same time, by computer-mediated communication, the educational environment tends to be affected and moulded by the cognitive, social, cultural and educational features of the content that is communicated through the environment, as well as by features that form the everyday life-context of the end-user of ODE (Rozendal 2003; House *et al.* 2004). Whilst these factors may empower learners through motivation to overcome psychological barriers to learning, they can easily have adverse effects (Gunawardena *et al.* 2003; Gunawardena & LaPointe 2007). One influential study conceptualizes culture as the "shared motives, values, beliefs, identities, and interpretation or meaning of significant events that result from common experiences of members of collectives that are transmitted across generations" (House *et al.* 2004: 15). Certain values may be accepted and others rejected owing to the nature and disposition of the individual person on the one hand, whilst on the other hand values will be subject to the social, intellectual, religious and political background of the community in which the individual is situated (Hofstede 2001). Where values are based on individuals' attitudes, therefore, any changes in values will affect their behaviour. Studies have proved that educational practices (teaching and learning processes) are tied to culture and tradition (Anakwe *et al.* 1999; Baron 2008). Consequently, during the creation of a virtual learning environment it is necessary to consider the socio-cultural factors likely to influence the end-users, since these factors may present barriers to learning (Chen *at al.* 1999; Wilson *et al.* 2000; Wang 2007).

In order to determine the role culture plays in the learning process, various researchers have explored experiential learning theory (Kolb 1984; Cantor 1997; Itin 1999; Stavenga-de Jong *et al.* 2006), which defines learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb 1984:41). An examination of the learning process leads to an analysis of the individual differences in approaching learning, based on the learner's preference and background (Wilson *et al.* 2000; Wang 2007), because culture plays an important role in the determination of the thinking processes and the background of the learner (Gravoso *et al.* 2002; Atherton 2011). Triandis (1994:4) observed that "within a culture as people interact, some of their ways of thinking, feeling, and behaving are transmitted to each other and become automatic ways of reacting to specific situations". Culture therefore acts as a strong socialization agent (Barmeyer 2004), which influences information cognition and processing (Earley & Ang 2003). Therefore, there are grounds for believing that the differences in cultural socialization tend to influence learning preferences and produce different learning styles (Kerr 2004). This implies that different social-cultural environments cause learners to react differently to authority, competition and difficult topics (Fyans *et al.* 1983; Salili *et al.* 2001; Joy & Kolb 2008).

Researchers have tended to focus on finding empirical evidence that learning-style variations are due to cultural backgrounds. The literature indeed shows that there are differences in learning-style preferences between learners from different national and cultural backgrounds (Wilson *et al.* 2000; Yamazaki 2005; Yamazaki & Kayes 2005; Zualkernan *et al.* 2006). Studies on learning style show that apart from culture, other factors such as age, gender, and level of education can affect the learning style (Jennings & Onwuegbuzie 2001; Ames 2003; Kolb & Kolb 2005). Other studies show that cultural diversity remains apparent among learners (Markus & Kitayama 1991; Nisbett 2003; Parrish & Linder-VanBerschot 2010), most probably owing to the deep-rooted cultural values and modes of thinking that are hard to separate from the learning process. There is a need for educational managers (principals, teachers, administrators) to develop educational content that directs learners to seek cultural adaptive learning experiences that allow for the full development of the individual (Visser 2007; Reiners & Dreher 2009) as the manner in which learning occurs is affected by learning styles and values mediated by social constructs (Gutiérrez & Rogoff 2003; Anderson & Haddad 2005).

eLearning has only a short history in the Arab world (Alsunbul 2002; Al-Harthi 2005), and it has not been highly prominent previously, although the situation is changing rapidly with the escalating need for higher education (HE) to be made more widely available. Oman has slowly adopted eLearning, but has faced serious cultural difficulties in the process. It was found that Omani students did not readily accept eLearning, preferring to participate in the traditional face-to-face classroom situation to which they were exposed during their previous experiences. These students were found by Al-Harthi (2005) to have many fears, doubts and reservations regarding the learning process as it moved away from their customary cultural principles. The new learning challenge has been posed by the internet and ICT. Consequently, eLearning has been associated with contemporary western culture, which is different from the Islamic culture in which these students were raised. The tensions caused bring into play Hoftstede's (1991) dimension of 'uncertainty avoidance', owing to these students' aversion to the unknown, which might be attributed to features of Arab culture (Hofstede 2012).

The other social-cognitive factor that affects learning (especially eLearning) in Oman is the general lack of technical skills, which have yet to be incorporated into the national curriculum. This makes it difficult for Omani students to take advantage of eLearning. Before 1970 and the beginning of modernization, Omani culture focused almost entirely on traditional Islamic education. This form of education put the emphasis on imbuing the student with the principles, knowledge, literacy and other intellectual skills that relate primarily and mainly to the study of Islamic religion. When the national education system was launched in Oman in the early 1970s, the curriculum adopted had to prepare young Omanis to play their part in a society that was just beginning to emerge from mediaeval isolation and would need many years before the first phase of modernization could be completed. The initial goal was to enable Omanis to take their place amongst their neighbours in the Arabian Gulf and the immediate region (Skeet 1992). Consequently, whilst non-religious subjects were introduced in the newly-built schools, the national curriculum was not *and could not be* comparable to one formed by contemporary western culture. The weight of the cultural past and the tradition of Arab pedagogy made it inevitable that the first generations of students would be taught by old-fashioned rote-learning methods (Birks & Sinclair 1987). By sheer necessity, Oman had to rely on the technical capacity and skills of foreign workers for implementing the modernization programme, and this did not generate great incentives for most Omanis to seek more modern teaching methods. Furthermore, from the early 1980s onwards the ever-increasing rate of technological development, especially in the field of ICT, began to outstrip the syllabuses of all education systems, even those of developed countries. In other words, developments in ICT placed greater demands on education systems to make ICT facilities available in schools and colleges, and also to upgrade their teaching plans for ICT on a constant basis. Western education systems have been forced to make rapid curriculum changes to adapt to current conditions. The Omani educational system is also moving to adjust to these new demands, but the process will take time.

Consequently, the learning styles of Omani students have continued to be influenced to a great extent by the older cultural influences (Gauntlett 2010), and these have tended to limit the acquisition of the skills necessary to operate ICT tools in an eLearning environment. However, this problem is being addressed, as the Sultanate of Oman—particularly but not solely through its Ministry of Education—is encouraging various new developments in educational delivery. Other factors that have affected teaching and learning in Oman have been demographic ones (including age and gender) and economic ones (especially the fluctuating price of crude oil on the international markets). Oman has a very young population. Four years ago 41 per cent of the population was estimated as being aged 15 years or less (Al-Barwani 2008). It has been estimated that the numbers of school leavers during the years up to 2020 will on average be 37,000 each year—20,000 males and 17,000 females (Al-Barwani 2008). Emphasis was initially laid on the education of boys, whilst girls received domestic education and Islamic teaching. There is now no discrimination, and girls follow the same curriculum as do boys. The situation is changing at an increasing rate through the development of contemporary education in Oman that encourages knowledge and skills acquisition together with the development of critical reasoning faculties (Rassekh 2004).

2.12 Acceptance of Technological Innovation

The use of modern technology has long influenced increasing numbers of aspects of people's social and work lives. However, the case of ICT is unique, owing to the phenomenal rapidity with which it has spread around the world and is increasing its presence in the lives of populations on a global scale hitherto unseen (Cortada 2008). The impacts of this rapidity and extent of pervasiveness have driven much of the research into technology diffusion and acceptance (Slowikowski & Jarratt 1997; Wejnert 2002). This in turn has influenced the development of a variety of theoretical frameworks and models that investigate technology acceptance in general and particular, including the works of Davis (1986, 1989), Davis *et al.* (1989), Mathieson (1991), Chau (1996), Venkatesh & Davis (2000), Chau & Hu (2001), Pavlou (2003) and Hess *et al.* (2010), Cornell *et al.* (2011).

The prolific spread of internet coverage, the adoption of multiple web-based tools, and the availability of wireless and mobile technologies have enabled eLearning to increase worldwide (Choi *et al.* 2007; Petrova 2007). These eLearning technologies create new possibilities for engaging and initiating innovative pedagogies. Towards this, Smith (2000) recommended that a digital mind-set is required in teachers and learners, since the successful utilization of computers and technologies in the classroom is dependent on the attitude of teacher and learner towards these technologies (Lawton & Gerschner 1982). Literature has indicated that the attitude of the teacher towards computers technology affects their performance (Kluever *et al.* 1994), while the study by Reffell & Whitworth (2002) showed that learner and teacher's reluctance to engage with information technology arises as a consequence of and under the influence of their perceptions. Studies carried out on acceptance and satisfaction are multidimensional, and include several critical variables such as beliefs, perceptions, level of involvement with content, learner's characteristics (Cheung *et al.* 2000). Johnson *et al.* (2000) recommended that internet-based learning should benefit learners by not being over-complex or difficult for them to use. Many researchers have used the Technology Acceptance Model (TAM) to evaluate the levels of acceptance and satisfaction of teachers and learners (Cheung *et al.* 2000; Reffell & Whitworth 2002; Choi *et al.* 2007; Petrova 2007) based on Davis's (1989) adaptation of the *Theory of Reasoned Action* (Fishbein & Ajzen 1975; Ajzen & Fishbein 1980; Sheppard *et al.* 1988; Hale *et al.* 2003).

The goal of using the TAM is to explain what determines technology acceptance. This model hypothesizes "perceived usefulness" and "perceived ease of use" as forming the basis of the determination of user acceptance. Research by Petrova (2007) showed that the perceived usefulness of technology influences the attitudes towards technology and the confidence levels of teachers. Their experience of using technology can often affect their effectiveness in implementing technology-based instruction in the classroom. The study of Saadé & Kira (2003) found that learner's intention to use technology is likewise determined by their attitude towards technology. The implication of their study was that external variables could also affect learners' internal decisions in the use of technology, as external variables affect their internal decision process. Their study has sought to find the level of affect intrinsic motivation, cognitive absorption and computer anxiety had on the learner's acceptance levels of technology.

Further, Saadé & Kira (2003) considered the ways in which learners' traits affected their perceptions of usefulness and influenced their attitudes to learning tools. It should be noted that what affects the motivation of learners can have a similar effect on the motivations of teachers, and *vice versa*. It is for this reason that for the experimental ELF for geography education in Oman, the technology acceptance levels of teachers and learners are taken into careful consideration. The framework makes use of a TAM, since this is identified by the literature as being a useful tool to predict intention, background experience and attitudes of learners and teachers in using information systems. Moreover, for the conceptual framework of the experiment, it was understood that a geography eLearning system is likely to be plagued with cultural acceptance factors, which determine the level of acceptance, especially given the fact that Arab culture associates technology with the western world. Therefore, the conceptual framework takes into account and makes use of socio-cultural factors that will help to reduce distractions for the learner.

Yuen & Ma (2002) proposed that the independent variables "perceived ease of use" and "perceived usefulness" directly affect a person's intention of using a computer. However, for any TAM to be considered useful it must meet some wider specifications. Legris *et al.* (2003) assert the necessity of integrating any TAM within a broader framework that would include variables related to both human and social change processes, as these are also most likely to impact upon the psychological variables that dispose users to react favourably or otherwise to the adoption of innovation. It is for this reason that in the current research, various constraints and constructs drawn from culture and society have been included within the TAM used for determining the acceptance levels of teachers and learners to technology.

The literature has identified the following factors as being relevant in formulating an acceptance framework—(1) *Cultural Factors*: the relative levels of individualism/collectivism, uncertainty avoidance, power distance; (2) *Social Factors*: language ability, qualifications & skills, ambient facilitating conditions; (3) *Political Factors*: the effect that the use of social networks and/or social media has on the socio-political standing of users both individually and collectively; and (4) the original TAM constructs: perceived usefulness, perceived ease of use (Saadé & Kira 2003). These researches show that the factors are useful in determining the perceived ease of use and therefore, the intention to use technology by teachers and learners. This research therefore seeks to create a framework that takes account of cultural, political, and social factors, and which also recognizes the important role of teachers as models to learners in their use of technology. In consequence of the background circumstances, secondary-school geography teachers in Oman need to take a proactive role in creating the necessary conditions that will enhance their students' perceptions of eLearning and that will favourably influence their students' acceptance of technology and eLearning. In order to achieve technology acceptance amongst students, all the staff involved in a school need to be in accord regarding the promotion of eLearning to their students.

Saadé & Kira (2003: 239) found that the "determination of perceived ease of use and the intention to use eLearning technology" was important in an eLearning environment. Therefore, it is vital to understand that the teacher's social, cultural and political experiences with technology do have an effect on their willingness to use eLearning systems, and it is crucial to assist the teacher to develop positive attitudes to technology and innovation. Allan (2007) has found this useful in the assisting of integration of technology in the learning and teaching processes. Fleming *et al.* (2007) found that background experience and knowledge of the teacher in computing was a major reason for teachers having a negative attitude towards technology. Therefore, this research found it necessary to develop an environment in which teachers were able to have a hands-on experience with technology and emerging technology. Moreover, Fleming *et al.* (2007) demonstrated that the teacher's role went beyond teaching and training, but in the experimentation of the technology. Hence, this study puts an emphasis on the acceptance level, positive attitude development, and efficacy of the teacher to technology, to create an effective ELF that will be accepted by the learner.

Davis (1986, 1989) first formulated the TAM based on the *Theory of Reasoned Action* (TRA) that had been developed by Fishbein & Ajzen (1975) from previous research on the theory of attitude, which led them to the study of attitude and behaviour. Their theory sought to explain behaviour through the observation and analysis of subjects' attitudes, declared intended behaviour and actual behaviour (Sheppard *et al.* 1988; Hale *et al.* 2003). The separation of behavioural intention from actual behaviour in this theory further enabled them to offer explanations of limiting factors on attitudinal influence and thus to build a model for the prediction of behavioural intentions (Ajzen & Fishbein 1980). The approach adopted by Davis (1986, 1989) on the basis of TRA theory posits that actual behaviour is associated with the intention(s) underlying a person's behaviour, and he elaborated this into a model for studying and explaining the acceptance of new technology (Davis 1986, 1989). The TAM has been developed into subsequent versions by Davis and others (*e.g.* Davis *et al.* 1989; Bagozzi *et al.* 1992; Venkatesh *et al.* 2003; Venkatesh & Bala 2008). Numerous studies have employed the

TAM to investigate specifically the uptake of eLearning, such as those by Morris & Dillon (1997), Hu *et al.* (1999), Landry *et al.* (2006), Van Raaij & Schepers (2008), Park (2009), Al-Enezi *et al.* (2010), and Arenas-Gaitán *et al.* (2011).

According to Suh & Lee (2007), two dominant factors make the TAM ideal for examining the adoption of eLearning systems: users' attitudes to ease of use and perceived usefulness. Lee (2008) identified other factors such as perceived adequacy of facilities/resources, internal *versus* external computing training, internal *versus* external computing support, and external equipment accessibility. Another factor identified by Suh & Lee (2007) is perceived enjoyment, and they showed that perceived enjoyment has an important impact on the intention of using eLearning and on actual eLearning usage. The main purpose of TAM is to predict people's attitudes, behaviours and intentions to new technology as they are formed by external variables (Lu *et al.* 2003b) as shown in Figure 2.2.

Figure 2.2: Technology Acceptance Model [TAM] (Davis 1989)

The motivational factors *perceived usefulness* (PU) and *perceived ease of use* (PEOU) are primary factors of user acceptance of information systems (Teo *et al.* 2008a). PU refers to people's belief that technology will help them increase their performance: if they believe that the new technology is useful, they will then have a positive attitude towards it and this in turn will lead to the successful adoption of the new technology. PEOU refers to the degree to which users believe that the system will be free of mental effort: this implies the extent to which technology will be interesting and attractive to learn and use. In addition, PEOU offers a good prediction of how easy technologies will be to use in terms of efficiency and effectiveness. In general, both these motivational factors affect technology acceptance and mould behavioural intention towards information-system acceptance (Pikkarainen *et al.* 2004). This model has attracted considerable criticism for not including social issues, and this has led to some modifications by the addition of social factors. Therefore, a proposed and extended model by Venkatesh & Davis (2000) included new factors such as subjective norm, image, job relevance, output quality, result demonstrability, experience, and voluntariness. These issues affect PU, PEOU and intention-to-use, but they omitted issues regarding attitude. As first posited by Davis (1986), developments in future technology might well lead to other issues that could affect usefulness, ease of use and user technology acceptance (Wang *et al.* 2008). Therefore, many studies have tested the TAM across various fields and subjects for its capacity to predict attitudes and intentions towards using any particular information system, and these studies have incorporated new issues that have been discovered in the research context (Liu *et al.* 2004; Huang & Liaw 2005; Hardy *et al.* 2008).

This present work presents complementary research in the first part, focusing on the importance of using technology to enhance the pedagogical context. The second part of this work considers and evaluates the ELF for this study in terms of user acceptance of technology. Recent studies have attempted to explore the understanding of acceptance of eLearning technology in the light of knowledge, attitudes, and skills involved in using computers. These fundamental aspects inform future behaviour in eLearning with regard to innovative pedagogies (Yuen & Ma 2008). Thus, a particular TAM is here to be developed to explore acceptance of eLearning amongst Omani teachers and students in the *BE* tenth grade, and to compare their attitudes with those of teachers and students in other countries.

2.13 A Specific TAM with Cultural Factors

This model comprises the TAM factors identified by Davis (1989), together with PU, PEOU, behavioural intentions and attitudes relating to accepting and using new technology. The model also incorporates three main external factors as manifested in (i) social factors, (ii) cultural factors and (iii) political factors, owing to the varied influences exerted by culture on human behaviour (McCort & Malhotra 1993). Cultural neutrality has been identified as a blind spot in previous TAMs, because culture has been demonstrated in the literature to exert a major influence on acceptance. Unfortunately, the literature shows that technology is predominantly developed for the young (Maguire & Osman 2003; Tedre *et al.* 2006; Rogers 2009; Ziefle & Jakobs 2010). Some studies are concerned with the investigation of how technology acceptance cuts across national borders. Often the practice is to take the existing knowledge regarding technology acceptance in developed western nations and to relate it to other cultures based on cultural beliefs and values (Hofstede 1980). However, as Ziefle & Jakobs (2010) affirm, people use technology within a cultural and social context, and these influence how humans behave towards technology. Often a whole host of factors differ across cultures, and these factors include social taboos, political and legal constraints, together with religious, ethical and traditional values. Therefore, technology users across the globe have different perceptions, styles of thinking, cognitive and cultural values, and assumptions.

Social factors include language, qualifications/skills, and facilitating conditions. The *language* used in technology plays an important role in a user's attitude towards technology. When technological language is easy and understandable, the use of technology will be easy and flexible, which elicits positive attitudes towards that technology. The converse is also true, as difficult and complicated technological language generates negative attitudes towards technology. Other important social factors include *qualifications* and the *skills* required to use technology. Users need to be qualified and well trained to use technology, as a lack of training and skills will lead to negative outcomes that will in turn give rise to negative attitudes.

Facilitating conditions refer to the technical support available and the adequacy (or otherwise) of equipment and/or software. All these are indicated as important factors by the literature (Groves & Zemel 2000; Lim & Khine 2006; Teo *et al.* 2008b).

Three primary continua drawn from the cultural dimensions theory of Hofstede (1997) are used to identify the differences in the **cultural factors**—individualism/collectivism, uncertainty avoidance, and power distance. *Individualism/Collectivism* is the degree to which individuals are integrated within any group. In *individualism* the emphasis is on individual roles and rights, where individuals are expected to stand up for themselves, their own family and their own affiliations. In contrast, in *collectivism*, individuals behave as members of an organization or group, so that their 'family' is that group or organization to which they pay unquestioning loyalty (Srite & Karahanna 2006).

Uncertainty Avoidance is defined as the tolerance of a society for uncertainty. It measures the extent of coping with anxiety by avoiding uncertainty. High uncertainty-avoidance cultures implement rules and laws to support plans that are followed step-by-step to minimize unknown and ambiguous circumstances (Srite & Karahanna 2006). On the other hand, low uncertainty-avoidance cultures have as few rules as possible, they tolerate changes and accept a changeable environment and situations; these cultures tend to be pragmatic cultures (Hofstede 1984).

Power Distance reflects the way people accept and perceive power differences. High power-distance cultures accept autocratic power relationships, where people are not equal to each other, and their positions are classified hierarchically from superior to subordinates (Akour *et al.* 2006). In contrast, low power-distance cultures experience more democratic relationships, and equality is practised by all members of the society, who have the right to criticize and change the decision making of those who are in power (Teo *et al.* 2008b).

Political factors measure the impact of the use of technology on the socio-political environment in which the user operates, and the resultant interactions (individually and collectively) between technology-users and the political environment (Berman & Phillips 2001; Shah *et al.* 2001; Selwyn 2004; Dutta-Bergman 2005; Shah *et al.* 2005). This interaction been demonstrated extensively in *social networks* (such as Facebook, Twitter, forums and blogs) and in *social media* (such as YouTube, eNewspapers, videos and mobiles) (Teo *et al.* 2008b). As mentioned above in Section 1.4 in Chapter One, such technology played an important role in the *Arab Spring* protest movements taking place in various Arab countries beginning in mid-December 2010. The urgency of the situation changed these facilities from being mainly social entertainment in nature and invested them with a whole new purpose and status.

The TAM proposed as the model for this thesis is shown in Figure 2.3 below. In the diagram there are two special flow-lines that designate *personal feedback* and *non-personal feedback*. It might be argued that these are superfluous or redundant in this model. In reply, it is suggested here that the discussion of the TRA and TAM studies given in Section 2.12 above illustrates the complexities involved in human motivation, especially where *intended* behaviour often gives way to *actual* behaviour, even against a person's better judgement, owing to factors of which the person might not be fully aware. The box labelled 'Behaviour/Behavioural Intention' describes the reaction of the user (student/teacher) to the eLearning experience. In the case of the Oman *BE* system, the user will not have the option of refusing to take part in the eLearning, but the effect of the user's attitude may well influence performance in using the ELF, and influence further encounters (*i.e.* future behavioural intention).

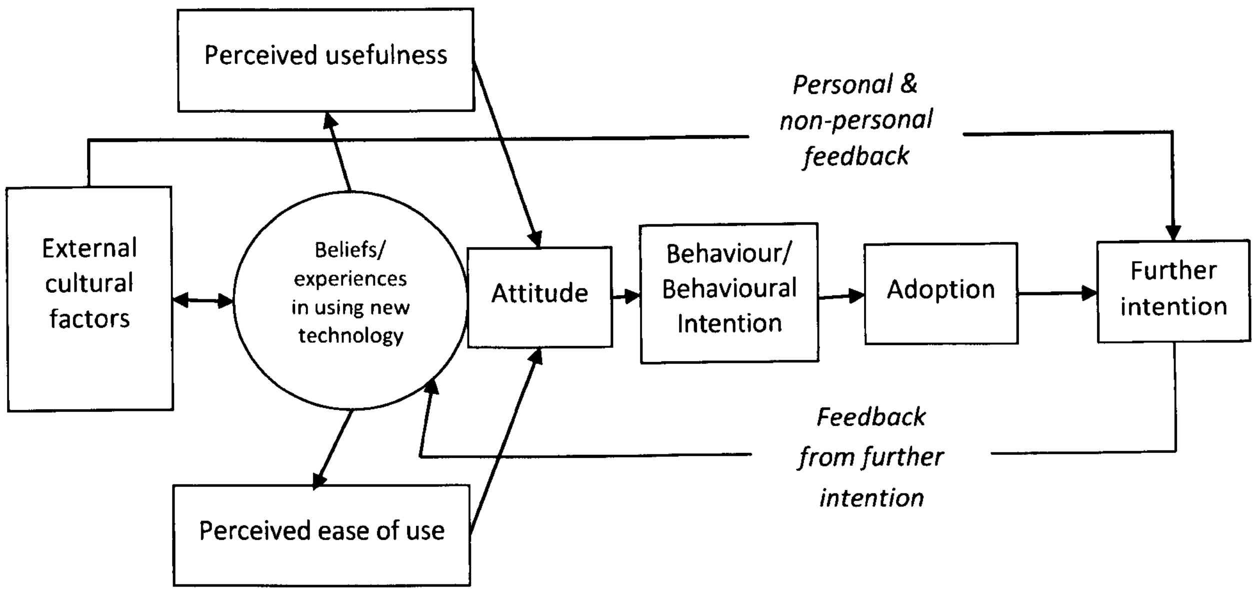

Figure 2.3: Proposed Technology Acceptance Model (TAM)

With regard to the discrepancy between intended and actual behaviour, Ajzen (1985) first introduced the concept of planned behaviour and subsequently developed it (Ajzen 1991, 2011), whilst Bandura (1994, 1997) formulated the concept of *self-efficacy* (referring to an individual's confidence in his/her personal competence) and explored the tensions between this and the individual's *expectation of the outcome* of a course of action (Bandura *et al.* 1999). In other words, a person does not always implement his/her planned behaviour, and does not always exercise self-control. In Figure 2.3 the upper outlying arrow for *Personal and non-personal* feedback refers to those influences that might cause an individual to modify intentions and/or behaviour even at the last instant before engaging in a certain course of action or behaviour. The lower outlying arrow showing *Feedback from further intention* shows how each user-session will feed further into the beliefs and experiences of the user.

This research thus critically recognizes that the success of using information technology in an eLearning environment will not only have to take cognizance of the individual's level of familiarity with technology, but also take into account that various other factors will have an effect on the learner's experience, perceptions, performance and (ultimately) acceptance of the eLearning process. The focus is thus laid on creating an adaptive ELF that factors-in user acceptance based on cultural influences. This is important since cultural influences affect each individual's responses, as well as the level of analysis. As Srite & Karahanna (2006:679) state, cultural values such as "masculinity/femininity, individualism/collectivism, power distance, and uncertainty avoidance are incorporated into an extended model of technology acceptance as moderators". Lau & Woods (2009:1059) have identified that the characteristics of a learning object influence "perceived usefulness and perceived ease of use of learning objects, therefore, individual differences appear to have no influence upon intention to use learning objects". The ELF in this study will thus include self-efficacy, system accessibility, subjective norms, perceived ease of use, behaviour intention, and perceived usefulness based on the TAM as proposed by Park (2009).

The intention of this research-work is to develop an ELF that adopts a TAM as elaborated in Figure 2.3 above, as a process diagram based on the beliefs and experiences of the user determined by perceived usefulness, perceived ease of use and external cultural factors. This model expresses the realization that these factors determine the attitude, behaviour, adoption and further intention of the user to technology, where further intention is affected by personal feedback of the user from external factors, as also by non-personal feedback from the system.

2.14 Geography: Technology, Pedagogy and Assessment

Geography courses are typically affected with an over-abundance of information and consequently by the need to filter, integrate and arrange the information (McKeown-Ice 1994; Keiper 1999). As the basic approach of geography is spatial, one efficient way of overcoming problems of selection/presentation and of enhancing geography education is afforded by the use of spatial technologies (Nellis 1994; McKeown-Ice 1994; Bednarz 1995; Keiper 1999; Bednarz 2004). Technology thus becomes a resource that enhances the learner's ability to understand the spatial process involved in geography (and thus to think geographically). Additionally, it has the potential to reduce considerably the difficulties faced by (suitably trained) teachers in preparing and delivering geography education. Furthermore, it has long been recognized that geography is an ideal disciplinary vehicle for environmental education, which has continued and still continues to grow in importance with the escalation of the impact of human activity of the planet (Naish 1986; McKeown-Ice 1994; Williams 1996). Environmental issues lend themselves naturally to the geographical approach. Research long ago identified various existing technologies that were able to enhance the learning and teaching processes of geography, and these have been in everyday use for many years. Such technologies include computer programs and simulations; global positioning satellite (GPS) technology; remote sensing; computer graphics and—early recognized for the educational potentialities still at the forefront of educational developments—geographic information systems (GIS) (Nellis 1994; Broad 2000).

The aforementioned technological applications share a particular adaptability to presenting geographical and spatial information, and their electronic/digital nature makes them most suitable for incorporation in the creation of geography eLearning systems. Early studies such as Palladino (1992), the Geography Education Standards Project (NCGE 1994), Bednarz (1995), Fitzpatrick (1997), Broad (2000)—to name but a few—identified the high suitability of GIS, and that GIS made "the process of presenting and analyzing geographic information easier, so they accelerate geographic enquiry" (NCGE 1994:45). Because of its suitability for constructivist, inquiry-based methods of analysis, GIS had "great potential as a tool to aid the acquisition of standards-based knowledge and skills" (Kerski 1999:2). Bednarz (1995, 2004) found that GIS, enhance the constructivist, inquiry-based analysis that leads to increased acquisition of knowledge and skills-based learning, by allowing learners to construct knowledge by building maps and databases, and through the exploration of spatial relationships. These systems also enhance inquiry based learning since they "pose questions and propose answers" to the learner about the real world (Bednarz 2004:8). In the case of the teaching/learning of geographic studies (and also environmental studies) it has been shown in the various aforementioned studies that these features considerably enhance the teaching/learning processes in schools at all levels and in tertiary-level education (Nellis 1994; McKeown-Ice 1994; Bednarz 1995, 2004).

Of interest for this study are the many advantages that the technology and especially ICT can offer the eLearning process for geography. The literature has revealed that the use of ICT in learning and teaching has the potential to change the educational processes and practices in a positive manner (Ben-Jacob *et al.* 2000; Rogers 2000; Yap *et al.* 2008). These studies have proved that the use of ICT features—such as emails, internet conferencing, electronic multimedia libraries and databases—have encouraged the development of eLearning. ICT features likewise also offer innovative approaches to learning and teaching, as they involve collaborative and problem-based learning, which are actively encouraged by such systems (De Verneil & Berge 2000; Freeman & Hare 2006). For example, in those USA high-schools where use was made of the GIS system recommended for teaching geography, experience has demonstrated that students gained increased proficiency in collaborative and problem-based learning (Wanner & Kerski 1999; Kerski 2003). The use of ICT in geography in British schools has also produced favourable side-effects (Warner 1995; Durbin & Sanders 1996; Donnelly 2000; Freeman 2003). Of course, as with any innovation, British schools encountered problems, in preparing teachers and students, and needed time to solve them, particularly with issues surrounding the time-allocation of computer use for different subjects (Rudd 1994; Ofsted 2001; Watson 2001).

However, apart from allocation and training problems, which are endemic to school systems, the benefits have been substantial. According to Bednarz (1995, 2004), the ICT-based system increases creativity and open-ended learning since the learners have time to carry out experiments and analyze data. Moreover, the use of GIS has been highly beneficial in enhancing many aspects of the teaching/learning process since it facilitates learners' acquisition of spatial and other geographic concepts (Fitzpatrick 1997; Deadman *et al.* 2000; Fisher 2004), it encourages learners to put these concepts into practice and thereby build up subject-related skills (Roberts 2003; Dixson 2004) and generic skills (George *et al.* 2002; Hassell & Taylor 2002), whilst also helping them to develop their computer skills in general (Freeman 2003; Bednarz 2004; Gobourn 2006). Teachers also benefit from acquiring further skills, both subject-specific and more general (Treanor & Kilcoyne 2000).

Through the use of the GIS system, it is possible for the teacher to align key strategies of eLearning with traditional educational methods (Williams 2000; Bednarz 2004; King & Taylor 2006). The teacher can make use of this system to pose real-world questions to the learner, and to create an environment for team-based open-ended learning environment where the teacher is the *facilitator* rather than the dispenser of knowledge (Roberts 2003; Martin 2006). Moreover, GIS has been shown to strengthen standards-based skills and inquiry-based skills over the traditional locational knowledge of geography (Broad 2000; Cartmel 2000; Balderstone 2006). It allows the teacher to help learners to develop the spatial skills necessary to understand and appreciate the concepts of geography. ICT offers to teacher and learner rapid, extensive and easy access to information and materials, thus making it easier for them to carry out complex and complicated operations. ICT heightens learning through the provision of opportunities to explore high-level cognitive activities such as creativity-based enquiry, problem solving, autonomy and teamwork (Martin 2001; King & Taylor 2006; Kwache 2007), and offers teachers the opportunity to take into account the individual needs of each learner.

Moreover, technology can assist the teacher in managing the learning process and the course, as it offers opportunities to enhance assessment (Jefferis 2004). For example, through classroom response systems that employ the use of input devices such as keypads (Burnstein & Lederman 2003; Lowery 2005) and clickers (Copas 2003; Martyn 2007), learners are able to input their response to questions presented by the system. Through these devices, it is possible to engage learners using online tests and Q&A sessions, and the eLearning system software can assess the level of knowledge acquisition gained by learners and the perceived quality of the content (Guthrie & Carlin 2004; Duncan 2005). Commentators such as Elby (2001), Duncan (2005) and Choi *et al.* (2007) have shown how technology-enhanced assessment techniques allow the teacher to determine the level of knowledge- and skills-acquisition of the individual learner, by using problem-solving techniques. In tandem with GIS, technology-enhanced assessment techniques are able to add considerably to the power of a geography eLearning package. The teacher now has powerful tools for evaluating the level of knowledge and the participatory activity of the learner (Bednarz 2004; Choi *et al.* 2007; Bojinova & Oigara 2011).

As described later in this chapter, the Moodle platform for the virtual learning environment incorporated into the ELF is designed to utilize constructivist perspectives. Thus, the framework is teacher-centred with regard to the design of the system, the composition of the course-modules and other content, and the necessary induction process for learners. Thereafter, the framework allows learners to begin to assume a fair degree of individual choice in their learning activities. In the Moodle-supported environment, the learner is encouraged to become the director of the learning process, making decisions regarding the selection of materials, downloading content, videos and other classroom materials from the platform through computer, mobile phone or Mps3 player. This particular platform was selected *precisely because* it incorporates tools that encourage learners to construct ideas by testing the content using problem-solving techniques. It also frees the learner from dependence on the classroom environment. Learners of all ages are able to enter into and take advantage of the virtual world of ODE. The only constraints are their own abilities and willingness to learn.

2.15 eLearning Software Packages

New eLearning models steadily emerge as the latest findings of research in the field of eLearning become available. eLearning models are designed to develop frameworks that address the learning and teaching process mediated by technology. There are many software packages that have been specifically designed for eLearning environments, including Blackboard, WebCT and Moodle (Brugess 2003). World Wide Web Course Tools (abbreviated to WebCT) was first invented in 1995 by Murray Goldberg, a computer science professor at the University of British Columbia. The uptake of WebCT has increased considerably since then, especially in the HE sector. The software integrates communication tools including bulletin boards, private emails, chat-rooms and calendars, and can support ICT hardware like videos, graphics and audio technology. WebCT enables increased interaction between learner and teacher, whilst also protecting contents authors' intellectual property rights and the privacy of the learner (Brugess 2003). The software cab also support course content including glossaries, self-tests, references and quiz modules, thus making possible the assessment and evaluation of eLearning performance and practices. The software facilitates eLearning functions in other ways, by allowing learners to post their assignments, papers and materials on the system, and by providing the course moderator with facilities for managing the eLearning process—including grading, monitoring learners' progress and directing learners' interactions (Brugess 2003). As the software is designed to run on servers using a UNIX operating system, teachers and others managing the eLearning package need to be familiar with the UNIX operating system.

The field of eLearning has seen a rapid development of software such as XML programming to offer new standards of internet use and interaction, allowing for the development of customized learning programs such as Flash, Authorware, Macromedia Director, and Microsoft FrontPage (Godwin-Jones 2003). One major software package used worldwide for eLearning is Moodle, which is a course management system for eLearning. Moodle—an abbreviation for 'Modular Object-Oriented Dynamic Learning Environment'—is a software package designed to assist teachers to create a high-quality eLearning environment. Martin Dougiamas, at that time an administrator of WebCT software, created the Moodle software using open-source solutions to replace the restrictive constraints of intellectual property rights inherent in the WebCT model (Klaus 2005). Dougiamas developed the model on the basis of socio-constructivist pedagogy, with the goal of providing the eLearning process with a set of tools that can support inquiry- and discovery-based approaches to learning (Klaus 2005). Moodle is designed to create an environment that allows for collaborative interaction between the learners as a stand-alone system, and between learners and teachers as a part of conventional classroom instruction (Klaus 2005). In this pedagogical process, eLearning projects and tasks are designed to allow cooperation to occur between learner and teacher through different formats of social interaction. In this environment, the teacher has an opportunity to divide the learners into groups, and interact synchronously through chat-rooms and by asynchronous discussions via wikis and forums (Klaus 2005). The advantage of this software is that the easy support of Wikispaces offers an eLearning module that enables learners to compose work on texts together online.

Literature shows that the software offers eLearning an advantage for it is developed on open-source software. According to Klaus (2005), Moodle can run on a number of operating systems such as UNIX, Windows, Linux, NetWare, Mac OS X, without necessarily being modified and it is for this reason that is has been selected for developing the ELF in the present research work. Moreover, Moodle offers eLearning systems the ability to support PHP, which is an HTML-embedded scripting language, and web-host providers (Klaus 2005). Data can be stored on the software in a single database such as MySQL and PostgreSQL, which are supported by the software. Additionally, data storage can also be made on supported databases such as Oracle, Borland Interbase, IBM DB2, Informix, Microsoft SQL Server, Visual FoxPro, SAP DB, Microsoft Access, and generic ODBC (Klaus 2005). According to Klaus (2005) the Moodle software is often used as a "courseware package and eLearning system, since it has the potential to support conventional classroom instruction." The software's design is a template based system, to which content is added, making the software's interface intuitive and easy to navigate. The page format is based on the flat-view formatting, laid out in blocks, with organization based on sections of a weekly or topic outline (Figure 2.4).

Figure 2.4: Moodle's Course-set-up topic format (Klaus 2005)

Moodle is different from other systems, since it does not make use of "Chinese boxes" with course content within folders at different levels but rather uses sections in the flat-view format (Robb 2004). Each section in the Moodle software has tools including quizzes, assignments, and forums linked to a built-in Grade-Book for assessment purposes. The arrangement of elements within sections is seen in Figure 2.4 showing a single course set-up page. Moodle software is frequently selected over its predecessors such as *WebCT*, since it easily supports various assessment and testing strategies (Klaus 2005). The assessment strategies include the "quiz module" which includes several response types: multiple-choice, fill-ins, true/false choices, short answers, and matching answers. These types are all managed through the automated tallying and scoring system, which is based on rating scales determined by students as well as teachers. Another assessment strategy is the "essay module", which allows the teacher to administer open-ended questions that have built-in comment boxes for feedback. There is also a "workshop module" that is designed to offer an opportunity for peer assessment by fellow learners. The software is very practical, making feedback from the assessments readily available to both teacher and learner, through text or audio-based files such as MP3. Feedback via the Moodle-based environment can be either qualitative or quantitative; for example, assignment modules and journals offer the teacher the option to provide comments through a feedback box or through forums, as seen in Figure 2.5.

Figure 2.5: Example of Moodle's Feedback Box (Klaus 2005)

Moodle contains useful eLearning software since it is based on a Learning Management System (LMS), which allows for information to be presented in small amounts to the learner, and can monitor the quality of achievement. Moodle can provide lesson modules that offer control in the learning process by guiding the learner on a step-by-step basis. The model integrates eLearning tools into a single organized coordinated system.

2.16 Web-based Learning in this Research Work

An exploration of the literature reveals that new online technologies have presented opportunities for the growth of eLearning. One particular emerging instructional technique is web-based learning. Education systems are increasingly focusing on creating websites that have improved visual design, usability design, site organization, database and file structures. Of interest is how teachers can best integrate the web into instructional design to obtain optimum outcomes from the teaching/learning process (Moallem 2001).

The literature recommends that effective web-based learning should systematically develop instructional specifications in line with relevant teaching/learning theories and practices to optimize the quality of instruction and the learning experience (Moallem 2001). This entails the development of instructional materials and learning activities, accompanied by careful evaluation and assessment of all the teaching and learning activities. Ideally, this implies that there must be a link between the learning theories and the building of instructional systems, especially as regards the arrangement of procedures and resources that promote learning (Gros *et al.* 1997). In other words, web-based learning should utilize instructional models that incorporate guidelines from a set of strategies based on learning theories and best practices (Moallem 2001). In many cases, the instructional design models to be factored-in are drawn from traditional teaching and learning processes, from objectivist approaches (Gagné *et al.* 1992) and constructivist/interpretivist instructional models (Hannafin *et al.* 1999).

Traditional instructional models embody behaviourist and cognitivist approaches, in which priority is given to the ambient learning and teaching conditions, the outcomes of the pedagogical process, and the learner's acquisition of an organized knowledge structure. However, for web-based learning this process additionally factors-in aspects such as a learner's prior knowledge, desired learning outcomes, goals and performance objectives, besides the instructional strategies, assessment strategies, evaluation procedures and techniques (Moallem 2001). The goal of this blended approach is to involve learners in task-based activities that will increase their involvement in the learning process, and to help them acquire and develop problem-solving skills through problem-based learning that will engage their knowledge-construction abilities and improve their cognitive strategies.

Therefore, based on the theories and best practices of web-based learning, the experimental ELF will make use of a website that supports an instructivist/constructivist model for the teaching and learning of geography. To meet the requirements of the instructional design-element, the "Geography World" website comprises several features and resources (described later in detail in Section 4.5.1). These features are designed to meet the behaviourist, cognitivist and constructivist requirements that will facilitate a smooth transition for Omani secondary-level students from the traditional classroom approach to a modified computer-based and web-based approach to the teaching and learning of geography. The instructional materials to be used to complete this web-based learning environment were designed using a Moodle platform, which offers an ideal web-framework as previously described.

The literature also supports the notion that an ideal web-based learning process must factor-in the user acceptance levels of technology. For the web-based learning to be effective, the platform and its supporting technologies must be well adapted to meet the needs, skills and ability-levels of both teacher and learner (Moallem 2001). The cultural and other background characteristics of teachers and learners have also been taken into account in the development of the adaptive ELF, to enhance how these actors accept eLearning technology. Given that the instructional design includes aspects such as prior knowledge and skills, the experimental framework likewise incorporates a specific TAM to monitor those personal aspects that have been proved to affect the perceived usability of the system.

2.17 Summary of the Chapter

A review of the literature has revealed that, unlike the traditional classroom environment, an eLearning environment can allow the occurrence of learning that is self-paced and individualized; it can allow learners to raise queries and doubts, and to obtain feedback without delay; it can also allow slow learners to participate more effectively by allocating to them longer response deadlines. This study aims to create an adaptive ELF that harnesses the opportunities highlighted by the literature to enhance the geography teaching/learning process in Omani secondary schools, over the *traditional* model of the secondary-school teacher/classroom environment. This research seeks to develop an ELF that will encourage secondary-school geography students to be more autonomous in learning, solving problems and creating their own knowledge and skills from the pedagogic process.

Moreover, the literature has drawn attention to the need for increased interaction between learners, teachers and content, through various technologies including blogs, discussion forums, bulletin board, videoconferences, virtual meetings, wikis, social media, and chat-rooms. The goal is to create a comprehensive ELF on two of the three levels of eLearning interactions—specifically, Level 2 (learner/content, learner/instructor, and learner/learner interactions) and Level 3 (evaluation, assessment, and feedback). The literature makes clear that the teacher needs to facilitate interaction and participation by offering feedback, in terms of strategies such as interaction with content, conversation, collaboration, performance support, and inter-personal interaction. This feedback to interaction is an important aspect of an effective eLearning environment, and is derived from assessment and evaluation of teaching and learning outcomes. The study focuses assessment and evaluation on learning outcomes, since these help to guide the learner with information on what they should understand, know and do with the knowledge gained. The study also focuses on teaching outcomes to assist the teacher to determine what is to be evaluated at the end of the learning process or course. This study seeks to create an ELF that offers opportunities for learner and teacher to interact through tools facilitating knowledge transfer, feedback and user information, by using the key elements of teaching, learning and assessment. The forms of assessment chosen are both summative and formative, to promote learning and feedback to teacher and learner. The assessment model selected for the framework focuses on dimensions such as internal vs. external validity, summative vs. formative, and quantitative vs. qualitative process, to achieve an integrated evaluation process.

The identified teaching, learning and assessment functions of the framework will be implemented effectively via selected technologies and ICT tools. For this study it was decided to incorporate computer graphics and Geographic Information Systems technology within the repertory of the geographical technology for the ELF, as these are readily available on the market. The purpose of these technologies is to highlight the spatial aspect in the learning and teaching of geography. These facilitate the acquisition of knowledge and skills-based learning, allowing learners to construct knowledge by building maps and databases, and exploring spatial relationships. Also in the repertory are maps, slides, still pictures, video-clips and audio-clips—all of which enhance the spatial element in learning and add value to the teaching process. ICT tools selected for the teaching and learning process are Microsoft PowerPoint; video technology; Moodle platform for real-time streaming; audio technology through Adobe; the media platforms YouTube and blogs. In addition, it has been decided to use virtual worlds, three-dimensional virtual worlds and Web 2.0 technologies for providing students' simulated environments, as well as role-playing games, which increase learners' motivation, critical thinking, leadership and problem-solving skills. This present study makes use of the LMS system to present information to the learner in small amounts (in sessions lasting no longer than 40 minutes), in line with the cognitivist approach. In the Moodle-based environment, the ELF adopts a constructivist perspective, in that learners are encouraged to begin to direct their own learning process and to construct ideas by testing the content through problem-solving techniques.

These technologies are selected by considering factors that affect the acceptance levels of both learners and teachers for technology and eLearning. The conceptual framework makes use of "perceived usefulness" and "perceived ease of use" to determine the acceptance levels of teacher and learner. This process is based on the TAM as well as other constraints and constructs to identify cultural factors, social factors and even political factors that can affect the ELF, which will be adaptive by factoring-in relevant cultural influences on the attitudes of learners and teachers towards eLearning. An example of a relevant social/cultural factor can be seen in the fact that, in order for the technology to be acceptable in the Omani school system, it was necessary for the Researcher to gain the approval of the regional education board, the school administrators *and* the teachers, otherwise it would have been extremely difficult to promote the prospect of geography eLearning to the student. The eLearning tools and technologies were selected by the Researcher based on their ability to link educational theory to online learning practice and to enable the ELF to integrate a strategic mix of pedagogical processes. The framework was based on the learning theories of behaviourism, cognitivism and constructivism, with collaborativist elements. These pedagogical foundations allow for increased interaction between student/student, student/content, student/teacher, and teacher/content. By offering a uniform core syllabus to learners, the shared background knowledge prepares the way for constructivist processes to take place. The ELF selected is based on the third and fourth teaching styles (Priyanto 2007), which includes face-to-face teaching supported with computers and an intranet where the teacher loads teaching materials from an external drive, while later the students are introduced to a fully-fledged web-based online learning experience. The ELF developed to house this adaptive environment is based on these teaching styles and is well supported by computer/ICT technology.

CHAPTER THREE: CONCEPTUAL FRAMEWORKS

3.1 Conceptual Framework: eLearning System Overview

Globalization in the education sector has gone hand in hand with the rise of distance learning programmes as well as the support provided by the increasing utilization of eLearning systems referred to as internet-based electronic learning. Van Raaij & Schepers (2008) have identified these systems as useful in the support of educational programmes owing to their relative freedom from the constraints imposed by space and time. A review of the literature demonstrates that organizations and institutions (educational and otherwise) need to understand the eLearning phenomenon in order that they can make decisions on how to adopt eLearning techniques and adapt them to specific environments. For example, a study carried out by Zhang *et al.* (2004) showed how multimedia technologies and the internet are reshaping the ways in which knowledge is delivered and how eLearning has become a viable alternative to traditional classroom learning.

For this research work an ELF had been developed for teaching geography at secondary-school level in Oman. This offered opportunities for teachers and students to interact more effectively through various tools and applications that facilitate the imparting of knowledge, information and feedback. The remit of this research work was to install an effective eLearning system for this purpose by examining the requirements for incorporating key components of the educational process (including teaching, learning and assessment) and finding solutions to them. It was necessary for the design of the eLearning system to incorporate various technological tools that had been identified as having a significant effect on the educational/pedagogical process (Zhang *et al.* 2004). For the system, Moodle (*Modular Object-Oriented Dynamic Learning Environment*) was adopted as its operating platform. Moodle is open-source software that manages and supports learning; its previous utilization history indicated strongly that it offered a suitable environment for the delivery of the geography curriculum. It was vital to set and meet stringent system requirements, because geography is a wide-ranging subject, and "the amount of learning materials in an eLearning system creates difficulty in identifying suitable learning materials for a particular topic, creating a need for the recommendation of tools" (Ghauth & Abdullah 2010:711). Accordingly, as part of this research the eLearning system was designed to be highly adaptive, in order to meet the particular demands of teaching, learning and assessing performance in the secondary-level geography curriculum in Oman. These essential aspects of the education process were incorporated into the system's programme by means of an organized series of activities with the aim of transferring skills and knowledge to the learner.

However, the design of the ELF also had to take account of the fact that the process of transferring knowledge and skills is highly dependent on the *quantity and quality* of interaction between the various components and elements in the system. Some of these constituent parts are human (for instance learners, teachers), some are tangible (for instance the hardware employed, the physical conditions under which people work), and some are intangible but nonetheless highly influential (for instance the curriculum, the software resources, educational policies). Furthermore, the ambient socio-cultural milieu in which the eLearning process is conducted (the personal and educational background of system managers and users) also has a significant impact through the cultural assumptions and attitudes brought to bear on the process by all participants—teachers, students, other actors—who interact with the system (Stigler & Hiebert 1998). Additionally, the ELF designed for this research work was also based on the conceptual foundations of social and peer learning, which are important in the eLearning context (Boud *et al.* 1999; Ghauth & Abdullah 2010), because they act to foster increased interaction as learners are encouraged to cooperate and learn with each other (Sapon-Shevin 1991; Hooper 1992; Johnson & Johnson 2008).

The ELF constructed for this research work was based on a combination of teaching styles, including (a) a certain amount of face-to-face teaching conducted with the assistance of computers/ICT technology (a *blended-learning* approach) and an internal network into which the teacher was able to load teaching materials from an external drive, together with (b) a fully online teaching environment available for students to use as they wished. By using blended learning, the students in the experimental group (EG) were not subjected to the sort of disorientation that might occur if traditional face-to-face teaching were to be withdrawn entirely (Tinio 2003). The ICT tools selected for this ELF included teaching slides, which can be prepared with readily available software such as Microsoft PowerPoint. This tool was identified for use since it offers an easy way for teachers to create non-moving items such as individual tables, charts, graphs and pictures. Furthermore, it is possible to convert a number of non-moving teaching materials into a flowing slideshow, with the use of enhanced colour, sound, graphics, animation, and even with embedded text-to-speech materials (Rughooputh & Santally 2009:131). Moreover, the slides can easily be printed off in hard-copy, they are easily convertible to web-page format to be published online, and they can be saved on Flash or CD drive for reference. This tool thus offers to teachers a rich resource for presenting learning materials to learners and for making ready summaries of course content. Whilst it is true that the use of slideshows can cause teachers to fall into bad teaching habits there are many advantages to their use (Klemm 2007), especially as it is one very versatile tool amongst the many available (Becker & Ravitz 2001) and even if only *one* computer is available in the classroom (Dockterman 1997).

A second highly useful feature is the use of video technology and/or the screening of downloaded films. These offer streaming media, and can be downloaded by the students for their MP3s or to the Moodle platform for real-time streaming. Video technology is widely used in geographical classes since it offers actual footage of geographical topics covering different parts of the world, and they allow learners to take part in real-time interaction with instructors (Nakamura *et al.* 2010:237). Videos offer a chance for teachers and learners to make follow-up activities on a lesson, and for teachers to present coaching classes, tutorials and conferences, which can be conducted live (Nakamura *et al.* 2010). Apart from follow-up activities, video technology offers learners who missed a particular class the chance to access help, explanations on class notes and so forth. The common video technology employed is Video Home System (VHS), Digital Versatile Disc (DVD) and films downloaded from the internet. Learners can access videos via notes downloaded onto MP3 players and smartphones, as well as via Moodle and other learning management systems (LMS).

Being closely allied with video technology, audio technology offers the opportunity for learners to enjoy a personal narrative presentation by their teacher or somebody else. This technology has evolved over the decades and transcends the original basic radio and television audio-transmission facilities. It is possible now for teachers to take advantage of the benefits of presenting learning materials via audio-enabled PowerPoint slideshows or through Adobe or TechSmith packages. Modern audio-with-video technology is considered extremely useful for teaching geography in an eLearning environment since it enhances the pedagogical content, by enabling topics to be presented in a lively, realistic and much more time-economical manner (Hill &

Nelson 2011). The history of educational practice has shown that the use of audio is advantageous as not only does it offer voiced-over explanations of the subject matter, but it also engages the learner's attention more effectively (Hsu 2007). A study by Özdemir (2008) concluded that the web-based technology that transferred texts, animated pictures and audio data was more effective in knowledge creation than were traditional eLearning systems that did not have such facilities.

Other online tools used for this system include social media and network platforms such as Facebook, Twitter, YouTube, Myspace, Wikispaces and blogs (Hall & Davison 2007). These allow teachers and students to engage in a wide range of interactions, as for instance through discussion forms and chat-rooms (Kirkpatrick 2005), and to explore geographical environments through various applications (Hill & Nelson 2011). For example, Facebook allows learners and teachers to manage and enrich the education process through items such as: (1) flash cards, which assist in building up activities; (2) blog tags, which enable users to exchange materials with each other; (3) keyword research, which assists learners to search for specific information; and (4) the 'Courses' application, which allows teachers to provide facilities vital for the delivery of learning materials. The initial version ('Facebook Courses') was superseded in 2007, with subsequent versions ('Platform Courses') being developed, often by people at school (Morin 2007). The tools have been demonstrated as being effective in delivery of materials such as course materials, assignments and announcements, as well as for engaging learners in work-groups and discussions (Hamdy 2010). Applications such as YouTube have proven useful in the dissemination of information in the form of videos that learners can download, upload and view. Facilities such as virtual worlds (especially 3-dimensional virtual worlds) and Web 2.0 technology make available to students highly complex simulated environments (e.g. *World of Warcraft*), from which students can learn valuable transferable skills such as collaboration, creative thinking, constructive experiences, simulating, game-based learning and social interaction (Chatti *et al.* 2007; Hall 2009; Dabbagh & Kitsantas 2012). Other facilities that offer effective learning environments include game-based learning and role-playing games, which help to increase learners' motivation, critical thinking, leadership and problem-solving skills (Suh *et al.* 2010). It has been argued that the use of video games in a geography class helps "to demolish the subject-object distinction between academic/popular knowledge and also to construct viable eLearning strategies" (Dittmer 2010:139). Genres of environment such as virtual worlds are important in facilitating social interaction, building student interest, promoting change in student's conceptual representation, affect and narration (Dalsgaard 2006). All these help to engage students in an active use of the web as a resource for their self-governed, problem-based and collaborative activities (Dalsgaard 2006; Chatti *et al.* 2007; Dittmer 2010; Dabbagh & Kitsantas 2012).

Apart from teaching and learning, the eLearning system can offer the teacher opportunities for assessing and testing the students' acquired knowledge and skills. This can be carried out through computers, personal digital assistants (PDAs), and interactive voice response, video-teleconferencing and telephones (Tippins 2011). Assessment can also be carried out by means of e-portfolios and project-based learning tools via web-based technologies and Web-pages. In order that the ELF would be effective in offering a rich teaching and learning environment to deliver the teaching/learning objectives, it was considered necessary to ensure that the ELF system should meet Viable System Model (VSM) criteria. The VSM (Beer 1984) is an approach designed to offer to any particular system robust support against external and internal malfunctions and disturbances, and to help the system survive changes and unpredictable environments (Leonard 1999; Espejo 2003). This model can be applied to the development of information systems (Kawalek & Wastell 1999). VSM requires a system to be based on six identifiers or functions: operations, coordination, control, audit, intelligence and policy (Walker 1991, 2003).

For the ELF, the *operations* are provided by the human elements—teachers, learners, administrators—who define activities and processes such as teaching, learning and assessment. *Coordination* entails the organization of the teacher/learner activities and processes within the eLearning system, whilst *control* comprises the synergy and cohesion present within the system's components that manage the activities and processes (Walker 1991, 2003). In an eLearning environment, these two functions are driven by the activities of the human actors (Kawalek & Wastell 1999) and their interactions with the system software components, which provide in-system feedback and follow-up procedures and pathways to facilitate these, whilst also recording specific historical records for enabling the *audit* and *intelligence* functions (Kawalek & Wastell 1999). The preceding two functions and the following two functions are particular well-supported within self-adaptive software (Laws *et al.* 2001). *Audit* entails the direct ability of the elements to access and collate data on specific activities and processes, whilst *intelligence* is the ability to upgrade the system with up-to-date activities (Kawalek & Wastell 1999; Leonard 1999, 2000). *Policies* consist in the rules that govern the system beliefs and assumptions underlying the model and the various flow-paths of information (Walker 1991, 2003). Thus the overall effectiveness of the VSM depends on the effectiveness of the feedback and follow-up sub-systems, which are largely determined by the *policies* as well as by the quality of the software installed.

3.2 Pedagogical Reasoning: Models

Pedagogical models are cognitive or theoretical constructs derived from models that seek to explore various aspects of the interrelationships between knowledge, skills and ability, which form the foundations for approaches to learning theory (Conole *et al.* 2004). This implies that pedagogical models seek to identify the mechanisms through which theory is linked to practice (Dabbagh 2005). Pedagogical models are employed in the endeavour to construct instructional strategies for any particular system of teaching/learning. These strategies are defined by Jonassen *et al.* (1991:34) as "the plans and techniques that the instructor/instructional designer utilizes to engage the learner and to facilitate learning". Although many pedagogical approaches to eLearning have been quoted in the literature, greater care is needed in mapping out the strategies to be followed in designing an eLearning system (McCormick & Scrimshaw 2001; Conole *et al.* 2004). Hadjerrouit (2007) argues for the importance of designing eLearning systems around pedagogical models based on behaviourist, constructivist and collaborative principles. These three approaches to learning theory have been shown to have characteristics that are important features for eLearning (Govindasamy 2002; Mayes & De Freitas 2004; Alonso *et al.* 2005). Indeed, Ally (2004) argues that owing to the particular configurational characteristics of eLearning systems, it is necessary to combine several approaches for developing online learning courses and materials. Making specific reference to behaviourism (for facts), cognitivism (for processes and principles) and constructivism (for high-level thinking), he shows how it is the combination of these approaches that helps to foster collaborative work (Ally 2004).

The behaviourist theory of learning makes the assumption that the role of learning is the transmission of knowledge from the teacher to the learner (Lin & Hsieh 2001; Mayes & de Freitas 2004). Therefore, a learning environment based on the behaviourist approach is characterized by teacher-centred learning activities. This type of pedagogy is associated with the total eLearning environment (Figure 3.3) where the teacher is at the centre of all the processes. Another pedagogical approach based on is constructivist learning theory, which views knowledge as a constructed entity made by every learner through a learning process (Mayes & De Freitas 2004; Alonso *et al.* 2005; Hadjerrouit 2007). The pedagogy of constructivism concentrates on learning not as a transmission made by active teacher to passive learner, but rather of a process of active construction as the learner gains individual skills and knowledge founded on prior knowledge (Lin & Hsieh 2001). The constructivist approach challenges the habitual ways of thinking and doing; in order to be truly productive, this approach often requires an adjustment towards accepting *ad hoc* informal interpretations and understandings at the expense of formal epistemological rectitude (Larochelle & Bednarz 1998; Gulati 2004). This adjustment towards informality is needed to facilitate the effective use of the collaborative approach (Gulati 2004), in which the individual learner is encouraged to gain skills and knowledge by collaborating with a range of other people such as fellow learners and teachers (Leach & Moon 1999; Lin & Hsieh 2001). Most of the literature agrees that the constructivist approach—focusing on knowledge construction based on learner's previous experience—is a good fit for eLearning because it ensures learning among learners (Hung 2001; Hung & Nichani 2001; Koohang *et al.* 2009). The Moodle virtual learning environment (VLE) is based on the constructivist perspective (Hadjerrouit 2007).

The Moodle VLE model offers an environment where the focus is placed on learners, encouraging them to construct new ideas by testing theory through the solving of problems. The pedagogy associated with this model functions through the provision of an interactive environment for the building of knowledge and problem-solving abilities, as well as the provision of activities that promote experimentation and discovery, presenting opportunities for evaluation and reflection (Honebein 1996; Koohang *et al.* 2009). This model also allows a teacher to maximize the dynamics of the learning environment to increase student participation and provide back-up learning materials (Honebein 1996). This approach encourages a learning environment in which the instruction is learner-centred and the teacher acts mostly as a facilitator: hence knowledge and skills are gained by the interaction between learner and study materials (Hadjerrouit 2007). Consequently, Moodle was chosen as it facilitates the development of learner-centred learning that encourages increased interaction and integration as described by Popescu (2010). According to Dittmer (2010:139), adopting a constructivist perspective through the use of video games offers rich opportunities for problem-based learning and self-regulation, thus harnessing the interest of geography students.

The facilities included in the design of the current ELF also offer opportunities for constructive experiences (social focus) and collaborative pedagogy. Learners can exercise, construct and test their knowledge, ideas and skills through dialogue, discussion, game-based learning, role-playing games, and collaboration with others. The various interactive features of the system are designed to promote and support peer review and evaluation to develop skills in creative thinking and social interaction. They are intended to increase motivation, critical thinking, leadership, and problem-solving skills. These goals extend the remit of the eLearning system into the "situative perspective" approach, which focuses on the physical and situational context within which the learning process takes place (Brown *et al.* 1989; Sfard 1998). In that model the educational process is linked directly to real-life situations in context where, through their collaborative efforts, learners are able to develop identity by participating in communities of practice (Hawisher & Selfe 1999). Learners thereby are able to participate in the socially-mediated practices of learning and enquiry, leading to the development of dialoguing abilities that allow for the creation of learning relationships.

The differences between the cognitive and situative perspectives may be summed up thus: cognitive/constructivist perspectives view knowledge as a commodity, and the metaphor for learning this knowledge is one of acquisition, for which self-regulation is the primary mechanism for learning (Sfard 1998). In the cognitive/constructivist view, contextual and social influences (including teaching) are seen as means for enabling the acquisition of individual knowledge, whilst situative perspectives view learning as participation in communities of practice (Brown *et al.* 1989; Brodie 2005). However, the educational debate has moved on from the earlier stages of adversative distinction between cognitive/constructivist and situative approaches. Situative and cognitive approaches are both able to elucidate different aspects of the educational process and both should therefore be pursued (Anderson et al. 2000). The modern practice is to accept the various approaches as being applicable at different levels of interaction. Thus, the behaviourist approach analyzes learners' overt activities and the outcomes of these activities for individual learners. The cognitive approach addresses a level of analysis that describes the detailed structures and processes that underlie individual performance, whilst the situative perspective aggregates at the level of groups of learners, describing activity systems in which individuals participate as members of communities (Mayes & de Freitas 2004).

The way in which the ELF has been designed thus offers the teacher the opportunity to enhance pedagogical content by employing a range of approaches to presentation and clarification. Social media provide teachers with the means of creating an interactive environment for their students, whilst the use of e-mails offers teachers the power to encourage student discussion and involvement. The eLearning system based on ICT also offers teachers opportunities to administer tests, to evaluate and then present results (Tippins 2011). They therefore fulfil the important pedagogical functions of evaluation, testing, measurement and assessment of acquired knowledge, skills and abilities.

3.3 Flow Charts and Data Flow-Diagrams: Contents, Process and Feedback

When researching topics in eLearning, the use of models is extremely useful—or even necessary—to help clarify the various issues involved. Models can help researchers to "identify, classify and characterize objects and situations they are studying and to decide their importance and significance" (Webb 2010:91). In the present case, the use of models seeks to explore various interrelationships, the directions in which the flows of activity and information proceed between teacher and learner, the various pathways of interaction between the human and non-human components of the system, and the pedagogical functions that have been identified for the eLearning environment. The design of the ELF for this research work is embedded within the environment formed by the various dimensions of eLearning, as shown in Figure 3.1 below.

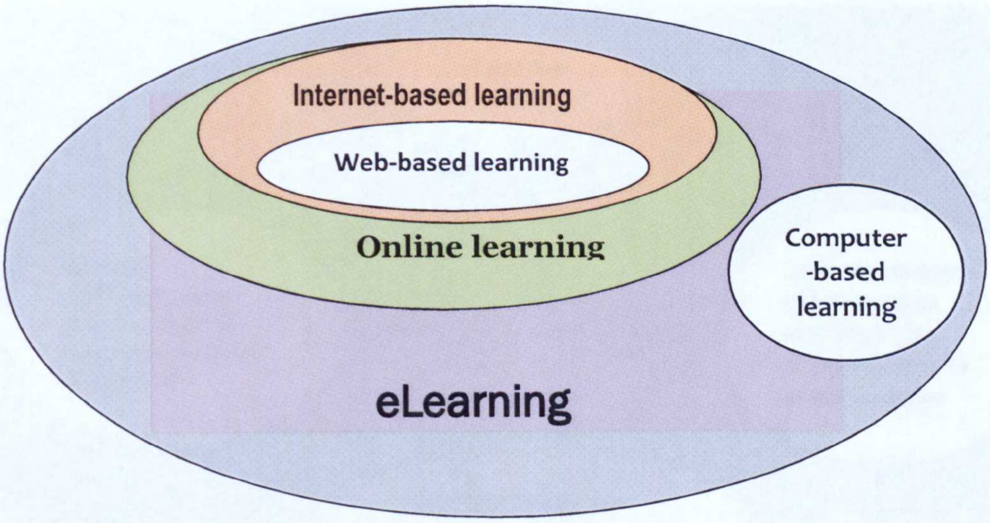

Figure 3.1: Technological dimensions of eLearning

For the current experimental research work, the performance of the activities are restricted to using a computer (i.e. desktop or laptop PC) as opposed to mobile and wireless technologies such as cell-phones and PDAs (Anderson & Blackwood 2004) in the fast-expanding sub-field of eLearning that is now often described as 'mobile learning' (Traxler 2009). However, the use of these more recent technologies would not necessarily introduce any drastic alterations to the ways in which the flow of information and activity between teacher and learner are shown in Figure 3.2.

Figure 3.2 shows how content, feedback and other information between the participants in the eLearning system (defined by with the boundary marked by the dash-line) flow between teacher and learner. The **two heavy horizontal arrows** mark the interactions occurring between teacher and learner for any *particular* cycle of activity, whilst the non-heavy arrows mark all the interactions that occur subsequent to the learner's initiation into the system. The teacher initiates the learner to the eLearning system and directs the learner to the first activity. Thereafter, all further actions/interactions between the teacher and learner contribute to a cumulative process. Thus, in any cycle of activity *after the initial one*, the cumulative process begins to have an effect on the interactions between teacher, learner and system. A subtle but continuous reconfiguration progress begins. It is for this reason that the heavy arrows are not marked differently to the non-heavy arrows.

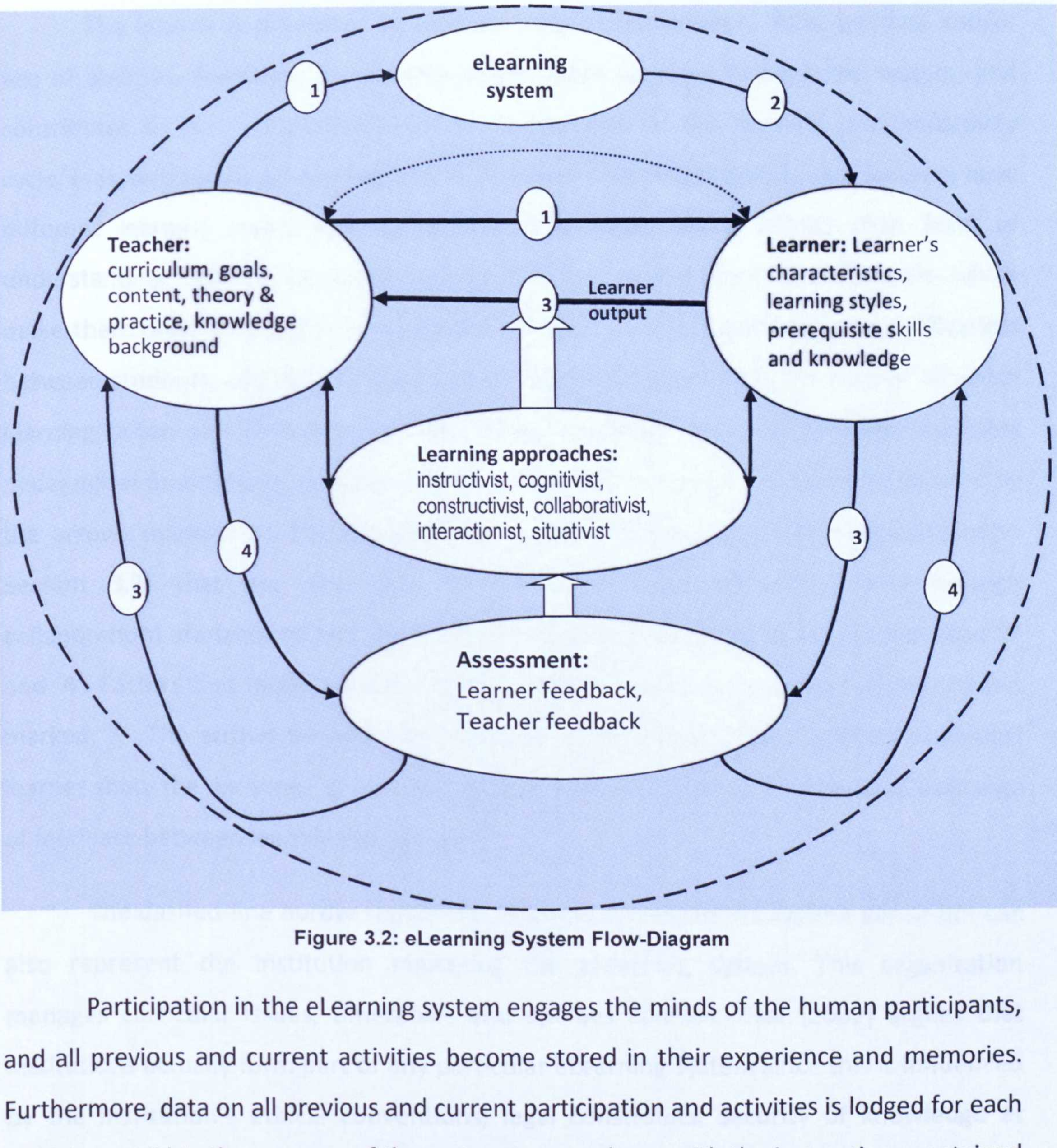

Figure 3.2: eLearning System Flow-Diagram

Participation in the eLearning system engages the minds of the human participants, and all previous and current activities become stored in their experience and memories. Furthermore, data on all previous and current participation and activities is lodged for each participant within the memory of the system in accordance with the instructions contained in the software programs installed for that purpose. The communication of content and eliciting of response form a key element, because this is a differentiating factor that distinguishes ineffective learning from effective learning (Govindasamy 2002), indicated by the two arrows marked '1' and the arrow marked '2'. There are *two* arrows marked '1', because the teacher can offer input to the student either system-immediately (*i.e.* directly, shown by **heavy horizontal arrow** '1') or system-intermediately (*i.e.* indirectly, shown by non-heavy arrows '1' and '2'). Note also the arched arrow-headed dotted line between teacher and learner: this represents interaction between the teacher and learner that takes place *outside* the mediation of the electronic system.

The learner is prompted to produce outputs (knowledge, skills, building and/or use of abilities, feedback) in response to the input received through the system, and contributes to the completion/on-going maintenance of the learning process/activity cycle, indicated by the arrows marked '3'. The flow-diagram recognizes that learners have different learning styles and background knowledge, which affects their level of understanding. Learners are influenced by different social-cultural environments, which make them react differently—to authority (of teachers and in general), competitiveness between students, and difficult topics. Strother (2003) argues that the manner in which learning occurs is affected by learning styles and values. The diagram also indicates pedagogical foundations, because they affect the eLearning implementation indicated by the arrows marked '2'. The cognitive/constructivist and situative effects (described in Section 3.2) that are generated by interaction (and, hopefully, later through collaboration) are factored into the system as represented by the arrow-lines marked '3' and '4'. Factors that make a contribution to learner output are indicated by the arrows marked '3'. The arrows between the teacher, the eLearning system and the individual learner show the exchange of content, while the arrows marked '4' depict the exchange of feedback between learner and teacher.

The dashed-line border represents not only the electronic system *per se* but can also represent the institution managing the eLearning system. This organization manages curricular issues, timetables and syllabus courses. Graf (2002) argues that institutions actually form part of any particular eLearning system since this is influenced by the institution's ethical conventions, legal constraints, security of knowledge *et cetera*. The learner and teacher both affect the activity cycle and they produce various outcomes upon and within the system. The system's performance is evaluated on the basis of the activity-cycle effects stemming from teacher and learner—for example, learner's actual performance, teacher's assessment of learner, teacher's assessment of system, adjustments made to contents/processes, and learner's assessments (of self, teacher, system and content).

Activities on the model diagram begin with the teacher putting in learning content and setting up the system. The teacher box also depicts curriculum, theory and practice and course goals, which the teacher ensures are reflected in the eLearning content. The knowledge and skills the teacher puts in the system are under the influence of their background knowledge and skills, course goals and resource materials used. The learner box contains characteristics that affect the learning process. Learners are affected by prerequisite skills and knowledge, learning styles and learner characteristics. The interaction between the teacher and learner indicate that both parties are predisposed to react in certain ways to each other and with the system. The main phase of the activity cycle begins with the learner accessing content input in the eLearning system allocated by the teacher. Having worked through the complete content, the learner is expected to make some form of comment on/response to the content through learner output. Teacher and learner roles affect the activity cycle, outcomes and repercussions in the eLearning system. These effects are relevant to the performance of the system, to the learner and to the teacher, owing to the repercussions of the various activities—

1. Learner's actual performance
2. Teacher's assessment of learner performance
3. Teacher assessment of the system performance
4. Teacher assessment of own performance regarding system set-up and contents
5. Teacher assessment of requirements to adjust contents or system
6. Learner's assessment of own performance.

It has not been possible to present the above-listed elements clearly in Figure 3.2, but they will be presented in detail later in the teacher/learner activity and feedback process diagrams (Figures 3.5 and 3.6).

As expected, a learner's output affects the assessment process; for this reason arrows have been used to make connections between the *Learner* box and the *Assessment* box with the *Learning Approaches* box. Similar connections are shown in respect of the *Teacher* box. The loop created between learner output and assessment indicates that assessment is an on-going process, not confined to the teacher but also aiming to satisfy at least a part of the pedagogical issues that are considered important by *the learner* as well. Regarding the large white vertical 'trunk arrows' from the *Assessment* box to the *Learning Approaches* box and then from the *Learning Approaches* box into the *Learner Output* (the heavy horizontal arrow running from *Learner* to *Teacher*), these are intended to show the strong influence that Assessment and Learning Approaches exert on the learner within the pedagogical process. Furthermore, it is the Assessment process that is far more likely to influence change in Learning Approaches, rather than *vice versa*. It should be remembered that the system is under the influence of the cognitive/emotional acceptance and non-acceptance experiences of both teachers and learners. The feedback between learner/teacher and the system can influence the participants (teachers included) to be well-disposed or ill-disposed to the eLearning experience or technology involved.

3.4 Total Teaching Environment: Process Diagram

This framework identifies the teaching processes for an eLearning system, whilst simplifying the complexities of showing the relationships between the various aspects of the pedagogy processes. The diagram shows the procedural and processual flows from the teacher's side of the eLearning process. The dotted arrows indicate the activities and processes the teacher performs for each cycle of eLearning activity. The role required of the teacher is to create knowledge, present the topics, content, concepts and skills needed for the eLearning class (Hackos 2002; Boettcher 2007). Figure 3.3 below is obtained from Figure 3.2, but is different in that Figure 3.3 shows the detailed role of the teacher. The role of the teacher is indicated by a larger number of arrows, which indicate the total teaching environment. The bold lines indicate the recursions between the total teaching environment with the eLearning system and learner. The detailed boxes of the teaching environment show that the teacher is responsible for ensuring that the eLearning class effectively covers the pedagogical principles of collaboration, interaction, constructivism and situativity.

Additionally, the teacher's role within this teaching/learning environment is to ensure provision to the class of all necessary requirements such as new materials and updated versions of existing/previous materials, all of which form part of the current repertory and archived resources within the programme software. The total teaching environment requires the teacher to carry out activities including supervision, discussion, communication, coaching, collection, evaluation, review of learner's knowledge and skills acquisition. The teacher is able to make an assessment of the productivity of the system through an evaluation of the learners' feedback in relation to knowledge, skills and abilities acquired/displayed. These are depicted as performance feedback and program feedback respectively. However, it has been noted that the flow-process chart has complexities in development of the structure of the various aspects.

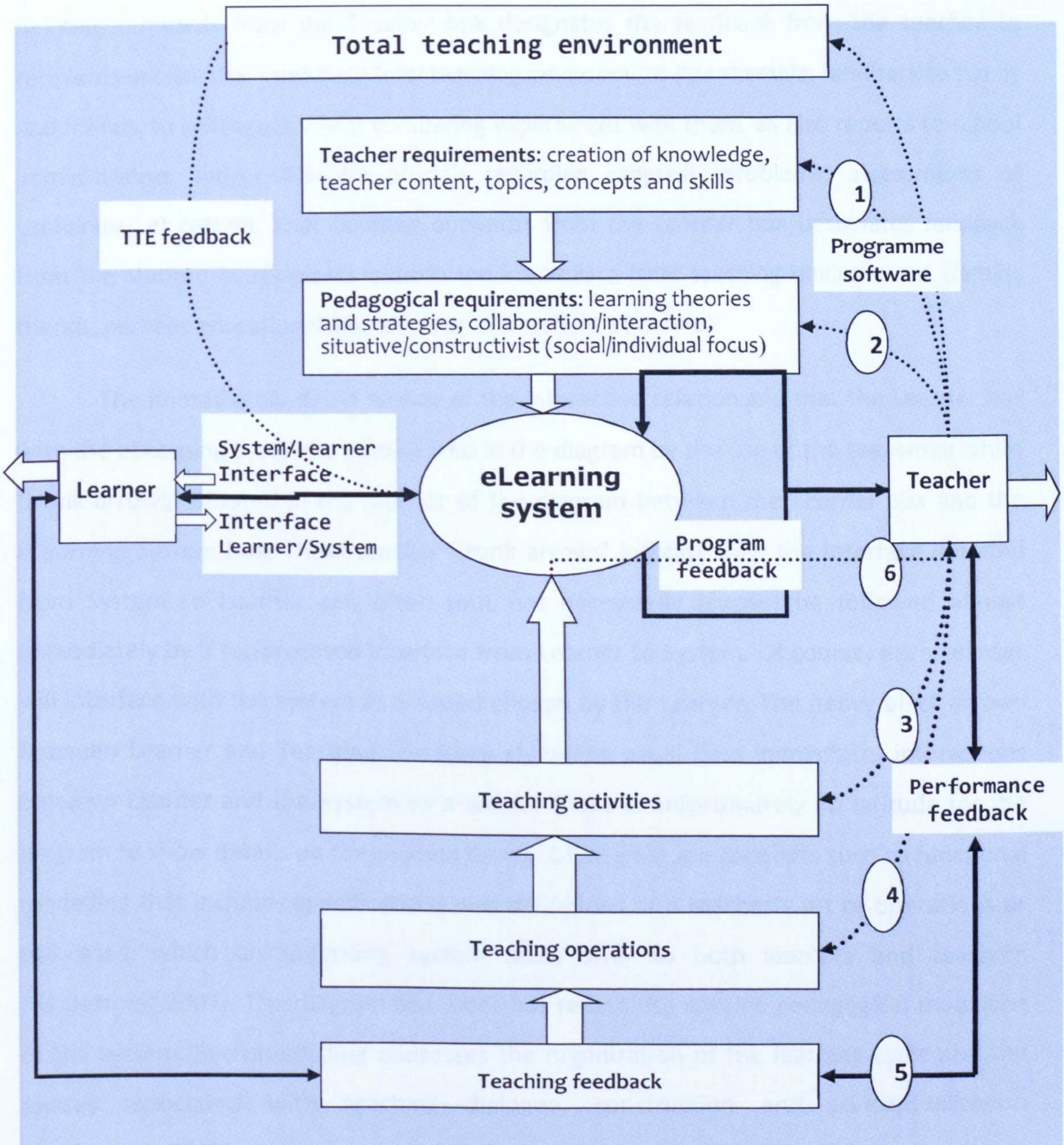

Figure 3.3: Total Teaching Environment Process Diagram

Arrow #1 indicates the beginning of the cycle as the teacher inputs program content into the system, beginning with teaching requirements. Arrow #2 indicates input of pedagogical requirements, arrow #3 shows the teaching activities, and arrow #4 indicates the input of teaching operations. Arrow #5 indicates teacher assessment and feedback processes between the teacher and the learner, while arrow #6 depicts the assessment and feedback process between the teacher and the system. Regarding the large white vertical 'trunk arrows' in the diagram, these are intended to designate the major importance of the inputs designated in the relevant boxes. There are also two white horizontal 'trunk arrows'. That pointing outwards from the *Teacher* box designates the feedback from the teacher to recipients *outside* the immediate total teaching environment (for example, feedback to family and friends, to colleagues whilst comparing experiences with them, as also reports to school administrators and/or Ministry officials regarding progress, problems, assessments of usefulness, *et cetera*). That pointing outwards from the *Learner* box designates feedback from the student to recipients *outside* the immediate total teaching environment (family, friends, perhaps educational inspectors or researchers, *et cetera*).

The immediately direct nature of the interactive relationship that the Learner has with the eLearning System is emphasized in the diagram by the use of the two small white 'trunk arrows' situated in the interior of the diagram between the *Learner* box and the *eLearning System* box. These smaller 'trunk arrows' indicate how the interface initiated from System to Learner can often (but not necessarily always) be followed almost immediately by a reciprocated interface from Learner to System. Of course, each Learner will interface with the system as a speed chosen by the Learner. The heavy black arrows between Learner and Teaching Feedback show the usual (less immediate) interactions between Learner and the System as a whole. There is unfortunately no latitude for the diagram to show details on the process boxes. Of interest are concepts such as functional modelling that includes specifications and definitions of a teacher's set of operations or use-cases, which an eLearning system must offer to both learners and teachers (Hadjerrouit 2007). The diagram also does not reflect the specific pedagogical modelling of the system. Such modelling addresses the organization of the learning cycle and the phases associated with teaching—dialogue, construction and conceptualization (Hadjerrouit 2007). These concepts are later dealt in detail in the teacher-use case or teacher activity and feedback process diagram.

3.5 Total Learning Environment: Process Diagram

The diagram in Figure 3.4 on the next page is used to identify eLearning and associated processes that are related to the total learning environment. The diagram was created by placing program content outside the central axis of the diagram with several paths indicating feedback function. This diagram attempts to present in an understandable form the complexities that involve the flow of process, function and activity of learning in an eLearning environment. The boxes for learning activities and processes are represented here.

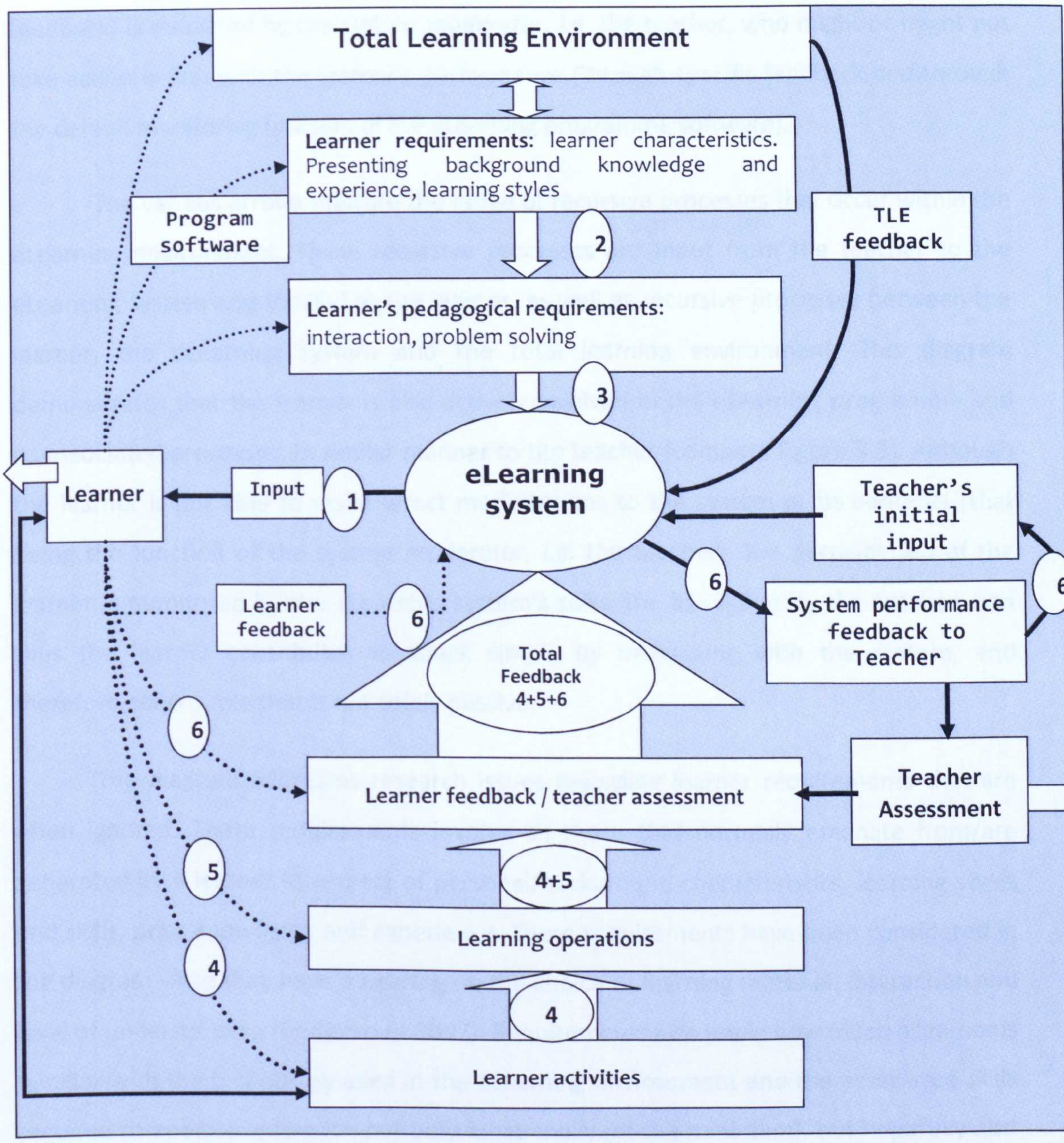

Figure 3.4: Total Learning Environment: Process Diagram

Consideration must be given to the issue of learning styles during the creation of an eLearning system. Choi *et al.* (2009) highlighted how students actually influence learning as they solve complex problems—especially in an eLearning environment but even when such an exercise is implemented in the traditional classroom. Figure 3.4 shows a total learning environment with most of the activities biased towards the learners' side. Learning processes and the various activities performed by the learner are indicated by the dotted lines connecting the relevant parts of the eLearning system. Dotted lines are used here for the learner, because the learner's influence on the eLearning system (through activities and feedback) is mediated by the system moderator, *i.e.* the teacher, who might or might not take action in line with the learner's performance (through specific feedback *and* through the default monitoring function of the eLearning programme software).

The various arrows indicate the range of recursive processes that occur within the eLearning environment. These recursive processes are input from the teacher to the eLearning system and (finally) to the learner, as well as recursive processes between the learner, the eLearning system and the total learning environment. This diagram demonstrates that the learner is also actively involved in the eLearning programme and its associated processes, in similar manner to the teacher (compare Figure 3.3). Although the learner is not able to make direct modifications to the system or its contents (that being the function of the system moderator, *i.e.* the teacher), the participation of the learner is monitored by the eLearning system's software, as well as by the teacher, and thus the learner contributes feedback simply by interacting with the system, and therefore plays a role that is not solely passive.

The diagram addresses research issues regarding learner requirements that are often ignored. These requirements involve all those that normally emanate from/are generated by a learner in respect of personal/background characteristics, learning styles and skills, prior knowledge and experience. These requirements have been considered in the diagram since they have a bearing on the choice of learning material, interaction and level of understanding (Hadjerrouit 2007). Requirements also imply how much a learner is familiar with the technology used in the eLearning environment and the associated skills required to operate within it—not only functionally (at the minimum), but hopefully also to effective capacity-building (Zacharias & Poulymenakou 2009).

Figure 3.4 shows the processes and activities that the learners undergo in an eLearning environment. Arrow #1 represents the first process where the learner gains access to content offered by the teacher in the eLearning system. Arrow #2 indicates how the learner refers to experiences and prior knowledge, whilst arrow #3 associates the learning process with the learner's pedagogical requirements to achieve learning. Arrows marked #4 represent the learner's various activities within the system, whilst arrows marked #5 represent the specific *learning operations* which the learner performs in this environment. The arrows marked #6 represent feedback/output of both learner and teacher within the system. However, there is insufficient scope in the diagram to show in detail the drop-boxes for these processes and activities. These relate to the deeper issues of learning, such as learning operations, learning cycle, learning assessment and communication processes. To give details of these processes, drop-down boxes will be used in the learner activity and feedback (learner-use case) diagram.

Regarding the large white vertical 'trunk arrows' in the diagram, these are intended to designate the major importance of the inputs designated in the relevant boxes. There are also two white horizontal 'trunk arrows'. That pointing outwards from the *Teacher* box designates the feedback from the teacher to recipients *outside* the immediate total teaching environment—for example, feedback to family and friends, to colleagues whilst comparing experiences with them, as also reports to school administrators and/or Ministry officials regarding progress, problems, assessments of usefulness, *et cetera*. But this arrow in this particular context particularly designates feedback shared during consultation with students and the family of the students, regarding the students' experiences of and reactions to the eLearning environment. That pointing outwards from the *Learner* box designates feedback from the learner to recipients *outside* the immediate total teaching environment (family, friends, perhaps educational inspectors or researchers, *et cetera*).

3.6 Teacher Activity and Feedback: Flowchart

The flow chart in Figure 3.5 on the next page presents a teacher-centred view of the eLearning system that resembles the teacher-centred view that underlies the traditional instructivist classroom teaching process. The reason for this approach is to highlight the *teacher's* specific role of input and feedback in the eLearning process. The flow of information—depicted by dotted arrows—takes place between (a) the teacher and the learner, and (b) the teacher and the eLearning system. The diagram shows a complex array of recursive relationships between the various processes and activities. Figure 3.5 attempts to create a picture of all the relevant teaching operations, activities and processes that take place in an eLearning environment. For this reason, the diagram depicts the teacher as system initiator and moderator (*i.e.* the teacher's original basic function), rather than as eLearning facilitator and co-operator with the learner.

According to Hadjerrouit (2007) constructivist learning theory is applied to eLearning in order that it can support task-based activities, as an alternative to the traditional transmission knowledge from teacher to learner. However, at the beginning and in the early stages of their eLearning experience, learners have to depend on the teacher for input and guidance, until such time as the learners gain sufficient experience of their own in order to function separately from the teacher. Meanwhile, to facilitate the development of self-learning abilities, collaborative/interactive principles are applied to eLearning to support dialogue, discussion and collaborative learning between teacher and learner—and even between learner and learner.

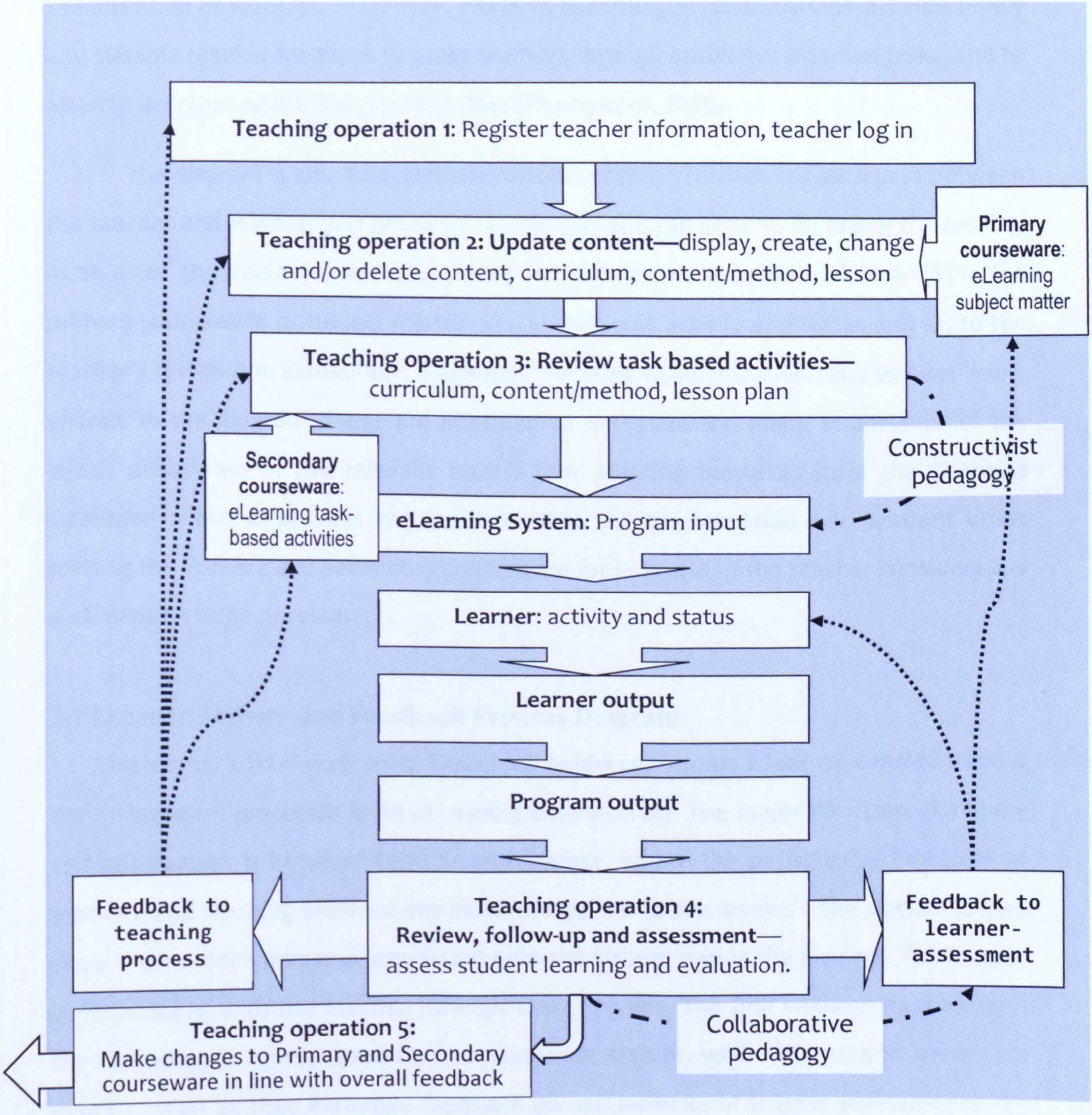

Figure 3.5: Teacher Activity and Feedback Process Diagram

By taking into consideration the teaching pedagogy employed, the diagram introduces the criteria of information-technology usability posited by Mayes & Fowler (1999), which are used to realize each stage of the learning cycle. Of interest for the teacher activity and feedback process diagram are the primary (conceptualization phase) and secondary courseware (construction phase), which deal with the eLearning subject matter and software tools that support task-based activities respectively. The linking of these phases gives the eLearning system a feedback loop that is adapted to the learning cycle. Teacher feedback was found useful in a study by Quinton & Smallbone (2010:125), since it encourages reflection and experiential learning, thus encouraging and capturing the attention of learners. Moreover, effective eLearning feedback should provide timely and suitable teacher feedback to guide learners through problems, assigned tasks, and to assist in overcoming ICT literacy difficulties (Huang *et al.* 2010).

The diagram is able to depict the various recursive relations or pathways between the teacher and learner, and between the teacher and the system. By taking the teacher as an actor, the model represents learners as having three recursive pathways: (1) to the primary courseware or subject matter, (2) to their own activity and status and (3) to the teacher's review and assessment. Regarding the large white horizontal and vertical 'trunk arrows' in the diagram, these are intended to designate the major importance of the inputs designated in the relevant boxes. That pointing outwards from the *Teaching Operation 5* box designates the feedback that the teacher takes into account when revising the Primary and Secondary courseware for later use, *if* the teacher considers any such revision to be necessary.

3.7 Learner Activity and Feedback Process Diagram

The learner's flow-diagram in Figure 3.6 below represents a learner-centred view of the pedagogical processes in an eLearning environment. The major direction of activity and information is between teacher and learner, where the pedagogical functions of teaching and learning involved are indicated by the 'trunk arrows'. The dotted arrows show the learner's personal interaction with the system during the process. The learner communicates with the teacher through two channels. The first channel runs through the technological media used for the eLearning system, whilst the second occurs via direct contact as they exchange feedback on assessments of learner performance. By considering the teacher as a part of the eLearning system, then the learner has four main channels of interacting with the system:

1. Through personal feedback to the teacher,
2. Through personal feedback direct to the system in response to system request,
3. Through personal feedback entailing modification of learner activity, and
4. Through system-mediated feedback from learner output to the system drive.

In practice a learner can adopt a passive role in the learning process by making only a small effort, or even the minimum effort necessary, to interact with the system. This implies that for the learning activity and feedback environment, the input from learner activity might not be substantially significant, when there is little or no engagement with the environment on the part of the learner. Therefore, the system does not display task-based activity or activity-output as crucial pathways, as the model is based on behaviourist learning principles which continue to place the teacher together with the learner as part of the central focus. Whilst learner feedback is expected—especially if the learner is *compelled* to contribute feedback—nevertheless, minimum or zero learner feedback is in itself a form of feedback, indicating that the learner has some sort of problem. It is deemed necessary to incorporate learning cycles into the framework model, since the literature has shown clearly that any particular learning situation is determined by the approach provided by at least one background theory—whilst the learning situation in eLearning is typically characterized by a combination of learning theories (Mayes & de Freitas 2004; Carman 2005).

Mayes & Fowler (1999) posited an eLearning cycle made up of three types of learning—conceptualization, construction, and dialogue. The learning cycle depicted in Figure 3.6 represents the continuous cycle of the gradual refinement of understanding (Hadjerrouit 2007). The learning phases are: (1) *conceptualization*, detailing the interaction between new knowledge and a learner's prior framework, where the learner *acquires knowledge and forms a mental image of the content* presented for study; (2) *construction*, the process of combining and building concepts by task-based activities, where the learner *uses* what has been mentally acquired; and (3) *dialogue*, the phase that entails creation of new concepts and the testing of old knowledge by discussion and interaction with teachers and other learners (Mayes & Fowler 1999; Hadjerrouit 2007). Figure 3.6 below shows the learning processes and the various activities performed by the learner in cooperation with the teacher.

Dotted lines are used for the learner, because the learner's influence on the eLearning system (through activities and feedback) is mediated by the system moderator, *i.e.* the teacher, who might or might not take action in line with the learner's performance (through specific feedback *and* through the default monitoring function of the eLearning programme software). Dotted arrows also connect the *Learner's Requirements* box to the four major process steps, to indicate that the individual circumstances of the learner have influence on the learning process, and so they need to be taken into account, at least to a certain degree so as to enable the learner to interact usefully with the system.

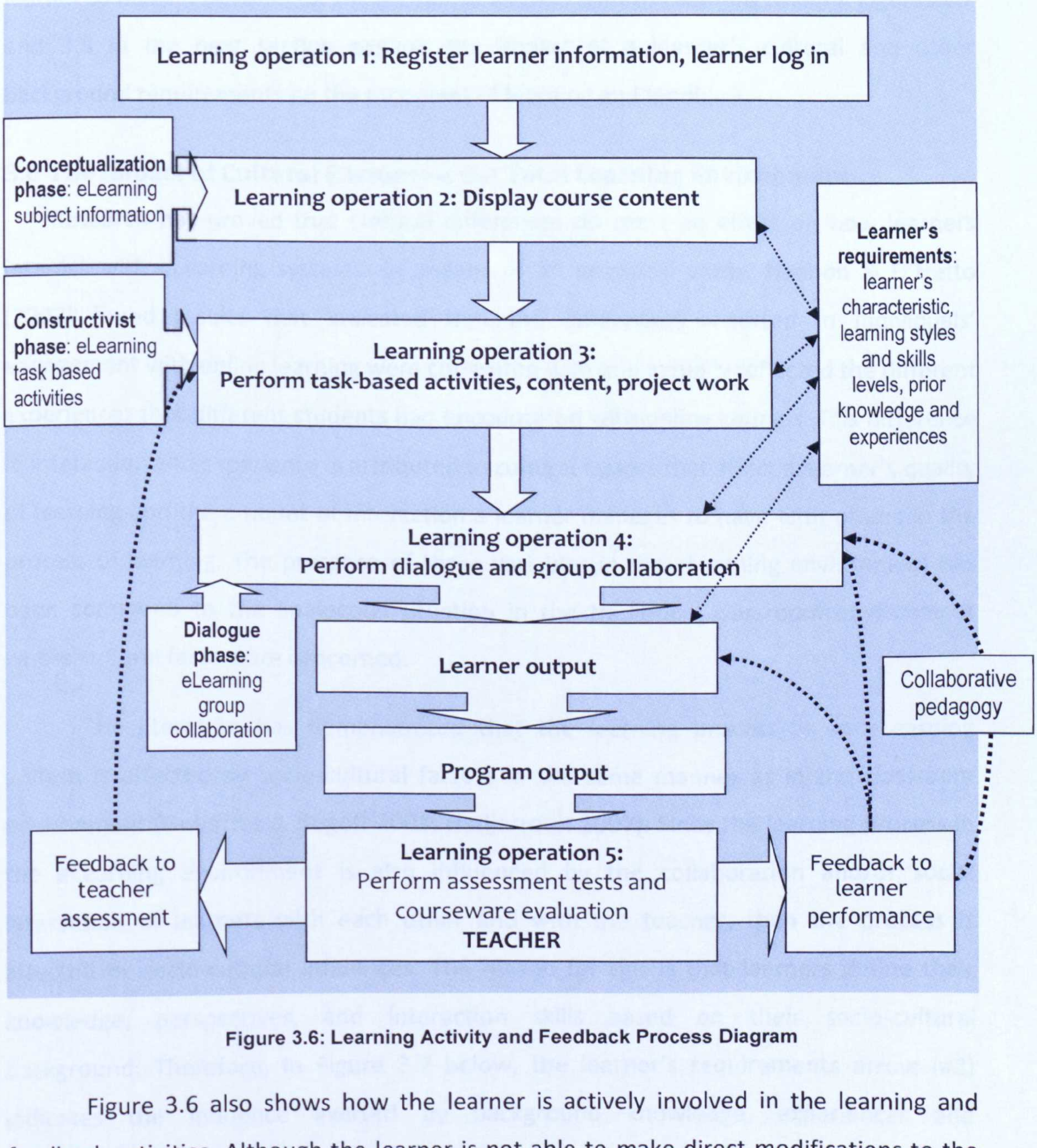

Figure 3.6: Learning Activity and Feedback Process Diagram

Figure 3.6 also shows how the learner is actively involved in the learning and feedback activities. Although the learner is not able to make direct modifications to the system or its contents (that being the function of the system moderator, *i.e.* the teacher), the participation of the learner is monitored by the eLearning system's software, as well as by the teacher, and thus the learner contributes feedback simply by interacting with the system, and therefore plays a role that is not simply passive. The white boxes with their 'trunk arrows' located are intended to designate the major steps of the learning and feedback activities within an eLearning system where sufficient cognizance is paid to the cultural features and pedagogical needs of the learner. The background assumption underlying this diagram is that sufficient pedagogical input is being received by the learner to make it possible for the learner to interact with the learning system. Figures 3.7 and 3.8 in the next section explore the impact of a learner's cultural and other background requirements on the processes of learning and feedback.

3.8 The Impact of Cultural Factors on the Total Learning Environment

Research has proved that cultural differences do exert an effect on how learners interact with eLearning systems. By means of an empirical study, Hannon & D'Netto (2007) found results that indicated that the differences reported in individuals' engagement with online learning were correlated with and actually reflected the different experiences that different students had encountered with online courses. This difference in interaction and experience is attributed to cultural factors that affect a learner's quality of learning and the amount of interaction a learner manages to have with others in the process of learning. The presence of these variables in the eLearning environment has been compared to the analogous situation in the traditional classroom environment where cultural factors are concerned.

The literature has demonstrated that the learning process in an eLearning system is affected by socio-cultural factors in the same manner as in the classroom environment (Gutiérrez & Rogoff 2003; Hadjerrouit 2007). Since the learning process in the eLearning environment is also influenced by the collaboration and/or social interaction of learners with each other and with the teacher, then the process is affected by socio-cultural influences. The reason for this is that learners define their knowledge, perspectives, and interaction skills based on their socio-cultural background. Therefore, in Figure 3.7 below, the learner's requirements arrow (#2) indicates the influence exerted by background knowledge, experiences and characteristics, which directly mediate the influence of culture. These have been identified by the literature to be factors that affect the learning process (Hadjerrouit 2007). In the event, a learner's pedagogical requirements—especially interaction and problem solving—are also affected (Boondao *et al.* 2009; Welzer *et al.* 2010).

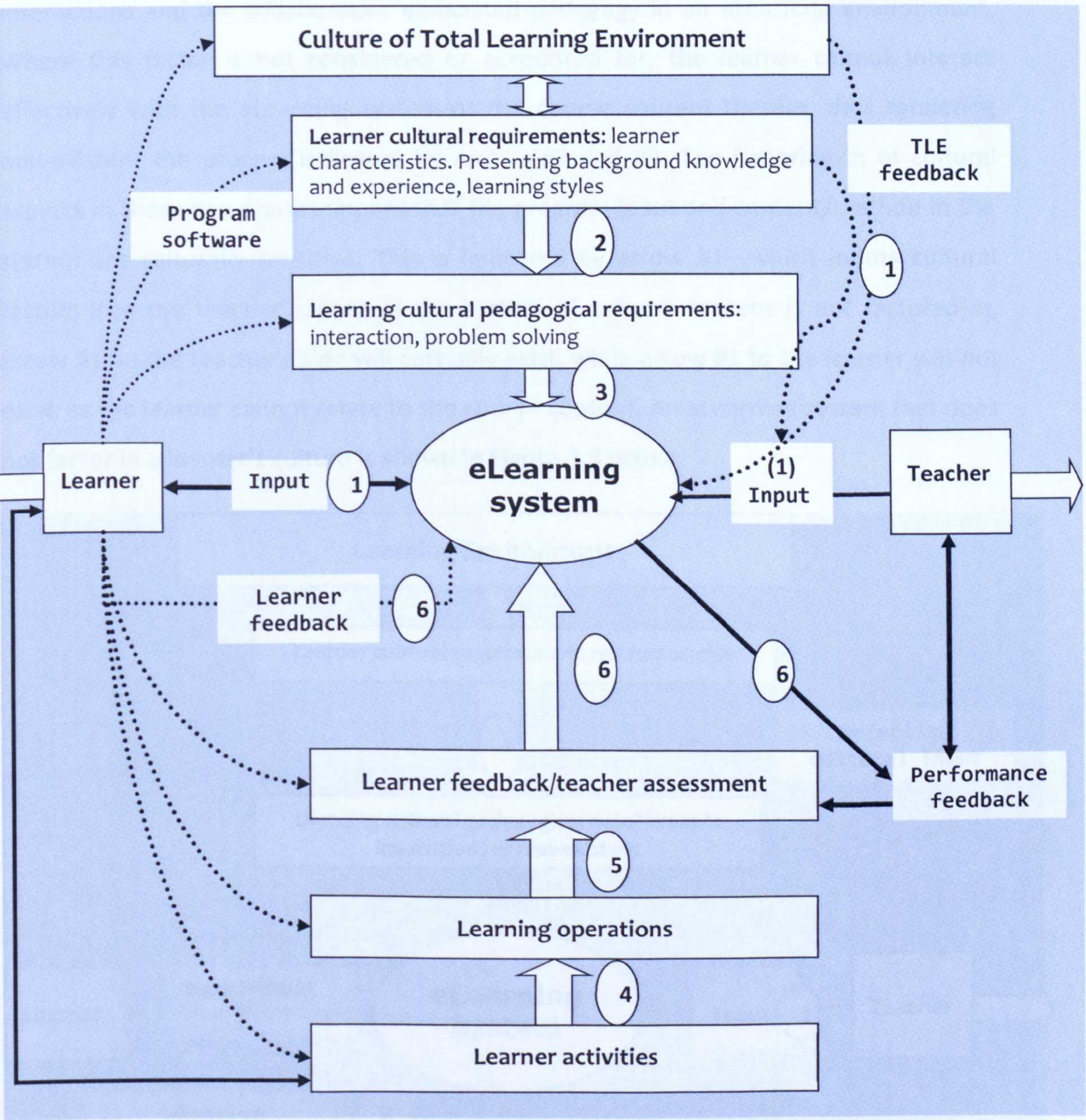

Figure 3.7: Positive Impact of Cultural Factors on Total Learning Environment

Figure 3.7 shows how in a total learning environment culture affects learning style, prior knowledge and skills. This implies that each learner will approach the eLearning system and content differently. Where the difference is significant, it is necessary to redesign step #2, gathering relevant cultural information regarding learners (in the *Learner's cultural requirements* phase) so as to take action to implement an upgrade in the *Learning cultural pedagogical requirements* phase in order to cater for each learner's social and cultural needs. Moreover, learner requirements determine pedagogical learning factors: arrow #3 indicates the input of knowledge that is directed by *Learning cultural pedagogical requirements*. The pedagogical requirements affect interactions and the collaborative associated pedagogy in an eLearning environment. Where this factor is not considered or accounted for, the learner cannot interact effectively with the eLearning system or the course content therein, thus rendering non-existent the process indicated by arrows #2 and #3. The factoring-in of cultural aspects in these two phases implies that the program input and content/method in the system are culturally sensitive. This is indicated by arrow #1—which inputs cultural factors into the teacher's input of the system. If cultural content is not factored-in, arrow #1 on the teacher's side will certainly exist, while arrow #1 to the learner will *not* exist, as the learner cannot relate to the course content. An eLearning system that does not factor in a learner's culture is shown in Figure 3.8 below.

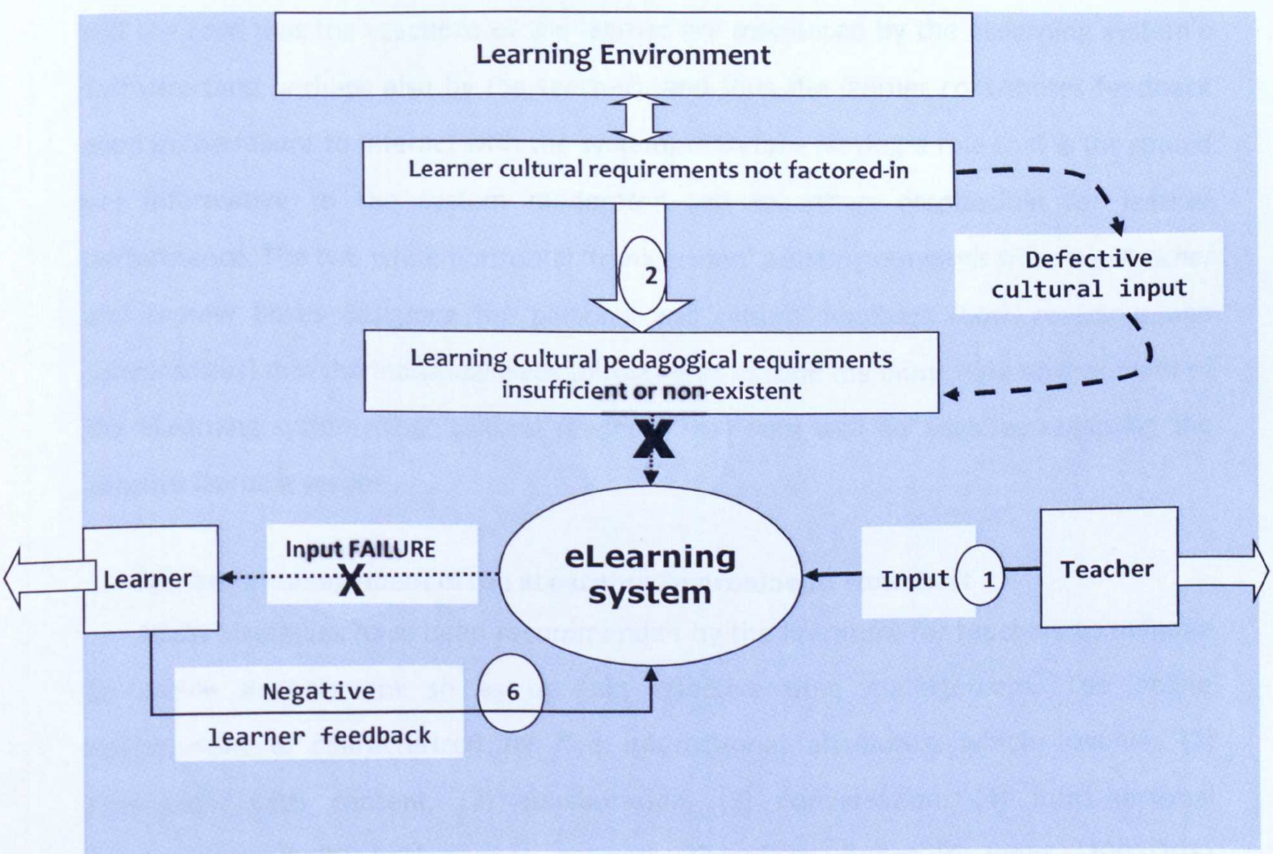

Figure 3.8: Negative Impact of Cultural Deficiency on Total Learning Environment

The factoring-in of cultural elements creates a total learning environment where the learner can be actively involved, or at least is included in the preparations made for the learning process. However, if cultural factors are neglected or forgotten, it may well happen that the learner is not able to interact (either fully or even partly) with the system or with the teacher. The consequences can range from inconvenience through to an impasse in the learning process, thereby interfering with or even eliminating the pedagogical processes—previously indicated in Figure 3.7 but NOT in Figure 3.8—by arrows marked #4 (learner activities) and #5 (learning operations).

In Figure 3.8 the worst-case scenario is shown, with a complete failure of the system to assist the learner in the learning process. The consequent negative feedback from the learner is represented by arrow #6. There are no arrows in Figure 3.8 to map out the learning processes and the activities performed by the learner, and this represents the worst case of input failure. Where there is no useful input to the learner, it is not reasonable to expect any useful feedback from the learner, so there are no arrows to show the various subsequent recursive processes that would be expected otherwise to occur within the eLearning environment. However, even in this worst-case scenario, it is still the case that the reactions of the learner are monitored by the eLearning system's software (and perhaps also by the teacher), and thus the learner contributes feedback even in the failure to interact with the system, therefore playing a role that is (or should be) informative to the system moderator and to others responsible for learner performance. The two white horizontal 'trunk arrows' pointing outwards from the *Teacher* and *Learner* boxes designate the personal and cultural feedback (both conscious and subconscious) that the individual gives to recipients *outside* the immediate environment of the eLearning system. That cultural feedback may very well be negative regarding the abortive learning session.

3.9 Teacher's Management of the eLearning Environment: Flowchart

Many strategies have been recommended by the literature for teachers to manage an online environment so as to gain effective time management. The online environment is characterized by five interactional attributes, which involve: (1) interaction with content, (2) collaboration, (3) conversation, (4) intra-personal interaction and (5) performance support. Therefore, Bullen & Janes (2007:198) recommended that teachers understand the facilitation and structuring of interaction in the web environment, and for this effective staff development is required. Effective management of eLearning environments requires the teacher to synchronize dates, topics and context, give a detailed explanation of assignments and activities, coordinate group work and discussion forums, giving feedback on assignments, and make comments on learner's contributions within the course activities (Mwanza & Engeström 2005; Shi *et al.* 2006). Figure 3.9 gives a representation of one possible teacher management plan for an eLearning environment.

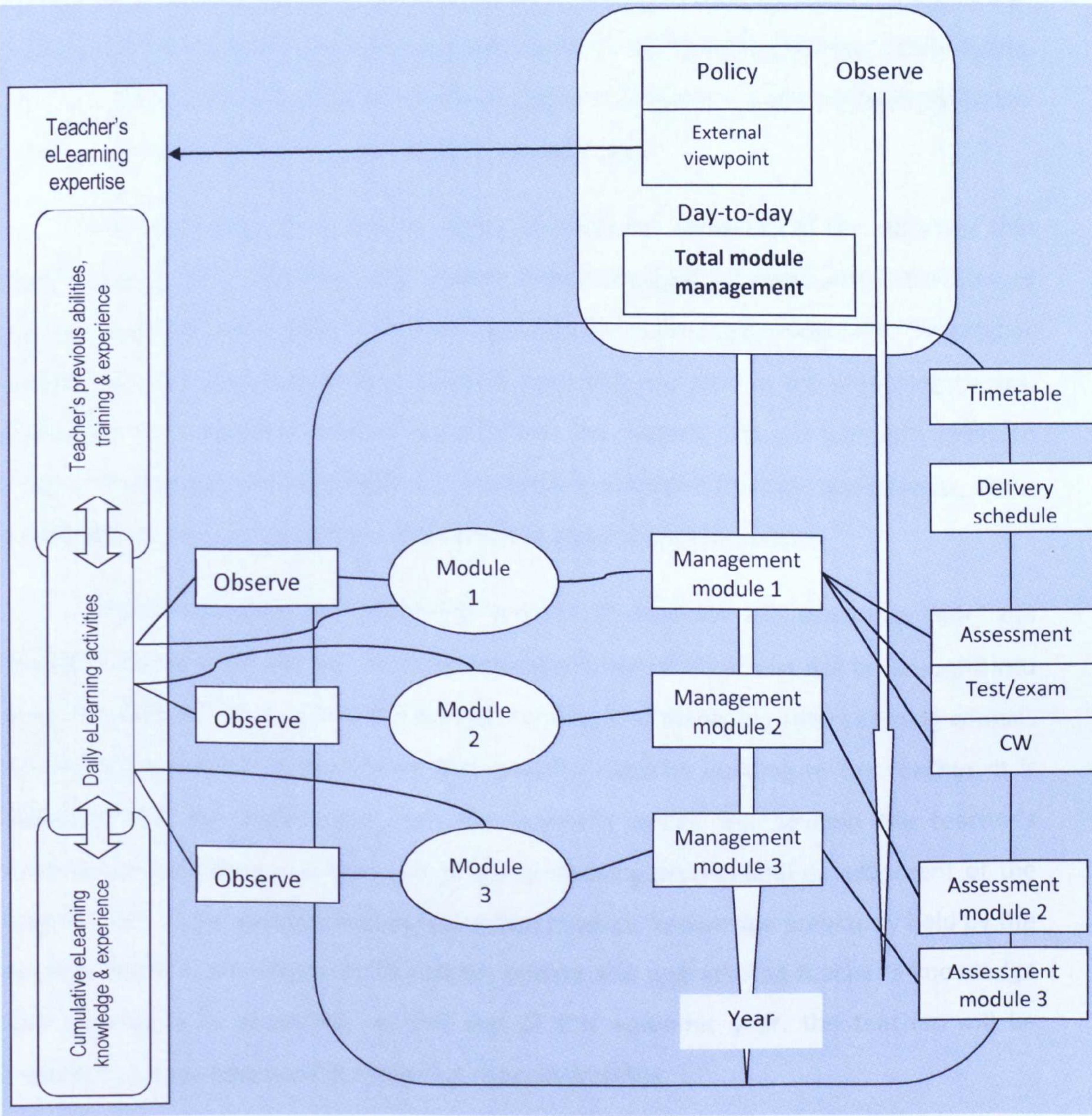

Figure 3.9: Teachers' Management of the eLearning Environment: Flowchart

The management plan takes into consideration the academic period, for this reason the diagram shows "year" as a time-line, and it also shows a timetable and delivery schedule. This is synchronized to teacher/learner activities, processes, pedagogical factors such as policy, total module management, timetable, assessment, test and examination administration, and assessment needs. The main role of the teacher in this diagram is to manage eLearning through the policies that have been set to govern the eLearning process. The policies set by the education ministry and/or by head of school might be more flexible or less flexible, giving the teacher greater or smaller scope for initiative in planning and delivering the eLearning course and contents. The guiding viewpoint of the policies set by the teacher's line management might coincide with those of the teacher or not, but the viewpoint will inevitably affect (1) the teacher's daily duties, and therefore (2) the development of eLearning by that teacher, and consequently (3) the teacher's personal development of eLearning expertise.

The teacher's role is also to act as an observer, especially of the activities that involve the learner. Therefore, the teacher makes constant observations of the flow of activities and processes down the timeline given in the eLearning environment. The teacher creates the teaching modules and monitors how they are used in the eLearning classes. Evaluation of the performance of the modules, the system, and the learner's ability to acquire knowledge and skills from the modules is managed through assessments, tests, examinations, and observations of the complete eLearning environment.

Whilst managing the eLearning courses throughout the academic year, the teacher's background abilities, training and experience of eLearning will be brought into play. The daily duties involved in planning, running and managing the eLearning courses will bring an increase in experience and (usually) capacity building to the teacher. It is expected that the daily input from the teacher's duties will develop the teacher's expertise in eLearning and thus add to the continuing professional development of the teacher. This might modify the theoretical and practical knowledge previously held by the teacher, but it is also expected to extend, update and upgrade the teacher's knowledge and experience of eLearning. At the end of the academic year, the teacher will be expected to have advanced in eLearning capacity building.

3.10 Oman eLearning Framework: Process Diagram

The process diagram in Figure 3.10 offers an overview of the experimental teaching website for geography for the Omani secondary-school system. The geography website was designed based on Unit 5 of the tenth-grade geography curriculum, which contains four complete topics. The researcher sought to design a web-based ELF by incorporating technological tools that have been identified by Zhang *et al.* (2004) as tools that can have a significant effect upon the educational or pedagogical processes. The "Geography World" website for the ELF is made up several features described in Section 4.5.1 hereafter. The system makes use of Moodle to provide the supporting platform to host the eLearning environment.

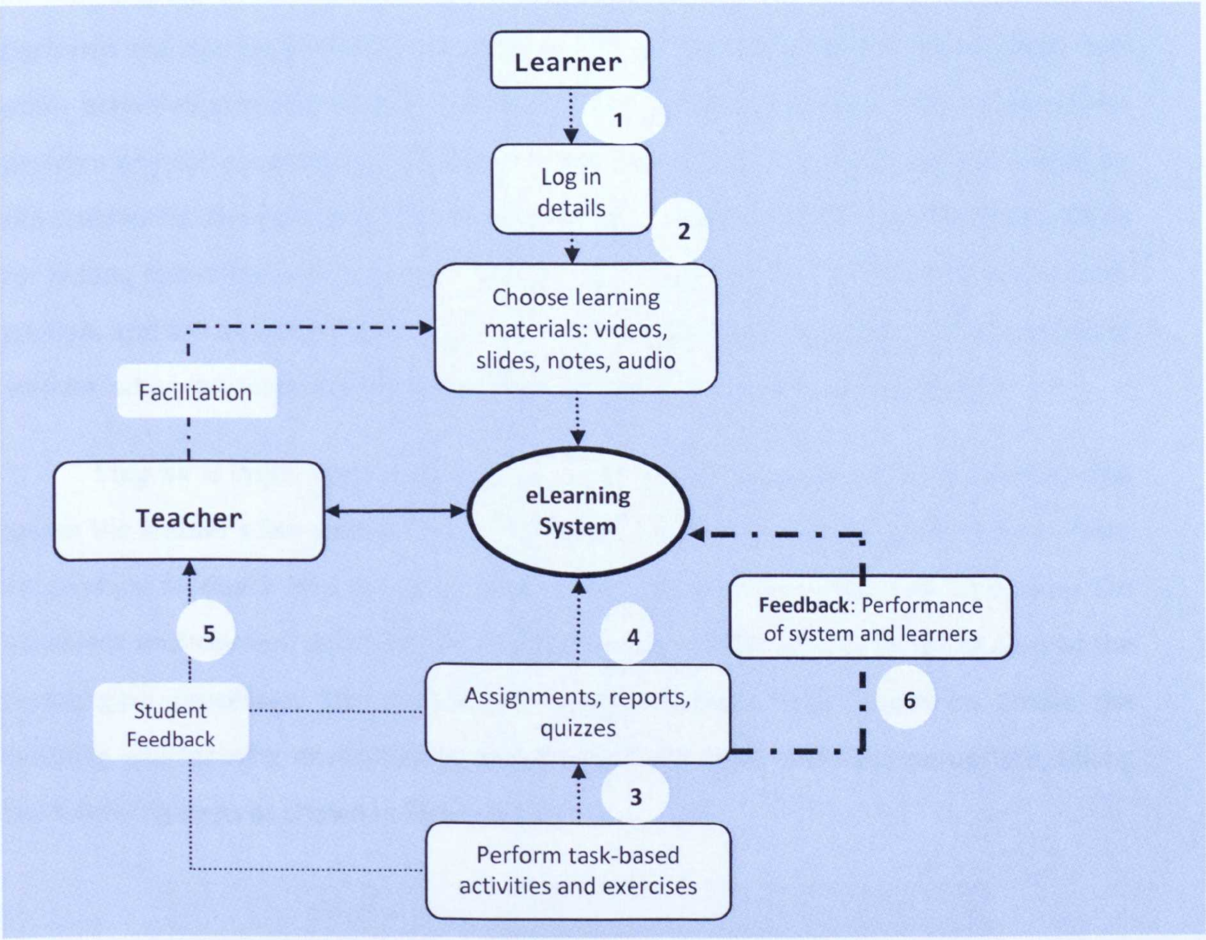

Figure 3.10: Oman eLearning Framework: Process Diagram

Figure 3.10 shows the ELF that was developed by factoring-in the processes involved in knowledge and skills transfer (Stigler & Hiebert 1998). The effectivity of this transfer is dependent on the quality as well as quantity of interactions between the various components and elements, such as teachers, learners, curriculum, resources, policies and physical conditions in the eLearning environment. Figure 3.10 represents the learning and teaching processes that were established by the Researcher using feedback Phase One fieldwork. The diagram thus represents the steps in the process of finalizing the eLearning course used in the Core Experiment (CExp) for teaching Unit Five of the geography curriculum.

The learning process begins with the learner opening the website and logging onto the session in step #1. The learner is required to choose from the range of learning materials and technologies provided for each session (including videos, slides, notes, audio narrations, and map feeds) in step #2. The learner is then supposed to carry out all the required task-based activities indicated for the session. In step #3 the learner performs the assigned exercises and takes part in the geographical games, play and other activities provided by the teacher for that particular session. The learners then perform any set assignments; they fill in their reports and answer quizzes provided by the teacher for the purposes of assessing the acquired knowledge and skills, as well as for testing suitability of the course content. These are performed at the end of the class session, and are an integral part of the activities in the eLearning system. This makes up step #4, which provides experimental feedback from the learner and system.

Step #4 is important for the teacher, as it offers the opportunity to evaluate and assess the learner's learning abilities, and also to assess the system's performance. Tasks #4 produce feedback (#5) and (#6), which offer valuable information for improving the eLearning environment with additional components, and also for fulfilling the aims of the pedagogical processes. The Researcher used web-based technologies to create the teaching and learning environment, whilst employing other tools as appropriate, taking the following steps as shown in Figure 3.11.

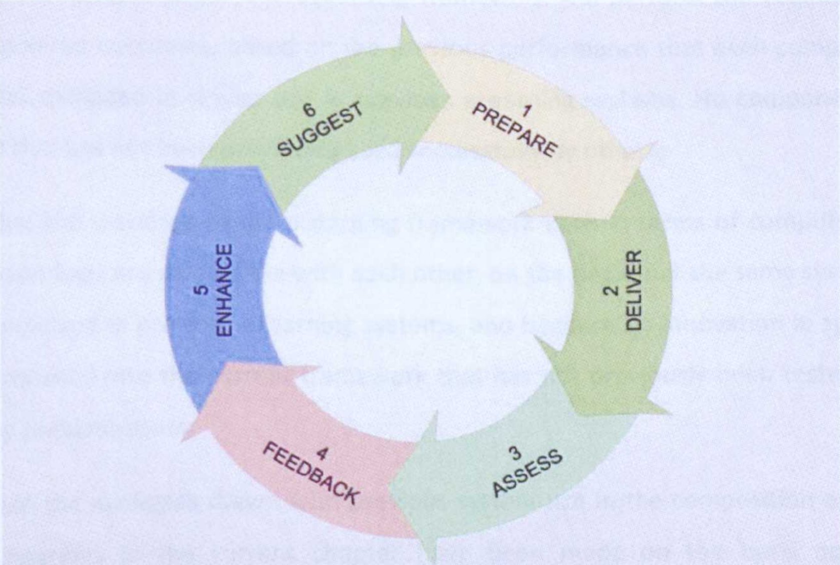

Figure 3.11: Pedagogical processes in the eLearning environment

3.11 Summary of the Chapter

The provision of an enhanced educational environment is within the reach of all educators and teachers who have access to web-based computer facilities. The chapter has identified that the challenge to the teacher lies in acquiring the knowledge and expertise to enable the teacher to make the most appropriate choices from the resources available for the task at hand. The chapter discussed the importance of providing a rich eLearning environment through balancing teaching/learning objectives, desired outcomes for particular exercises, cultural perspectives, background knowledge and skills. The other factor to be kept in mind is that it is essential that each eLearning exercise should have a clear mechanism for feedback from the learner so that the efficacy of the module can be assessed. Whilst the technology now makes it possible to perform broad and in-depth assessments, the facilities for processing and analyzing the assessments must be adequate in relation to the bulk of data and other information obtained through the assessment process. Otherwise, the assessment process can easily degenerate into the amassing and hoarding of indigestible information. The attainment of desired outcomes should always be the overarching criteria for eLearning.

The descriptions of the conceptual frameworks and their illustrations in the diagrams contained in this chapter have been elaborated by a process of logical deduction based on three basic premises—

(1) that the functions of the eLearning framework will perform the required tasks and deliver the required outcomes, based on the previous performance that each component in the framework has exhibited in similar use in previous eLearning systems. No component has been incorporated that has not been previously used successfully by others;

(2) that the workings of the eLearning framework both in terms of computer/electronic logic and human logic are compatible with each other, on the basis that the same systems of logic have been employed in previous eLearning systems, and because no innovation in system design has been introduced into the current framework that has not previously been tested and found acceptable by previous users;

(3) that the analogies drawn with previous system use in the composition of the various framework diagrams in the current chapter have been made on the basis on reasonable adaptation from previous system use, and that no component or operations (electronic or pedagogic) has been unreasonably forced from its previous use to an innovatory or unsuitable new application for the purposes of this research.

In each and every case, the Researcher made full use of the information available in previous studies such as those cited in the Literature Review, and has also sought to err on the side of caution in constructing the experiment eLearning framework for the present study. In summary, it can be said that the eLearning framework developed for the fieldwork in Oman is simply an extension and adaptation of previous frameworks and models that have been used with observed success elsewhere. The innovation in the current study has been to introduce a specific set of TAM cultural criteria to adapt the model of the framework for use in Oman.

CHAPTER FOUR: METHODOLOGY

4.1 Introduction

The goal of this chapter is to describe the research process used in collecting and analyzing information and data in accordance with the Research Questions posed for the present research work. This study is based on three hypotheses, which are stated here in full rather in Chapter One to highlight the methodological aspects that are mentioned in them—

First Hypothesis
There are no significant pre-existing differences between experimental and control groups in the pre-test used to measure the level of achievement at the level of significance $\alpha = 0.05$. Results show that there were no significant pre-existing differences between experimental and control groups found by pre-testing for measuring the level of achievement in the geography curriculum fifth unit, where the *t*-test for independent samples was applied to compare average samples.

Second Hypothesis
There are significant differences at the level of significance ($\alpha = 0.05$) between the experimental and control groups (EGs and CGs) in the post-test used to measure the level of achievement, with trending towards the experimental group (EG), owing to the development and use of an experimental learning-environment. The results showed that there were significant differences between the TGs revealed by post-testing (with trending towards the EG) in terms of measurements of the level of achievement in the geography curriculum fifth unit where a *t*-test for independent samples was applied to compare average samples.

Third Hypothesis
There are significant differences between pre-run and post-run attitude responses from the EG for the CExp shown by measures of the trends in favour of e-learning, and these are due to their use of an experimental learning-environment. A dedicated questionnaire was prepared for the EGs to measure their trends towards e-learning based on a Likert scale that contained 15 items. The results show that there were significant differences between pre-run and post-run students' responses. Averages increased in the post-run as compared with the pre-run responses, indicating that the learning-environment engaged and motivated the students to use technological applications in the classroom.

For this study to qualify as authentic research, it has to satisfy several characteristics identified by Kumar (2005), so that it must be rigorous, verifiable, empirical, systematic, controlled, and critical. The goal is to use an accepted research approach that will help in solving the problems posed for study, while creating knowledge on an effective adaptive ELF for teaching geography in Oman. The intention of this research is to make use of a mixture of quantitative and qualitative research approaches. For the research to be credible and valid, the approach selected is based on both positivist and interpretivist philosophical foundations, since this study has to do with certain things that are objectively 'factual' (the specifications and processes of technology) whilst also addressing subjective beliefs, perceptions and assumptions that also impinge upon the 'nature of reality' of the research (Flowers 2009:2–3).

4.2 Qualitative vs. Quantitative Approaches to Research

Quantitative research is an approach that is typically applied to the natural sciences, where there is a particular interest in the positivist approach to phenomena. According to Bryman (1984) the paradigm of positivism is characterized by a methodological approach "exhibiting a preoccupation with operational definitions, objectivity, replicability, and causality" (Bryman 1984:77). Within this tradition, research is based on objectivized truth, reason and validity; it places emphasis on facts, obtained from pure observation and analyzed empirically through quantitative techniques, surveys or experiments (Flowers 2009:9). This method is often referred to as 'positivist' or 'empiricist', as it is grounded in various aspects of epistemology, in which research draws knowledge from measurements, and deals with data obtained from established facts. The application of a philosophical approach to the quantitative method implies that the researcher makes use of data obtained from statistical methods such as surveys, which are based on epistemological assumptions. Other quantitative methods such as experimental designs and secondary analyses exhibit the same philosophical basis.

Qualitative research, on the other hand, differs from quantitative methods in that it places "emphasis on processes and meanings that are not rigorously examined, measured, in terms of amount, quantity, intensity, or frequency" (Denzin & Lincoln 2000:4). Moreover, Noor (2008) finds that "there are instances, particularly in social sciences, where researchers are interested in insight, discovery and interpretation, rather than hypothesis testing" (Noor 2008:1602). Qualitative research is presented as more fluid and flexible as compared to quantitative research, since it focuses on "discovering unanticipated findings and opportunities of altering research in response to serendipitous occurrences" (Bryman 1984:78). Meanwhile, the quantitative research design puts emphasis on fixed measurements, the testing of hypotheses, and fieldwork involvement.

The philosophical approach to qualitative research is underpinned by phenomenology and symbolic interactionism (Bryman 1984:78). This implies that qualitative research often follows the philosophical paradigm of interpretivism, where the research makes sense from interpretations of reality. This is closely associated with post-positivism where research deals with a subjective understanding of social phenomena/social sciences (Noor 2008:1602). Therefore, the adoption of qualitative research with a post-positivist/interpretivist approach introduces a subjective component into the study. The application of this method to research requires that the researcher carry out a self-test to eliminate any bias arising from interpretations made from a pre-determined point of view. The advantage of this method is that it introduces into the research a certain cautionary dynamic, in that the researcher is required to examine all possible aspects of problems, rather than simply the most prominent or the immediately obvious ones. The positivist approach also requires the researcher to examine matters from an external viewpoint, from outside the immediate appearances, and from the view of empirical concerns, implying that the observations must be subjected to investigation. Meanwhile, the phenomenological position requires that, in examining human reactions to encounters with the environment and with other humans, qualitative research must adopt the actor's perspective as the empirical point of departure (Bryman 1984:78). This research thus makes use of quantitative and qualitative methods of data collection and analysis in order to evaluate the performance of an adaptive ELF constructed for the purposes of promoting the teaching, learning and assessment of secondary-school geography in Oman. The research employed questionnaire surveys administered to teachers and students regarding their use of and attitudes to eLearning environments and reporting on their acceptance levels of technology. Qualitative research was used during the observation, description, explanation and exploration of the fieldwork, and was used to interpret the analysis of the quantitative data collected by the questionnaires.

4.3 Mixed Methodology

The application of quantitative and qualitative research methods each individually, would offer to a study the advantages of each, in simple arithmetical addition. However, the literature proposes that a combination of both methods will prove more advantageous (Creswell 2003), whereby a mixed-method approach refers to "the *integration* of qualitative and quantitative research methods" (Creswell & Plano-Clark 2007). There are several definitions of the mixed-method approach. Greene *et al.* (1989) defined mixed-method research designs as those that "include at least one quantitative method (designed to collect numbers) and one qualitative method (designed to collect words)", while Tashakkori & Teddlie (1998) defined the mixed-method as "those that combine the qualitative and quantitative approaches into the research methodology of a single study" (Molina-Azorin & Cameron 2010:96). Meanwhile, Johnson & Onwuegbuzie (2004:14) defined mixed-method study as "the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study". Ideally, the mixed-method approach aims not merely at addition, but at synergy.

The mixed-method approach has several advantages as identified by Creswell (2003): the method conveys rigour in research and offers guidance to others on what the research intends to do. Therefore, the "typologies of the mixed-method can offer research the ability to clarify the nature of intentions or accomplishments" (Bryman 2006:26). These typologies include such processes as: (1) the collection of data by quantitative and qualitative methods simultaneously or sequentially (Morgan 1998); (2) the prioritization of either quantitative or qualitative data (Morgan 1998; Creswell 2003); (3) integration of the methods by triangulation, explanation or exploration (Creswell 2003; Creswell *et al.* 2003); (4) constructing various types of data-strands (Creswell *et al.* 2003).

Quantitative and qualitative approaches can be combined by either sequential or simultaneous means (Morgan 1998). These methods involve the timing and importance given to the method in the study. The sequential approach entails the use of quantitative and qualitative methods independently, at different phases of the research; 'simultaneous' implies the use of the methods in parallel or at the same time (Morgan 1998). The triangulation method of mixing quantitative and qualitative research methods draws on the work of Denzin (2009), in which the combination of different methods and theories falls into in four different types. The first triangulation is data-triangulation—whereby varieties of data sources are used in the research, both quantitative and qualitative in different approaches or in the same method. Secondly, there is investigator-triangulation—whereby different researchers bring their perspectives together. Thirdly, there is theory-triangulation—involving the use of different theoretical points of view entailed in the approaches. Lastly, there is methodological triangulation—whereby different methods are used to study a single problem (Denzin 2009).

The mixed-method approach presents several advantages for conducting research. It is perceived that the use of quantitative and qualitative approaches in combination offers a better understanding of the research problems and helps to unravel the complexity of phenomena more effectively than does either approach on its own (Creswell & Plano-Clark 2007). This understanding can be achieved through the triangulation of one set of results with another, thereby helping to increase the validity of the research. The advantage of the triangulation approach is that the weaknesses of one method are overcome by the strengths of another. According to Greene *et al.* (1989) there are several reasons for using the mixed-method approach. The mixed-method allows a researcher to use the results from one method to develop work being conducted under another method. In addition—especially in the case of the triangulation mixed method—it allows the researcher to produce greater elaboration, enhancement, illustration and clarification of results (Greene *et al.* 1989). Moreover, the mixed-method encourages the discovery of paradoxes and contradictions, which provides opportunities for the re-framing of questions. Lastly, the mixed-method allows the researcher to extend the breadth and range of enquiry through the instrumentality of the different methods and inquiry components (Greene *et al.* 1989). Collins *et al.* (2006) positively recommend the mixed-method approach as strengthening the quantitative element; it is able to provide a fidelity instrument for the research (Onwuegbuzie *et al.* 2010), thus offering measures of integrity as well as significant enhancement.

However, it is also vital that the researcher realizes that the mixed-method approach might also create barriers to effective study. Creswell & Plano-Clark (2007) describe how difficulties may beset the mixed-method approach, owing to the additional requirements generated in respect of work, time and financial resources required. The particular challenge of mixed-method stems from the demand generated by the need to carry out both qualitative and quantitative approaches (Long *et al.* 2000). Mixed-method requires those conducting the study to develop sets of skills that span both qualitative and quantitative approaches; therefore, the researchers and any assistants must be well versed—both in general and in detail—with the particular features and demands of both approaches (Creswell & Plano-Clark 2007).

This present research combined quantitative and qualitative methods of data collection and analysis in order to take advantage of each method and improve the quality of the research. The mixed-method approach used herein involved the use of questionnaires to evaluate the performance of and to elicit feedback from the learners who participated in the eLearning Core Experiment (CExp). Qualitative data-collection methods were used to make observations of the experiment and gather feedback from teachers and learners regarding the ELF. Further qualitative analysis was used to analyze the results obtained by quantitative methods. The goal of this mixed-method study was to identify relevant practices that can promote teaching, learning and assessment of geography through eLearning.

4.4 Fieldwork and Experiments: Methodological Considerations

An experiment is a trial-and-error research process performed with the aim of verifying or establishing the validity of some hypothesis. One question that arises is whether to carry out the research in the laboratory or in the field. For many, the basic practice is to carry out research in the laboratory, since researchers believe that laboratory experiments allow for a controlled environment that makes possible a controlled study (Levitt & List 2007, 2009). However, field experiments must also be taken into consideration, as they are situated in the real world, and field experiments have proven influential especially in ascertaining human behaviour. Field experiments have a high validity, as the results and conclusions made are more easily generalized to the larger population, as compared to the laboratory experiments (Levitt & List 2007). Secondly, field experiments are also to be considered for the reason that their results tend to offer greater insight, as well as being more compelling and convincing to a larger audience. These reasons have invested field experiments with increasing appeal to researchers, and have gained attention and resources from policy makers, practitioners and the media. It should be noted that field experiments follow the practices of traditional research methodology in respect of the various procedures to do with the identification of objectives, population sampling, testing, randomized trials and site selection (Harrison & List 2004).

In designing the fieldwork and experiments for this research, it was soon realized that there were several factors that needed to be considered. These related to the goals set for the conducting of the fieldwork. Besides assessing the effectiveness of eLearning, it was hoped that the experiments would help in developing positive trends to eLearning (Erez & Arad 1986; Butler 1987). One anticipated spin-off was that the experience would motivate the participating teachers and learners to desire to gain further new skills relative to learning software (Orehek *et al.* 2011). The experiments were thus seen as a means of raising awareness of the opportunities to gain multiple geographical skills for both teacher and learner. It was hoped that they would react favourably and spread news of their experiences (Chen *et al.* 1999; Novak *et al.* 2003). It was hoped that such a successful outcome would help to create a demand for eLearning through the perception of its potential to provide an effective and interactive learning environment. Of course, it is not expected that these hoped-for outcomes would occur overnight. Teachers would need to create innovative strategies and methods of teaching geography. They would have to depart from traditional ways of working, to adopt modern theories of learning such as learning-by-doing and learner-centred-learning. These developments would also be dependent on the willingness of students to cooperate with the introduction of the changes. Such a weight of expectation depending on one set of fieldwork and experiments consisting of small sets of simple testing-procedures might appear unrealistic, if there had been no previous work done to prepare the participants and the general school population. However, for more than two years the Omani Government has been publicizing the benefits and opportunities to be gained with the launch of 'digital Oman'.

Consequently, it was this researcher's responsibility to ensure that, while the fieldwork procedures were to be as rigorous and scientific as possible, they should also be an 'experience', as enjoyable and stimulating as possible for both teachers and students. It should be noted here that making sure that the experiments should also be an *experience*—indeed a *learning experience* and furthermore an *enjoyable* experience—does *not necessarily* introduce bias into the proceedings (Ainley *et al.* 2002). Any strategy of innovation introduction has to overcome the natural inertia of humans accustomed to doing things in a certain way (Kanfer & Heggestad 1997). There is also a choice in the way of overcoming inertia in humans, known popularly as the 'stick-and-carrot approach' from that applied to beasts of burden. The use of coercion (the 'stick') is a form of motivation that inevitably raises resentment and reinforces resistance. The use of an incentive (the 'carrot') aims to motivate by overcoming inertial resistance with something attractive. In the field of education, the role of attractive motivation is well recognized (Lepper & Cordova 1992; Linnenbrink & Pintrich 2002). The strategy for the experiments thus left the major initiative in the power of the participants and made the outcome of the experiments dependent on the participants' unforced willingness (Morrison 2002).

4.5 Fieldwork conducted for this Study—An Account

The fieldwork was done in three phases. Phase One consisted of preparatory work, including an exploratory questionnaire survey and a Pilot Experiment (PExp). The main experiment—called the Core Experiment (CExp)—was conducted in Phase Two. These first two phases took place in Oman, whilst in Phase Three questionnaire surveys were conducted in Oman, UAE and UK.

4.5.1 Oman

The fieldwork in Oman targeted teachers and learners in the tenth grade of the Omani *Basic Education* state-school system in all three phases. An *exploratory questionnaire* was used during preparation (Phase One) to elicit views from teachers and students about the sort of electronic audio-visual features (such as animations, videos *etcetera*) respondents considered to be useful for helping them to teach/learn geography. These questions were posed in an informal way to encourage respondents to give their honest personal opinions about the suitability of such features (for the Phase One Questionnaires, see Appendixes One and Two, pp 301–306). This exploratory questionnaire must not be confused with the one used in the questionnaire surveys conducted during Phase Three.

The ***first phase*** of fieldwork was conducted in the first semester of the academic year 2010/2011 (September to December 2010). The target population consisted of tenth-grade *BE* students. In that academic year 28,458 such students were registered with the Ministry of

Education. For this phase, in order to identify a suitable survey population, the survey selection criteria included the following student variables: (1) having a mean age of 15 years; (2) balanced representation from each of the three socio-economic levels defined by the government; (3) possessing experience of information technology. The third criterion was most important, as it was essential that all student participants should have acquired (at least approximately) the same IT skills from the first to the tenth grades.

The Basic Education Programme had first of all been introduced in the educational areas of Muscat, Al-Batinah South and Al-Batinah North, as these areas are the most densely populated in the Sultanate. Consequently, these educational areas were identified by these criteria as being the most eligible for the fieldwork. As mentioned above, an exploratory questionnaire was sent to all relevant schools in these three areas to gain background information on students' and teachers' preferences regarding features of eLearning. After receiving the returned questionnaires, the Researcher turned to the next task, selecting one of the three educational areas for the PExp.

As time pressures were increasing, the Researcher decided to select Al-Batinah South educational area for the PExp and CExp. The reason for this was that her network of contacts in that area was better developed and that would be very beneficial in optimizing the use of time for the fieldwork in Oman. Having decided on the educational area, the Researcher then surveyed the scores gained by the relevant students at the end of their ninth-grade year. The Researcher used SPSS to process the individual scores—awarded by schools on a range of criteria, not simply for their examination performances—to arrive at a consistent average that was fair and balanced, as ascertained by *t*-test. Eligible schools were those that had students whose scores had consistently high proportions of 'very good' or 'excellent' ratings, according to the MOE classification. From the pool of eligible schools in Al-Batinah South, a random selection was made for the schools that would be asked to provide the Test Groups (TGs) for the PExp. The schools thus chosen for this phase were Al-Rustaq School (EG) and Al-Nawar School (CG). Random selection was followed in choosing a relevant class from each school. The EG consisted of 30 students, while the CG had 28 students.

The same seven topics had already been chosen from two geography units for both groups. Members of both groups were subjected to a pre-experiment test (a 'pre-test') in which a list of questions was presented to them to assess their geographical knowledge. Following the pre-test, the course contents were presented to the EG through web-pages (containing features such as animations, videos and non-moving images) delivered to participants by CD. For the CG, the same course contents were presented in the traditional way as previously. After the experiment was concluded, the learners in both groups were again tested on their knowledge levels. In this post-experimental test (the 'post-test') the same list of questions that had been used in the pre-test was again presented to the participants. These pre-tests and post-tests were administered to the two groups in order to measure whatever difference each individual member of each group might display in the performance score *after* having taken part in the experiment in comparison with the score gained *before* taking part.

It was posited (1) that members of the EG would display significantly greater improvements in their individual post-test scores in comparison with the post-test scores gained by members of the CG; (2) that the EG would show an overall improvement in learning performance greater than that for the CG; and (3) that these differences would display a consistent pattern that indicated the actual beneficial impact that using the eLearning programme had on the learning achievement scores of the students in the EG.

The *overall purpose* of conducting the PExp was to prepare the Researcher for the CExp, to familiarize the Researcher with any practical issues and problems, and also to establish a bench-mark with which to assess the results generated during the future CExp. The results of the PExp were used in conjunction with the outcomes of the exploratory questionnaire survey to help the Researcher to make final adjustments to the contents of the web-based eLearning course for the CExp. For the same reason, after the PExp the Researcher spoke informally with the students and teachers of the first EG to obtain their feedback. In this way the Researcher was able to enhance the effectiveness of the eLearning materials, by taking into account the most up-to-date opinions and feedback of teachers and students in the field.

The ***second phase*** of the fieldwork took place in the same academic year 2010/2011, in the second semester (beginning in February 2011). This phase entailed the implementation of the ELF for the CExp: the teaching, learning and assessment of the fifth unit of the geography curriculum of the second semester. Again, this was to be presented to a CG in the traditional teaching manner and to the EG by a blended learning approach that included the extensive use of eLearning—in this case through a computer-based ELF named "Geography World". The Researcher again surveyed the performance of the relevant students, this time using the scores that they had gained at the end of their first semester as *BE* tenth-grade students. Again the Researcher used SPSS to establish a fair and balanced set of average scores for the students. Eligible schools were those that had consistently high proportions of students achieving ratings similar to those scrutinized for the PExp. For the selection of the two groups of students, a further criterion was laid down that their geography teachers must possess comparable levels of professional qualifications and experience. From the new pool of eligible schools thus formed, two were selected at random—Al-Nawar School for the EG and Widam School for the CG. There were 28 students in both groups. Both groups followed the same course according to the national curriculum. Only the method of delivery was different. For the CG, delivery was by traditional teaching. For the EG, the "Geography World" website had several features including Home Page, Electronic Library (containing articles and videos), Atlas, Dictionary, Teacher-World (including lists of classes, class-schedules, curriculum for the classes, the annual plan and lectures), and Student-World (class-schedules, tasks, play-with-geography, curriculum, Flash files and self-assessment activities). Moodle was used as the platform to host these features. To assess the effectiveness of the ELF as rigorously as possible, both groups were subject to assessment tests before and after the performance of the learning exercise.

4.5.2 Oman, the UAE and UK

The ***third phase*** (survey of technology acceptance attitudes) was carried out in all three countries, and was aimed at comparing the cultures of the UK and the two Arabian-Gulf countries with regard to the acceptance of technological innovation. Questionnaires were administered to secondary-level teachers and students in a range of Omani state schools following the Basic Education programme, to teachers and students at a comparable level in the UK and to teachers in the UAE, in the academic year 2011/2012.

Table 4.1: Summary of Fieldwork Phases

Phase	Countries	Methods
1	Oman	First Questionnaire Survey; Pre-test & Post-test (CG & EG)
2	Oman	Pre-test & Post-test (CG & EG) Pre-run & Post-run Attitude Scales (EG), informal interview (EG)
3	Oman, UAE,UK	Second Questionnaire Survey
CG = control group (students); EG = experimental group (students)		

4.6 Questionnaires: Theory and Practice

According to Foddy (1993) a properly-constructed questionnaire can be a useful survey tool for reliable data collection. According to Boynton (2004), questionnaires offer an objective means of collecting data about the beliefs, attitudes, knowledge and behaviour of people. Various factors determine the reliability of the questionnaire, including the pattern of its construction as well as its length and content. An efficient questionnaire should be constructed under the guidelines of the research objectives to ensure that the questions bear relevance to the research. A carefully-constructed questionnaire can also act as a means of measuring the credibility of the research (Oppenheim 1992). In order for questionnaires to be effective it is advised that randomized trials be conducted during the construction of the questionnaire. There are several considerations that recommend this research instrument for use; it is relatively inexpensive to construct and administer questionnaires, they can be constructed in various ways to capture information of different sorts (both quantitative and qualitative in the same questionnaire), their construction can be pre-set for ease of analysis, and they are generally convenient for use. According to Robson (1993), by framing questions in various ways, a questionnaire helps in generating answers that can vary in uniformity and variety through a predetermined scale attuned to the purposes of the research, since respondents are invited respond to the same set of question or to similar questions, according to the directions in the questionnaire. This also ensures that the questionnaire offers research validity. Additionally, the inclusion of open-ended questions in a questionnaire that is not strictly quantitative helps respondents to express their views more deeply and fully.

Questionnaires can include checklists, projective techniques, attitude scales, rating scales and a variety of other research tools (Boynton 2004). The questionnaire is a major data-collection method for surveys and quantitative research approaches. The measurement specification of a questionnaire depends on several factors, which include the nature of the population and whether the questionnaire is analytical or factual. If a questionnaire is factual, it has fewer complications, whilst analytical questionnaires are largely value-laden in that there is less scope to frame questions that are completely neutral in tone or in overtone (Dörnyei 2007). Complex questions in a questionnaire can present opportunities for subjectivity. Value-laden questionnaires require complex questions in order to minimize bias whilst dealing with topical issues such as attitudes, opinions, social representation, awareness, values, precepts and stereotypes (Oppenheim 1992; Foddy 1993). Owing to its multifaceted nature, the value-laden questionnaire often involves (or even necessitates) questions that are multifaceted; it also invites responses that are likewise multifaceted. Responses to such questionnaires are much more open to the subjective vagaries of respondents who are influenced by their environment (Oppenheim 1992). The findings of a value-laden questionnaire are difficult to validate as they reflect the state of the mind of the respondent at any given time. Moreover, the type of respondent targeted also determines the measurement specification of the questionnaire (Dörnyei 2007).

Items for this study's questionnaire were framed in accordance with the aims and objectives set down for this research, and efforts were made to link the questions with the relevant background literature. The Researcher sought to design and sequence the questions in an easy-to-use and logical manner, as well as to use negative questions in a careful manner. The careful framing and sequencing of questions is necessary as errors can emerge during the analysis of responses owing to misinformed conclusions on the part of the respondents (Dörnyei 2007). To eliminate this, the first logical step in the design of this instrument was the definition of the type of data to be collected and thus the type of questions to be included. Since the research had adopted a realistic approach, entailing positivist and interpretivist approaches, there was a requirement for both closed- and open-ended questions. In order to reduce confusion during the implementation stage, questionnaire questions were coded with sequence numbers.

After the initial draft of questions, the questionnaire was taken through different stages aimed at improving its content, structure, and overall appearance. The first development stage that the questionnaire was taken through was the background stage (Dörnyei 2007), in which the purpose, research questions, objectives and research hypotheses were re-examined to determine whether the type of questions to be asked were actually consistent with these criteria. This stage also included a close re-examination of the background of the target audiences: the identity and background of a teacher varies considerably from those of a student, and the variations should be taken into account when considering the readability levels of the questions addressed to the different groups of respondents (Dörnyei 2007).

The second stage is the questionnaire conceptualization stage, where a thorough review of the research is carried out to generate research questions and statements for the questionnaire. At this stage, the Researcher had to identify any assumptions, perceptions, facts, opinions and any other variables that could affect the outcome of the questionnaire (Oppenheim 1992). The Researcher needed to revisit each question in order to assess its suitability both individually and in the overall sequence of questions. In the third stage the Researcher requested five of her peers to take the part of respondents and respond to the questions. This is a valuable strategy for identifying mistakes and for providing comments that could help in improving individual questions and the overall questionnaire (Long *et al.* 2000). Based on the peer feedback, the questionnaire was revised, sequencing was adjusted and some questions rephrased.

For the two questionnaire surveys, the questionnaires were designed to be self-administered by persons in groups in the presence of a moderator (the Researcher or a deputy) who was available in case of difficulty. In Oman, the questionnaire was administered to teachers and students in the tenth grade of the state schools that had been identified by the background screening described in Section 4.5.1 to ensure a balance representation of students from each of the three socio-economic levels into which the MOE classifies the Omani population. For the broader Phase Three questionnaire survey, the wider variations in the amount of school-based experience of information technology gained by teachers and students was not prejudicial but actual beneficial to the survey outcomes. In the case of the other two countries, the questionnaire was administered to teachers (in UK and UAE) and to students (in UK) who were in comparable educational circumstances, in order to ascertain the cultural differences in the acceptance of eLearning and technology in the different nations.

4.7 Data Collection: Quantitative and Qualitative Methods

Rigorous control and monitoring of data collection is vital in the research process, since the inaccurate collection of data leads to invalid results. Data-collection methods range on a continuum from quantitative methods to qualitative methods. Quantitative data-collection methods depend on structured and random sampling research instruments. The goals of these collection methods are to test hypotheses drawn from the research theory and to estimate the size of the research phenomena (Reichardt & Rallis 1994). Where the data collection involved random sampling of the respondents, data will be drawn from the various treatments applied to the samples (Bernard 1995). Data collected by quantitative means is also subject to the influence of outcomes of variables tested. Where large populations are used, the data collected is expected to represent a sample for which there is a good probability that generalizations from the data collected will be reasonably accurate (Morse 1991). The common quantitative data-collection methods are experiments, numerical observations and recordings, closed-ended questions in surveys, and secondary data from management information systems. According to Bernard (1995), questionnaires are an effective method of collecting quantitative data. However, for the data collected to be genuinely quantitative the questions must not be open-ended.

Most respondents prefer to give their answers by means of questionnaires since these allow for anonymity, and respondents thereby feel less inhibited in responding to controversial issues (Morse 1991). Questionnaires may be administered by an interviewer (by telephone or in person), or they can be self-administered by the respondent after having been received in hard-copy format or online. The drawback with self-administered questionnaires is that most people who receive them do not return them, therefore reducing the representativeness of the sample population (Bernard 1995). Web-based questionnaires necessarily exclude respondents who do not have access to a terminal, and the validity of responses to web-based questionnaires may often be reduced, as most respondents tend to reply to web-based questions in a hurried manner. Questionnaires can also create quantitative data by the use of checklists and rating scales, which serve to simplify and quantify the responses, attitudes and behaviour of respondents. The checklist is a list of characteristics, behaviours and other items regarding which response is sought (Morse 1991). Whilst employing a rating scale is useful in determining a respondent's perceived behaviour or reaction along a continuum, the use of checklists offers a greater number of observable behaviour/response options.

Interviews are another method of collecting quantitative data. However, for this method to qualify as truly quantitative data collection, the interview must be highly structured, in which the interviewer asks a standard set of questions (Reichardt & Rallis 1994). Types of interview include face-to-face, telephone or computer-assisted personal interviews. Face-to-face interviews assist the researcher to create a rapport with the respondent and hence generate cooperation (Bernard 1995). This form of interview is highly recommended since it has proved to offer the highest response rates for any mode of survey. Interviews also allow the researcher to clarify a respondent's answers and gain opportunities for follow-up information. Telephone interviews on the other hand, offer the advantage of consuming less time and are less costly as compared to face-to-face interviews (Long *et al.* 2000). The disadvantage of this form of data collection is that the response rate is low as compared to face-to-face interviews.

Qualitative data-collection methods offer evaluation techniques to understand the processes underlying the results and the elicited perceptions of respondents. The practice has been to use qualitative data-collection methods in order to improve the quality of data gained by quantitative methods through the generation of supplementary information that contributes to the evaluation of hypotheses (Denzin & Lincoln 2000). Qualitative data-collection methods tend to have open-ended and less structured techniques, relying more on interactive interviews in order to allow the respondent to clarify concepts and check reliability (Patton 2002). These methods employ the use of triangulation to increase the accuracy, relevance and even credibility of the results, and it is often possible to generalize their findings (Long *et al.* 2000). Qualitative data-collection methods include in-depth interviews, document reviews and observation methods. According to Kvale (1996) the purpose of conducting an interview is to understand the meaning of what is said by interviewees. For qualitative research to be valid, the interview must cover factual matters or issues of attitude/opinion, and must address rational levels of meaning. Interviews are seen as a viable means of penetrating the superficial significance of a respondent's answers and to approaching nearer to the core issues and meanings underlying these answers (Denzin & Lincoln 2000). The most frequent practice is that interviews are used as a follow-up to questionnaires. For the current research fieldwork in Oman, a face-to-face group interview was conducted with ten members of the EG in Phase Three. In the group interview the Researcher asked a set of questions (given in Chapter Five) to elicit open-ended responses from the interviewees. These were recorded, and later transcribed and analyzed for key words and expressions that were coded and entered into an SSPS analytical programme to collate trends, similarities and differences in the responses of the various interviewees.

4.8 Data Processing: Quantitative and Qualitative

Data collected by questionnaires, structured interviews or field experiments, where a structured set of closed-ended and open-ended questions or observations have been used, can be processed quantitatively. Processing of this data begins with the determination, assignment and listing of the variables measured. Numerical variables are processed by categorization, where each category is assigned the corresponding value of the respondents. For example, the age variable can be categorized as 20–29, 30–39 or 40–49. Responses to open-ended questions can also be categorized, where the responses of each question are first assigned a code and a label is given to each category of the response (Niglas 2004). Coding is an important processing method in quantitative data processing, particular in computer data analysis where codes are used to represent the questionnaire, the questions and their responses (Wholey *et al.* 2004).

When processing qualitative data, it is essential to remember that this data represents *interpretations* made from observations, semi-structured interviews and questionnaires (Wholey *et al.* 2004). Data processing for this method is on-going and involves the organization and expansion of the notes and other observations made, and that this process continues during and after the experiment (Maxwell 2005). During the time in which a researcher conducts the interview or experiment, it is not usually to make a word-for-word transcription. Unless there is an assistant who is able to transcript verbatim, the best expedient that can be had is to make an audio (or even video/audio) recording of proceedings. The drawback to this lies in the considerable amount of work involved in transcribing the visual and auditory matter thus recorded. Usually, raw field notes are taken, and these are later organized into a set of notes in which key statements are expanded for analysis (Patton 2002). Qualitative data can be ordered in ways similar to those for quantitative data. This is done by performing an exercise in mapping relational links to the research questions, but for a large data source coding should be carried out (Niglas 2004). Codes can be obtained from the list of questions or topics used for the data collection, although for this method the codes are labels rather than the numbers or letters used in quantitative processing.

4.9 Data Analysis, Assessment and Presentation

Data collected by quantitative means is typically analyzed by statistical means, which fall into either interval estimation or hypothesis tests. Interval estimation entails the analysis of a parameter from a sample of data. The parameter value used for all possible data is referred to as population/true-value parameter. To estimate this population/true-value parameter, statistics uses sample data called the point-of-estimate. Measures that estimate quantitative data from this point-of-estimate are values such as the mean, standard deviation, variance, mode, and median. These values are also often termed descriptive statistics, because they describe the basic features of the data. Descriptive statistics also entail measures such as percentages and ranges, and are combined with simple graphical representations. Descriptive statistics are used to simplify the representation of data in an organized manner. Quantitative data is further analyzed by inferential statistics, which assists a researcher to move beyond the limited significance of the immediate data. Inferential statistics are used to infer from the sample data various indications as to what might be the thoughts, beliefs, behaviours or attitudes of the sample population.

Under the hypothesis-testing group, we have measures that obtain the data for uncertainty values. Hypothesis testing functions to contest a claim made about the sample population based on the data, to test whether such a claim has any validity, and if so, the extent of such validity. Examples of hypothesis testing are measures such as population mean and standard deviation. In statistics this often is termed univariate analysis, where data analysis involves the examination of cases across variables. Univariate analysis focuses on three major characteristics of the variable that tends to examined: (1) the distribution; (2) the central tendency; and (3) the dispersion. Distribution is related to the descriptive measures, as this summarizes the frequency of the values or ranges for each variable, such as percentages, frequency distribution. The central tendency estimates the centre of the distribution and is associated with the mean, mode, and median as identified under the descriptive statistics. Lastly, dispersion embraces measures that estimate the spread of the data values, and includes measures such as the standard deviation and the variance.

Qualitative data analysis is unlike quantitative measures for it does not deal with the mathematical properties described above. There are various methods to analyze qualitative data depending on the method of data collection (Cohen *et al.* 2000). Data that is collected from texts, action (video) and nominal measures are analyzed through intuition, thinking aids, display methods, classification and coding, or though literary criticism, interpretation and thematic coding (Patton 2002). Interpretivism is a form of inquiry, in which human activity is seen as consisting of texts or a collection of symbols expressing meaning (Holloway 1997). This type of data is analyzed through the phenomenological approach or the deep-understanding approach, where a researcher creates an empathy with the subject. Interaction comes about when a researcher understands the actions and interactions of the sample population (Patton 2002). The phenomenologist works on interview transcripts to gain insights for interpretation, and continually reads and re-reads the data to gain an essential grasp of the account. The interpretivist, on the other hand, realizes that a researcher has his own understanding and concepts, which must be detached from the analysis for objectivity and credibility to be achieved (Miles & Huberman 1994).

Qualitative data analysis also entails description of particular perspectives of a researcher and the interpretation of the data (Holloway 1997). Description is often found within ethnographic qualitative methods of research where documentation is made of human experiences, beliefs and ways of living. Description in this type of research requires the interpolation of the observations made on the population (Boyle 1994). Ethnographic analysis therefore makes use of iterative and descriptive processes where cultural ideas arise from an interaction with the field and the field data. Simply stated, this method entails sifting through pieces of data to realize and interpret thematic categories, as also to identify any inconsistencies and contradictions in the data (Miles & Huberman 1994).

A third qualitative analysis method is narration, which expresses the manner in which human experiences are shaped, understood and transformed (Boyle 1994). This entails the putting of experience or observations into words, with the aim of providing insights into experiences. Qualitative data assessment techniques must entail comprehension, synthesis, theorizing and recontextualization (Holloway 1997). Qualitative data must be fully comprehended in order to arrive at an understanding of the phenomena under study, synthesis entails the construction of the accounts and relations of the phenomena, whilst theorizing entails why these relations appear (Cohen *et al.* 2000). In summary, recontextualization is the process whereby a researcher puts new knowledge on the target phenomena and its relations into the context of other literature (Holloway 1997).

4.10 Summary of the Chapter

The goal of this chapter was to describe a research method that would analyze and interpret the study's research question. The purpose of the selected method was to evaluate the extent of the effectiveness of an ELF designed for teaching geography in ways appropriate to the achievements and attitudes of tenth-grade students in the Omani Basic Education school system. The study identified quantitative and qualitative approaches to the research. The research made use of the mixed-method approach, which combined quantitative and qualitative approaches. A quantitative method component was selected since it is applicable to natural science and focuses on the positivist approach to phenomena. The quantitative research design selected put emphasis on fixed measurements, testing of hypotheses, and fieldwork involvement. Qualitative enquiry was also used since it required the Researcher to carry out a self-test to eliminate any bias and offered the research a dynamic view as the Researcher is required to look at all aspects of the subject.

In addition, for the research to have credibility and validity the research method employed the philosophical foundations of positivism and interpretivism underlying the quantitative and qualitative research approaches respectively. The positivist aspect was found useful since the research should be based on ascertainable truth, have reason and validity. Moreover, the positivist approach places emphasis on facts, which can be obtained from pure observation and analyzed empirically, through quantitative techniques, surveys and experiments. The research also was founded on the philosophical paradigm of interpretivism, where the research makes sense from interpretations of reality. The mixed-method approach combined both methods simultaneously, where data was collected through the fieldwork.

The first fieldwork experiment—the Pilot Experiment (PExp)—was designed to monitor new teaching methods for geography through the use of seven topics from two course units, which were presented as web pages and delivered electronically. This preliminary experiment targeted tenth-grade students in two schools: Al-Rustaq School (the EG, who received the lessons by a large element of eLearning) and Al-Nawar School (the CG, who received the lessons in the traditional manner). Both groups were subsequently tested for learning performance. Feedback on the effectiveness and requirements of the ELF were obtained through a questionnaire administered to tenth-grade teachers and students from the Muscat, Al-Batinah South and Al-Batinah North *ER*s. In Phase Two of the fieldwork, the Core Experiment (CExp) was designed to measure the level of effectiveness of the adaptive ELF in teaching *BE* tenth-grade geography in Oman. The CExp entailed the implementation of the "Geography World" ELF that was presented to the EG. The CG did not receive eLearning. The participants were tested before the onset of this teaching session, and after its completion. Finally, a survey was made to arrive at an evaluation of the cultural influences affecting the acceptance of technology and eLearning, by administering a questionnaire to secondary schools in Oman, a secondary-level academy in the UK and corresponding educational institutions in the UAE.

The fieldwork employed both quantitative and qualitative research methods. By means of pre-tests and post-tests administered to the TGs, data were collected on the effect of the ELF upon the learning performance of the EG through a comparison with the performance results shown by the CG. Quantitative data were also generated by questionnaires administered to the teachers and learners to obtain their view on the ELF. The results presented also qualitative value from feedback obtained from the fieldwork observations, open-ended questions in the questionnaire, and the group interview with ten of the EG students in Phase Three.

The research method selected was designed to gather, then process and analyze this data through quantitative and qualitative means. Quantitative data processing methods selected were coded with numerals and categorization, while qualitative data processing methods entailed coding with labels. Quantitative data presentation and analysis methods included descriptive and inferential statistics, entailing tables for frequency distribution. Inferential statistics involved measures of central tendency such as mean, median and mode, as well as measures of dispersion such as standard deviation and variance. Qualitative data analysis tools used included interpretivism, description phenomenological approach, and narration.

CHAPTER FIVE: LEARNER SURVEYS

5.1 Introduction

This chapter deals in the first place with the two questionnaire surveys that were conducted in Oman to elicit information regarding students who had followed the national *Basic Education* programme exclusively from the first to the tenth grade (*i.e.* from Year 1 to Year 10; *see* Section 1.5.2 in Chapter One). Thereafter, the survey of Year 10 students in UK is described. At this point it might be appropriate to explain that administrative difficulties prevented a survey of the corresponding Year 10 students in the UAE. However, from a reading of the available recent literature—*e.g.* Abdalla (2007), Al-Hawari & Mouakket (2010), Almekhlafi & Almeqdadi (2010)—as well as from personal experience, this Author knows that, regarding technology and innovation, attitudes amongst Year 10 students in the UAE are broadly similar to those amongst their contemporaries in the areas of Oman surveyed in the current research work. What is more likely is that differences of opinion might possibly arise between teachers in the UAE and Oman, owing to differences in training and institutional experiences. It is for this reason that the survey of teachers in the UAE was included, despite the absence of a survey for the relevant students in that country.

5.2 Surveys of Learners in Oman

Prior to commencing the fieldwork surveys, permission was sought from the Ministry of Education, which drafted a letter that confirmed the Ministry's acceptance and permission for the research and experiments, requesting the schools and Educational Region (*ER*) administrations to assist in the fieldwork. The aim of the research was to measure the effectiveness of a developed interactive learning environment and to elicit user reactions to the learning environment. This research included both quantitative and qualitative data-collection methods, with a view to employing a mixed-method approach to analyze the data collected and to use triangulation to evaluate the results. The research made use of two field experiments (Pilot and Core), two questionnaire surveys, as well as observation methods to collect data from respondents concerning the use of an ELF for the teaching of geography. The Phase One and Phase Three questionnaires were distributed to students in the tenth grade of Basic Education in three Omani *ER*s (Muscat, Al-Batinah South and Al-Batinah North) as shown in Figure 5.1 below.

Figure 5.1: Educational Regions in Sultanate of Oman (Ministry of Education 2011/2012)

These three *ER*s had been selected owing to their containing the highest concentrations of schools possessing nine full years' experience the *Basic Education* programme and the highest concentrations of students who already had nine years' experience of ICT. A sample-size of 70 students was set for respondents in each of the selected *ER*s in order to cover the largest practicable number of respondents and to optimize the credibility of the answers.

In Phase One, students (along with teachers) were surveyed by questionnaire for their opinions about eLearning and their preferences regarding eLearning features. Their responses helped to further develop a prototype experimental ELF that was subsequently tested by means of the PExp conducted with tenth-grade *Basic Education* students. The intention was to use in various ways the results generated by the Phase One activities for further refining the requirements and developing the design of the experimental ELF for the CExp that would be run in Phase Two.

In preparation for the PExp, the Researcher held informal meetings (Leedy & Ormrod 2010) with both groups of students in order to explain the importance of the study and to motivate their cooperation during the PExp. The Researcher met with both groups not only to ensure that exactly the same material was to be learned, but also to emphasize the importance of the input from *both* groups for the PExp, even though the CG would continue to be taught and to learn by traditional methods only. For the EG, the preliminary teaching was delivered with the help of the initial version of the ELF that contained many of the features that were to figure in the CExp—the learning materials were designed as web-pages that could be accessed from CDs.

For the Pilot Experiment, pre-experiment and post-experiment tests ('pre-tests' and 'post-tests') were administered to both groups to evaluate their levels of geographical knowledge levels before and after the experiment, to record whatever difference might be found in the learning-performance score gained by each individual *after* the PExp as compared with the score gained by that student *before* beginning the PExp. All the information gained was used to support adjustments and further developments to the ELF for Phase Two. ***For the Core Experiment*** similar pre-tests and post-tests were applied to measure the geographical knowledge levels of the students before and after the CExp. The expectation was that the differences in the pre-test and post-test knowledge-level scores between the two groups would help evaluate the impact of the eLearning programme on the learning performance of the EG. Pre-tests and post-tests are traditionally used in surveys to determine the existence and scale of any changes that might occur in participants' behaviour, knowledge, skills or attitudes after a procedure in comparison with those that existed previous to the procedure (Raidl *et al.* 2004). Although pre-tests and post-tests offer various benefits, it is apparent that they are capable of producing biased data through "response-shift", where participants tend to be confident in making responses during the pre-tests but are less confident in making responses during the post-tests (Davis 2003; Hill & Betz 2005).

To reduce this disadvantage, in the CExp a five-point Likert scale attitude survey was administered before and after the experiment to members of the EG to monitor any changes in their opinions of eLearning as a result of participating in the experiment. To gain even more insight into changes in the mind-set of students in the EG, an informal group interview was held with ten members of this group at Al-Nawar School. It was not possible for the

Researcher to meet all 28 members of this group, as many of them had conflicting timetable demands. The students who did attend the informal interview were asked open-ended questions in order to elicit their perceptions of the ELF to which they had been exposed.

5.3 The Learning Context: eLearning & Web-Based Learning

The ELF was created on a web-based design titled "Geography World" as shown in Figure 5.2 below. The web-based learning option was selected since it has the capability of enriching the teaching of geography with tools such as bulletin boards, private emails, chat rooms and calendars, and can support ICT hardware such as video-applications, graphics and audio technology. Furthermore, the web-based learning environment was selected since it offers tools and software such as those provided by the Moodle platform, which increases considerably the scope for interaction between learner and teacher.

Figure 5.2: Experimental learning environment ("Geography World")

The Moodle platform was employed to set up to provide this ELF as it offers considerable flexibility in hosting the sources and features needed for presenting the learning materials, facilitating learner activity and assessing performance. In addition, the ELF thus constructed has features that allow swift support and effective processing for geographical artefacts such as maps and GIS. It makes us of software such as Adobe *Design Premium CS4*, *Photoshop* and *Illustrator*, Corel *Paintshop* and various flash applications. These make the presenting and analyzing geographical information far easier and rapid than is possible in the traditional classroom learning environment.

The web-based ELF offers a particularly broad range of facilities for enriching the traditional classroom environment to increase the learner's spatial skills whilst facilitating the gaining of geographical knowledge. Moreover, the ELF allows both learner and teacher to access a large pool of resources, learning materials, and instruction tools from the internet that support geography—and these can all be stored in an electronic library like the one installed within "Geography World" that was designed to accommodate a series of materials and resources, whilst the Home Page supported the learning material. Such resources have been proved to enhance the learner's performance since they not only offer access to learning materials, but also contain instructions on how to use geographical tools such as the Atlas to find places and measure distances. Moreover, these resources actively engage the learner's attention, providing the opportunity to access learning materials away from the classroom. Moreover, there is ample evidence that eLearning improves the learning of geography, by offering learners a common space for sharing solutions, opinions and pointers to sites on the web. In addition, individual discoveries, questions and ideas are not restricted to the traditional period allocated to class-time. The teacher also has plenty of opportunity to post up resources electronically in an organized manner—to place class assignments, guidelines, journal articles, hand-outs, additional reading materials and samples of work (Teh 1999). It has been found that web-based learning allows learners to go beyond traditional library research, as they increasingly become engaged in primary data collection (Teh 1999). Additionally, it is evident that the computer technology offered by web-based eLearning environments has the capacity to provide geographical education opportunities that are far richer than what is obtainable in other ways (Hill & Solent 1999).

5.4 Dual Approach to Surveying the Learners

The Researcher made use of both large *and* small samples for the learner surveys. This dual approach was adopted in line with the concept of test reliability that can be expected in relation to larger and smaller groups, as also the stability of the scores relative to each sort of group (Cronbach 1947:1). Owing to the fact that the PExp and CExp were time-consuming and complicated procedures, the samples chosen for these procedures would have to be relatively small. To counterbalance this, the Researcher instituted two larger samples to capture data from a wider range of students by means of questionnaires (a relatively simple procedure) with the intention of using the data thus gained for triangulating the findings derived from the data from the smaller samples. Therefore, there were two large samples of students (those taking part in the Phase One and Phase Three questionnaire surveys), and two small samples of students (those taking part in the PExp and CExp).

For Phases One and Two, the target student population was identified as the entire tenth-grade *BE* school population in Oman. However, as the research could not cover this entire population, samples from educational regions (*ER*s) were selected to form subgroups to represent the general population. Each subgroup was selected on the basis that it had characteristics representative of those of the entire target population (O'Leary 2004). Within this target population, the Researcher selected subgroups located in Muscat, Al-Batinah South and Al-Batinah North, on the basis that the official data showed that these areas contained the highest concentrations of eligible schools and of students having the necessary exposure to ICT.

Regarding the recommended procedure for selecting a sample population, the literature provides evidence that in a normal sample population for a test, the sample should satisfy the general standard of equivalency. This implies that an effective sampling method should identify the sample population as the "general percentage of the specific subgroup in a general group" (Merrell 2002:385). The subgroups selected satisfied this criterion, and these subgroups were then further divided into specific groups that were involved directly in the research. The specific subgroups for the PExp in the academic year 2010/2011 were drawn from the sub-population in the Al-Batinah South *ER*. From this ER, the Researcher selected students from Al-Rustaq School (EG) and Al-Nawar School (CG). For the CExp samples were drawn from the same target sub-population in the same *ER*, and the specific samples taken from Al-Nawar School (EG) and Widam School (CG). For the Third Phase of fieldwork, the general target student population comprised *BE* tenth-grade students in Oman and secondary students of equivalent age/grade in the UK. In Oman, the specific groups were again drawn randomly from eligible schools in the three *ER*s previously mentioned, whilst in UK the process involved random selection from a large secondary-level academy.

5.5 Fieldwork in Oman: Description of Procedures

5.5.1 Setting up the Experimental Programme

A major goal of the research was to create an adaptive ELF for teaching grade-ten *BE* school geography in Oman. The experimental framework was constructed around the cause-and-effect principle, to assist in understanding how the fieldwork would work (O'Leary 2004). The set-up for the fieldwork procedures was based on the variables being examined. A responsive variable—in this case the effect of use of ICT—is one that is monitored to check its effect with regard to one or more experimental variables—in this case, (1) user attitude to ICT and (2) ICT user actual performance. The experimental variables are subjected to alteration in order to observe the cause and effect (Leedy & Ormrod 2010). The research procedures for this study also had control variables (student characteristics) that were not altered—their presence was constant and thus exerted no disruptive effects.

For the fieldwork, the Researcher set up four main tasks—the first questionnaire survey, the PExp, the CExp, and the second questionnaire survey—in order to meet the various requirements of the study. The fieldwork was divided into three phases to facilitate the gathering of preparatory data, the performance of the experiments, and finally to elicit opinions from respondents in three different countries. The two experiments were aimed at testing the viability and reliability of web-based eLearning in relation to learning practices and outcomes. The PExp was set up to fine-tune the ELF that was to be used in the CExp. For the PExp, seven topics were selected from Units One and Two of the tenth-grade geography curriculum for presentation to the CG in the traditional manner, but to the EG by additional means of suitably configured Web-pages stored on CD. The CExp was designed to test the experimental ELF that had been modified in line with the findings of the PExp. For the CExp, four course topics were chosen from Unit Five of the same curriculum, the responsive variable being the effect exerted by the ELF on the learning performance of the EG.

5.5.2 Choice of Samples

Three *ER*s—Muscat, Al-Batinah South and Al-Batinah North—were selected on the basis of their containing the highest concentrations of eligible *BE* schools and eligible *BE* tenth-grade students in the Sultanate. Thereafter, the Researcher made use of random sampling to obtain student participants for the various fieldwork activities. The sampling method made it possible for each tenth-grade student to have an equal chance of being selected (Bordens & Abbott 2008). In these three *ER*s there were 13,639 *BE* tenth-grade students registered with the Ministry of Education for the academic year 2010/2011. A random sample of 70 students (mixed male and female) was selected from each of these regions, making a total of 210 students for the first questionnaire survey, in order to optimize the number of respondents and the credibility of their answers.

Owing to various factors, the amount of time available to the Researcher at the beginning of Phase Two had been severely depleted. She did not have sufficient time to conduct full sampling procedures for the PExp and CExp throughout all three *ER*s. Consequently, she decided to confine these two experiments to Al-Batinah South *ER* because her network of contacts was most extensive there and she would be able to make most economical use of the time remaining. The 46 eligible schools in Al-Batinah South had 4,055 relevant students, so it was still possible to implement a valid random sampling method.

For the PExp, selections were based on the scores awarded to students at the end of their ninth-grade year. The EG (30 members) was drawn from Al-Rustaq School, whilst the CG (28 members) came from Al-Nawar School. The PExp ran for 24 sessions at the rate of three per week, from September to November 2010 during the first semester of the academic year 2010/2011. For the CExp, the selection procedure was based on the scores awarded to students at the end of the first semester of the current academic year. Thus, the EG (28 members) was selected from Al-Nawar School and the CG (28 members) from Widam School. The CExp ran for a period of two months (March and April 2011) in which students were taught Unit Five of the tenth-grade geography curriculum.

5.5.3 Assessing Background Knowledge and Performance of Participants

The two groups for both experiments were tested for their background knowledge of geography before the experiments commenced, and were tested again after completion of the experiments. The pre-test and post-test assessments were aimed at determining the relative outcomes of the traditional and eLearning programmes for the participants (Bordens & Abbott 2008) by comparing the students' pre-test and post-test scores. The learning performance of The TGs were measured and evaluated through statistical analysis such as the independent *t*-tests. These procedures helped to bring improvements to the results of the random-sampling method used, in order to address the danger of having different outcomes for the control and experimental samples (Powell & Connaway 2004).

For the EG participating in the CExp, the procedures also employed observations, attitude surveys and a post-examination interview in order to monitor and assess any significant differences between members of the EG. This overall approach was relevant to the research, since there was difficulty in gathering a totally randomly-distributed group of students because they had already been distributed in a certain way by the school administration in the light of the standards defined by the schools. The various assessment procedures were useful for revealing the influence of variables such as age, socio-economic circumstances, knowledge of information technology, and personal background—all of which had the potential to affect the performance of members of the groups.

5.5.4 Familiarization Process for the Experimental Groups

Both EGs were taken through an orientation process in order to make them familiar with the ELF and its procedures. The Researcher met with the EG at the beginning of the PExp to describe the system, the goals of the system and the application of the results—with the intention of convincing the students about the seriousness and importance of the study. Each student received a CD containing a statement of the purpose and objectives of the eLearning programme, as well as the materials for the support of the programme in their studies. The CD contents contained the geography educational materials that covered seven topics. For each topic the students applied themselves to that part of the geography content designated by their teacher. They were asked to use all the learning materials that related to the particular topic, after which they engaged in the activities and games installed on the CD that supported the content. The teacher involved in each session acted as a facilitator for managing the classroom, helping students in their learning and encouraging them to engage in interaction with each other. The participation of the students in the PExp offered useful feedback to the Researcher for the further development of the "Geography World" website in preparation for the CExp.

For the CExp, the Researcher met the EG and explained the purpose of the study, as well as the features contained on the website and the ways in which the students could use it. However, in order to observe closely the reactions of the members of this group and to monitor their progress during the CExp, the Researcher personally attended each eLearning session.

5.5.5 Running the Experiments for the Control and Experimental Groups

The PExp was intended to assess the effectiveness of the conversion and/or adaptation of the learning materials contained in the two tenth-grade geography units to fit into website technology. This was especially necessary for the later CExp, where learning materials had to be presented via eLearning technology. In the PExp, two units of the tenth-grade geography curriculum for the first semester of the academic year 2010/2011 were presented to the two groups of students. For the CG, the traditional teaching methods were used. Meanwhile, the EG was exposed to a web-based eLearning package that contained the various technologies and facilities previous mentioned, as well as collaborative forums such as discussion boards that could support interaction. The Researcher used a pre-test to measure the knowledge levels of each group before the PExp, and assessed the learning performances of each group with a post-test after the experiment. In the CExp the fifth unit of the tenth-grade geography curriculum was presented to both groups of students. As in the PExp, the CG learned the unit content by the traditional method, whilst the EG were introduced to and familiarized with the "Geography World" website. Pre-tests and post-tests were administered to both groups during the PExp and CExp. However, in addition the students in the EG for the CExp were asked to complete pre-run and post-run Likert-scale surveys regarding their attitudes to eLearning. Furthermore, a number of members of this EG took part in an informal post-experiment interview.

5.5.6 Student Assessment: Pre-Tests and Post-Tests

Pre-testing was designed to assess the geographic knowledge levels of participants prior to each experiment, whilst post-testing helped to assess knowledge levels of participants following the experiments. For each experiment, the same list of questions on geographical knowledge was administered before and after the experiment. The difference (if any) between the proportion of correct post-test responses as compared to pre-test responses was taken to indicate the learning performance of the individual participant during the experiment. For the PExp, the list of questions was prepared using material from Units One and Two of the tenth-grade geography curriculum. For the list of questions for the CExp the Researcher used material from Unit Five of the tenth-grade geography curriculum. Each list contained four main questions: the first required the students to fill in gaps in a statement according to memory; the second (multiple-choice) question offered five responses. The third and question required students to deal with map skills in terms of drawing activities, whilst for the fourth question they had to identify countries by means of their outlines. For the CExp there were additional procedures for the EG, consisting of a Likert-scale attitude survey administered pre-run and post-run, as well as open-ended questions put to certain members during an informal post-run interview, in order to gain further information of a subjective nature to help evaluate the usefulness of the website in the teaching, learning and assessment of geography.

5.5.7 Open-ended questions used in the Fieldwork

When preparing for the fieldwork, even after extensive enquiry at MOE and the tertiary education institutes, the Researcher was not able to find any studies that had explored the reaction of Omani secondary-level school-students to the use of eLearning for any subject, including geography. Thus, no previous research was found that might have offered any practical guidance regarding optimal content, formulation and sequencing of questions to elicit attitudes from students. Therefore it was decided to include an open-ended question at the end of the questionnaires used in the first field survey (conducted before the PExp) and in the informal interview held with certain EG members after the CExp. The approach to the topic under study was exploratory, and open-ended questions presented a good way of collecting supplementary information on this topic. Open-ended questions are able to indicate the concerns of the respondents, particularly in face-to-face interviews, but open-ended questions can also be very useful for obtaining extensive and nuanced information in other situations, such as in the administering of questionnaires (Geer 1991). Moreover, open-ended questions increase the quality of response and explanation on the part of the respondents, especially in salient responses, so they are also applicable in web-surveys (Smyth *et al.* 2009).

At the end of the questionnaire used in the first field survey, the open-ended question ran, "For developing an effective learning-environment using technological resources, what additional features do you think should be in the programme that would help you understand the contents of the geography course in the best way?" Of the responses to this question, approximately sixty per cent made some useful relevant point.

After the CExp, three open-ended questions were asked (verbally, not in writing) of the members of the EG who were able to attend the informal interview. These three questions were: (1) "How did you find the new style of learning in terms of using new methods with the new technology?"; (2) "Did you gain any information, skills and abilities when you learnt through the technology, as compared to the traditional method?"; (3) "What are the obstacles that you faced when you began using the eLearning environment?". The replies to these questions were many and varied.

5.6 Results of Phase One Survey and the Pilot Experiment

5.6.1 Phase One Survey

A questionnaire was distributed to students prior to the running of the PExp to invite them to identify the specific requirements needed in the development of an efficient eLearning environment. The average response of the students in the 15 questions of the questionnaire was between 4.5–3.8 of 5 in the Likert scale as shown in Table 5.1 below.

Table 5.1: Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.234	3.814	4.529	.714	1.187	.050	15

The questionnaire prepared for this survey had 15 items based on a five-point Likert scale, together with one open-ended question, making 16 items in total. These items are listed in Table 5.2 below. The questionnaire item ranked highest was Item #1, which sought respondents' perceptions of the importance of computer-assisted learning as a means of working through the geography curriculum. The item ranked second was Item #11. This item aimed to elicit the extent to which learners had confidence in their own abilities in acquiring knowledge and skills, and how the eLearning experience might lead not only to the reinforcement of learning outcomes and effects, but also contribute to capacity building and a positive emotional attitude. Third in order of rank was Item #10, which was intended to identify the importance of self-learning in eliciting the strengths and weaknesses of the learners.

Table 5.2: Phase One Student Questionnaire Items

	Items in Phase One Student Questionnaire [for five-point Likert-scale reply]
1	Computer-assisted teaching will deepen my understanding of the subjects covered in the course textbook
2	The use of various computer programmes for clarifying and explaining new geographical terms and concepts helps me understand to them and apply them in fresh contexts/new situations
3	The presentation of geographical forms and phenomena by three-dimensional display and through multi-media does ***not*** lead me to a deeper understanding of their different aspects and properties
4	The use of graphic and statistical tables and diagrams through various displays (*e.g.* charts) that can be transformed into different explanatory forms helps me in analyzing, interpreting and comparing them
5	Computer-based activities expand my intellectual and practical capabilities and help me acquire various knowledge and skills
6	Computer-based simulations, educational games, virtual role-playing and field-trips are all methods that help me to grasp and learn things quickly
7	Computer-based simulations, educational games, virtual role-playing and field-trips are all methods that do ***not*** help me to perform activities, tasks and tests effectively
8	The provision of screen-pages for discussion and exchange of views and ideas between me and my teachers regarding problems encountered in the Social Studies textbook does ***not*** actively lead to any increase in my progress or confidence personally
9	When I know what is required, then my progress and learning are stimulated, helping me to grasp things quickly and effectively
10	My continuous progress in my studies both in strong and weak areas encourages me to improve on my strong points and also to address my weak points where these hamper my progress and performance
11	My self-learning process in acquiring knowledge that corresponds to my needs, inclinations and desires acts as a powerful incentive for me to be self-reliant and confident in my own capabilities
12	I do ***not*** think that the educational e-profile is an important and effective tool for my continued progress and performance
13	Immediate feedback regarding performance and other educational aspects actively encourage me to achieve the maximum in performance and achievement
14	The variation of the test-questions in type and scale in terms of form (open-ended and multiple-choice) and level (easy/difficult) help me to make use of my various mental skills and abilities
15	I think that the presence of the teacher in the classroom is absolutely essential even in computerized educational surroundings
16	**Question for open-ended reply** 'For developing an effective learning environment using technological resources, what additional features do you think should be in the programme that would help you understand the contents of the geography course in the best way?'

The open ended question (#16) in this questionnaire yielded the following responses (these are cited by theme rather than by actual wording):

1. It should not be complicated.
2. Users need the ability to access multiple learning methods and activities.
3. It needs to be complementary to and supporting the traditional education.
4. It needs to help students understand geography concepts and phenomena.
5. The teacher's role should be as facilitator and organizer in such an environment.
6. It should deliver contents in interesting and attractive ways by integrating a large amount of multimedia software.

5.6.2 Pre-assessment for Pilot Experiment Test Groups

The selection process had previously smoothed the disruptive influence of variables such as age, socio-economic level and background, and prior knowledge of information technology in both the EGs and CGs. The screening process set the average age of the students as 15 years, with middle class as the average socioeconomic class of the students, and consistently similar previous experience of exposure to ICT in the first to tenth grades of Basic Education. This narrowed the search down to schools having students who were generally compatible in all the aforementioned criteria (*see* Section 4.5.1). For the PExp, an assessment was first carried out using the ninth-grade scores previously recorded for students in order to identify two groups that would be balanced in terms of displaying similar previous learning outcomes at commencement of the PExp. The assessment yielded an EG of 30 students and a CG of 28 students. The average performance score for the EG stood at 3.0667 while that for the CG was 2.9286, indicating no significant difference between the two groups.

Table 5.3: Achievement of Test Groups in Phase One: Mean and Standard Deviation

	TG	N	Mean	Std. Deviation	Std. Error Mean
Achievement levels	Experimental	30	3.0667	1.04826	0.19139
	Control	28	2.9286	0.89974	0.17003

5.6.3 Pre-Tests and Post-Tests

In the PExp, the EG (Al-Rustaq School) and CG (Al-Nawar School) were exposed to the geography teaching content. After the two groups had completed the designated geography units, they were tested by pre-test and post-test procedures to evaluate the impact of the programme on the learning process and achievement levels of the learners. The results of the pre-test showed that there was no statistical difference between the two groups, while the post-test indicated a statistical difference between the two groups, with an increase in performance results being seen for the EG, as shown in Table 5.4 below.

Table 5.4: Pilot Experiment pre-test & post-test results: *t*-test for independent samples*

	Levene's test for equality of variances		*t*-test for Equality of Means					95% Confidence Interval of the Differences	
Achievement levels	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	7.674	.008	3.959	56	.000	.7071	.1786	.3493	1.0650
Equal variances not assumed			3.894	43.566	.000	.7071	.1816	.3410	1.0733

*where results show statistically-significant difference at 0.05 level of significance between EG and CG for post-test in the Pilot Experiment

5.7 Results of the Core Experiment

Students were selected from Al-Batinah South *ER*. For both groups, the number of members was 28.

5.7.1 Pre-Tests and Post-Tests

Student performance was measured by pre-tests and post-tests before and after the CExp. The performance results indicated no significant pre-existing differences between the TGs in the pre-test, for which the level of significance was set at α = 0. 05. However, significant differences were evidenced at the level of significance (α = 0. 05) between the TGs in the post-test measurement of performance, with trending towards the EG, in terms of measurements of the performance levels as shown in Table 5.5.

Table 5.5: Core Experiment pre-test & post-test results: *t*-test for independent samples*

	Levene's test for equality of variances		*t*-test for Equality of Means					95% Confidence Interval of the Differences	
Achievement levels	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	11.410	.001	5.554	54	.000	.82143	.14789	.052492	1.11794
Equal variances not assumed			5.554	37.062	.000	.82143	.14789	.52178	1.12107

*where results show statistically-significant difference at 0.05 level of significance between EG and CG for post-test in the Core Experiment

5.7.2 Pre-run and Post-run Attitude Scale

To measure the development of EG attitude trends towards eLearning, a pre-run and post-run attitude survey having 15 items with responses on a five-point Likert was drawn up and administered to members of the EG for the CExp (*not* for the PExp, which was only exploratory). The statistically-significant results derived from the responses proved that there were significant differences in the eLearning attitudes of the EG after participating in the CExp, in contrast to their attitudes before participating in the CExp. Full results regarding pre-run and post-run details are contained in Appendix Ten (pp 346–346).

5.7.3 Interview: Open-ended questions

An informal interview with a sub-sample from the EG (Al-Nawar School) was conducted after they had completed their study of Unit Five of the curriculum using the "Geography World" website. Ten students were interviewed, as the constraints of time and other incidental difficulties made it impossible to meet all the students in the group. The Researcher conducted the sub-sample interview with open-ended questions that produced the following results.

Most of these students responded to the first question by saying that they found studying from the website very helpful and that they were able to gain access to a wide range of sources of geographical knowledge and information. Moreover, the website deepened their understanding of the environment and improved their understanding of spatial relationships, as they experienced alternative images of people, place and environment. In reply to the second question, students said that they were able to retrieve information easily and apply it to new situations. They also gained new skills and abilities especially with geography-related activities such as data collection, the investigation, development and presentation of geographical ideas, as well as prediction and problem solving, which helped them make decisions. To the third question, students indicated that for technical support they did not have sufficient time to search and carry out activities on the websites because the allocated time for each session was only 40 minutes, and this was too short to accommodate all the planned activities. Moreover, there were not enough computers and other technological devices to allow access to everyone in a timely manner.

Other comments were to the effect that the teachers needed better preparation and training to set up and use the technology. It was noted that only a limited number of Arabic-language eLearning websites were available and that difficulties arose when teachers and students attempted to conduct searches in languages other than Arabic. It was also noted that certain teachers continued to prefer teaching in the traditional way.

5.8 Questionnaire Survey of Learners: Oman and UK

5.8.1 Survey Samples in the Two Countries: Compatibility Issues

The second field survey was carried out to evaluate the effect of cultural factors on technology acceptance in an eLearning environment. In the Phase Three survey, target groups of students from Oman and UK were questioned about an eLearning model that took account of cultural factors. This exercise was purely experimental, since its variables (derived from schools in the UK and Oman) were all experimental variables. Suitable schools in the UK and Oman were selected on criteria similar to those used in selecting schools and students for the CExp. Meanwhile, considering the importance of choosing a suitable sample size, the target group was set at 40 participants (20 male and 20 female) in each country in order to afford proper scope for data analysis and statistical analysis. The total of 80 participants presented a workable sample-size for capturing and analyzing data with a reasonable chance of representativeness. The two countries represent different cultures—western culture in a developed country (UK) and Middle Eastern/Gulf Arab culture in a rapidly developing country (Oman). This affords the opportunity to investigate whether social and cultural differences can affect the acceptance of eLearning, by comparing student responses to a standardized set of questions.

It is evident from studies that educational practices—both teaching *and* learning processes—are tied to culture and tradition (Chang & Chin 1999; Bodycott & Walker 2000; Tweed & Lehman 2002; Zhu *et al.* 2008). Consequently, during the creation of a virtual learning environment, socio-cultural factors must be taken into consideration since they may present barriers. This survey measured the differences in TAM outcomes between students who have grown up in Oman and the UK. To members of the Middle Eastern and Gulf Arab communities, the challenge has been that the internet, ICT and therefore eLearning have arisen and are therefore inevitably associated with western contemporary culture, which is different from Islamic culture. In this regard it might be well to remember Hoftstede's (1991) dimension of 'uncertainty avoidance' owing to the Arab cultural feature of aversion to the unknown.

5.8.2 Familiarization Process for Learner Survey Sample

The Phase Three questionnaire contained 20 items, together with a further four regarding student profile. In order to obtain representative responses to these items, the Researcher selected different schools in the same three *ER*s within Oman. In order to make sure that the students were aware and familiar with what was required of them in the survey, the Researcher attended the classes selected and explained the implications of the items to the students. The Researcher oversaw the distribution of the questionnaires and collected them, to reduce the margin of error in sampling. This process was also used in the UK, as permission was sought from the administration to explain the meaning of the questionnaire items to the students at Shorefields Technology College in Liverpool. Although only one institution was selected in the UK, this one is prominent in its field and had a sufficient number of students available for the survey.

5.8.3 Administration of the Questionnaire Survey

The ethical issues surrounding the questionnaire were addressed by ensuring that the data were used solely for the purpose of this research, and the identity and personal details of the participants have been kept secret. The following sentence in the introduction to the questionnaire gave the undertaking of guaranteed anonymity: "All provided answers will be treated confidentially and will be used only for the purpose of this investigation. The identity of respondents will be kept anonymous". The questionnaire consisted of 20 questions and four student-profile questions.

The Phase Three questionnaire sought to elicit responses by offering a five-point Likert scale for each item: 1 (Strongly Disagree); 2 (Disagree); 3 (Neutral); 4 (Agree); and 5 (Strongly Agree) to measure the various eLearning technology acceptance variables. The variables that were measured in the survey covered *social factors* (including language, background qualifications and skills, and facilitating conditions); *cultural factors* (including individualism/collectivism, uncertainty avoidance, and power distance); *political factors* (including use of social networks and social media); and *Technology Acceptance Model constructs* (including perceived usefulness and perceived ease of use). The Phase Three student questionnaire is included in Appendix Sixteen (pp 378–381).

The questionnaire was divided into two sections. The first section had questions that provided a list of responses for the students to tick. These questions represented the demographic data (covering gender, age, cultural background, language, and experience with the internet). The second section measured social factors (the variables of language, qualifications, skills, and facilitating conditions—Questions 1, 11, 2, 12, 3 and 13). Section Three dealt with cultural factors that measured the variables of individualism/collectivism, uncertainty avoidance, and power distance in Questions 4, 14, 5, 15, 6 and 16 respectively. Section Four evaluated political factors, measured by the variables of use of social networks and social media, in Questions 7, 17, 8 and 18 respectively. Finally, Section Five measured Technology Acceptance Model constructs, identified by the variables of perceived usefulness and perceived ease of use, in Questions 9, 19, 10 and 20 respectively.

5.8.4 Results of the Questionnaire Survey

The aim of the survey was to measure student acceptance of eLearning in terms of cultural values and to identify the extent of new technology acceptance in the two different cultures.

5.8.4.1 Results from Survey on Omani Students

The survey results for Oman were gained from the questionnaire administered in the academic year 2010/2011, obtained from 40 student respondents from different schools. The total response-rate of students surveyed was 100 per cent, with therefore the full complement of male and female student respondents. The results from the questionnaires that were distributed in Oman indicated that the average responses ranged between 4.3–2.8 of 5 as shown in Table 5.6.

Table 5.6: Phase Three Questionnaire: Summary Item Means of Omani students

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.677	2.875	4.300	1.425	1.496	.159	20

The results from the students' responses indicated a high acceptance of eLearning technology, as shown by an item mean of 3.67, which is derived from all the items in the questionnaire that ranged between the responses 1 (for Strongly Disagree) and 5 (for Strongly Agree). The high acceptance of the eLearning technology is also indicated by the high response to items as indicated by a maximum of 4.300 with a narrow range of 1.425 from the minimum of 2.875. Items numbers 13, 2, 7, 12, 20, 10, 3, 14, 19 and 6 had high average response in terms of rankings within the first ten items. Items number 13 and 2 in first and second place respectively reflected the Omani students' responses regarding the availability of computers for eLearning and the basic skills in using technology need to support students in using and searching the learning websites. Items numbers 7 and 12 in joint third place illustrated that the social networks help to exchange political and other ideas, and also that the opportunities to study in the field of information technology (IT) will provide multiple skills for the use of learning websites.

Items numbers 20 and 10 in fourth and fifth place respectively confirmed the ease of finding information from eLearning websites. Items number 3 and 4 in joint sixth place confirmed the importance of conducting regular maintenance on computers in the eLearning context and respondents agreed with the item that referred to "Using eLearning rather than traditional instruction creates an isolation atmosphere between me and my friends". Item number 19 in seventh place showed that the student sample preferred the eLearning websites that provided them with useful learning materials. Item number 6 in the eighth place reflected the respondents' desire to share new experiences from eLearning websites with their friends. The mean values of the survey items indicate that the students found the eLearning environment useful in providing them with ample news, information and learning materials. However, the percentages of the four main Technology Acceptance factors according to the Omani students (as shown in Table 5.7 below) by the variance of percentages indicated that TAM constructs had the highest percentage (26%) followed jointly by social factors and political factors (both on 25%), whilst cultural factors came last (at 24%).

Table 5.7: Omani students' percentages of social/cultural factors

Factors	Means	Percentages
Social	3.7	25%
Cultural	3.5	24%
Political	3.6	25%
TAM constructs	3.8	26%

Details of the Technology Acceptance Factors means are shown in Table 5.8.

Table 5.8: The means of social/cultural factors from Omani students' responses

Factors	Means	Mean of Means
Social		
▶ Language	3.1	3.7
▶ Qualification/ Skills	4.1	
▶ Facilitating conditions	4.0	
Cultural		
▶ Individualism/Collectivism	3.7	3.5
▶ Uncertainty Avoidance	3.4	
▶ Power Distance	3.5	
Political		
▶ Social Networks	3.9	3.6
▶ Social Media	3.3	
TAM construct-factors		
▶ Perceived Usefulness	3.7	3.8
▶ Perceived Ease of Use	3.9	

5.8.4.2 Results of Survey of Students in the UK

The results indicated here are taken from the survey that was conducted on students at Shorefields Technology College, Liverpool. The sample population was 40 students (22 male and 18 female) who responded to the questionnaire in the academic year 2011/2012. The total response-rate of students surveyed was thus 100 per cent—with males at 55% and females at 45% of sample. The analysis of the questionnaire results show that the average response ranged between 4.0–4.5 of 5 as shown in Table 5.9.

Table 5.9: Summary Item Means of UK students

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.345	4.025	4.550	.525	1.130	.030	20

The results indicate that the UK students had a high acceptance of eLearning technology given that the response to the survey items had a mean of 4.550, with a very narrow range of 0.525 from the lowest mean of 4.025, which is derived from all the items in the questionnaire that ranged between the responses 1 (Strongly Disagree) and 5 (Strongly Agree). Items numbers 2, 20, 12, 7, 19, 1, 3, 10, 15 and 13 had high average response in terms of students' rankings within the first ten items. Items numbers 2 and 20 in joint first place confirmed that it was agreed that students should acquire basic skills in using technology to support them in searching and finding information from eLearning websites. Item number 12 in the second place again identified the studying of information technology (IT) as positively helping to provide students with multiple skills for eLearning. Items numbers 7 and 19 in joint third place highlighted the role of social networks to exchange political/other information and the students' preference for eLearning websites that positively provided useful learning materials.

Items numbers 1, 3, 10 and 15 in joint fourth place confirmed the students' opinion that having sufficient skills in the use of other languages was valuable/necessary for accessing a wider range of eLearning websites, as well as their belief in the importance of regular maintenance of computers. In addition, items 10 and 15 reflected the respondents' view regarding ease of use of eLearning websites and their ready willingness to surf unknown and unpopular learning websites. Item number 13 came in fifth place, regarding issues surrounding the availability of computers in the learning environment as helpful/necessary for expected use of eLearning websites. The percentages for UK student responses regarding the four main technology acceptance factors (Table 5.10) exhibited variance from joint 26% for *social and TAM construct* factors, to 25% for *political* factors, to 23% for *cultural* factors.

Table 5.10: UK students' percentage responses for social/cultural factors

Factors	Means	Percentages
Social	4.3	26%
Cultural	3.8	23%
Political	4.1	25%
TAM constructs	4.3	26%

Details for the Technology Acceptance factor means are included in Table 5.11 below.

Table 5.11: The means of social/cultural factors from UK students' responses

Factors	Means	Mean of Means
Social		
▶ Language	4.2	4.3
▶ Qualification/ Skills	4.5	
▶ Facilitating conditions	4.4	
Cultural		
▶ Individualism/Collectivism	3.2	3.8
▶ Uncertainty Avoidance	4.2	
▶ Power Distance	4.2	
Political		
▶ Social Networks	4.3	4.1
▶ Social Media	4.0	
TAM construct-factors		
▶ Perceived Usefulness	4.3	4.3
▶ Perceived Ease of Use	4.4	

5.9 Summary of the Chapter

The results of the fieldwork indicate that information technologies are important tools for providing effective, interactive and easily-assimilated means through which content can be communicated to learners. The experiments and other fieldwork provide evidence that learning content can easily be disseminated through the use of a rich repository of web-based learning materials capable of supporting the required learning outcomes. Moreover, the research work has proved that an eLearning environment based on web-based materials allows great scope for learners to interact easily with facilities, even after the learners have received only a little training. These factors allow students to save time and effort in searching for materials. The improvements in learning performance in the ELF were indicated by the pre-test and post-test results. These showed that prior to both experiments, the TGs did not show significant differences in performance achievement levels. However, following the use of the eLearning system, significant differences were displayed in the performance levels of the TGs in the post-tests. The results of the post-tests indicate an improvement in performance by the EG, as indicated by the test averages. Moreover, the experimental results indicate that there is a positive correlation between the use of technology and the maintenance of an active learning environment. The informal interview conducted with EG participants after the CExp indicated that use of the ELF improved learners' interaction and learning styles. It is to be noted that the ELF had been based on modern learning theory and the practice of self-learning and interaction. The survey results indicated the existence of differences between students in the UK and Oman in the patterns of acceptance of technology and that several factors affect the acceptance of technology. The survey results indicated that the TAM did indeed flag up the influence of learners' cultural factors in relation to their acceptance of technology. The survey showed that an eLearning system based on factors identified by a TAM does better in negotiating influences such as social, cultural and political circumstances, and that the users of such a system report more favourably regarding their experiences in respect of Perceived Usefulness and Perceived Ease of Use.

CHAPTER SIX: TEACHER SURVEYS

6.1 Introduction

Students might be considered as the ultimate end-users of eLearning, and it is essential to take their attitudes and reactions into account for designing effective eLearning. However, teachers are also important end-users of eLearning, as they play a role in the formulation of the eLearning course that can influence its effectiveness for good or ill. Therefore, a proper survey of their attitudes and reactions is also essential for studies such as the present one. As in the case of students, so also in the case of teachers permission was sought from the Ministry of Education to conduct the fieldwork for this research. The Ministry drafted a letter confirming acceptance of the research and experiments, requesting schools and *ER*s to assist in the fieldwork and the field survey of teachers.

6.2 Oman Teacher Sample: Background and characteristics

There were 28,748 Omani *Basic Education* teachers registered with the Ministry of Education for the academic year 2010/2011 (MOE 2010/2011). The sample for this research was chosen randomly from representative schools in the three *ER*s that were targeted (Muscat, Al-Batinah South, Al-Batinah North), with 70 from each region making a total of 210 teachers. Moreover, for the PExp and the CExp, the Researcher made sure that in each case the teachers who taught the students had the same levels of competence and experience. In each case they were the senior teachers in their field in their school. This selection procedure was undertaken by applying the specific standards of competence and experience as set by the Ministry of Education in Oman.

The Researcher met many teachers involved in the Phase One Survey. She also met all the teachers of the student-groups selected for the PExp and for the CExp, to whom she explained the aims of the research. She also met many teachers during the Phase Three Survey. All the teachers she met indicated their willingness to cooperate, and they were proactive in providing observations that related to the positive as well as the negative points of the experiments and the overall aims.

6.3 Phase One Teacher Questionnaire Survey

Through the general screening process three *ER*s in Oman (Muscat, Al-Batinah South and Al-Batinah North) had already been identified as most compatible for the purposes of the fieldwork. They had been selected from among the seven *ER*s owing to their having the highest concentrations of *BE* schools and of students with necessary experience of ICT. A sample-size of 70 teachers was then identified for teacher respondents in each region to cover the largest number possible that was practicable in the circumstances, as well as to optimize the credibility of the answers.

The teacher questionnaire (see Table 6.2 on the next page) contained 14 items designed based on a five-point Likert scale while the final question (number 15) was an open question which ran: 'Imagine that you are preparing an educational programme aimed at increasing the capacity and effectivity of the teaching and learning environment in terms of improving the efficacy of the Social Studies course for learners'. What in your view are the features that you would wish to include in this programme to achieve the greatest improvements on what has already been mentioned in this questionnaire?' Average responses ranged between 4.6–3.7 of 5 (Table 6.1).

Table 6.1: Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.276	3.700	4.600	.900	1.243	.082	14

The Researcher distributed the questionnaires to the recipients in the *ER*s, then collected and analyzed the data. Since the research aim was to enhance a prototype ELF using the results of this questionnaire survey the information gained in this phase allowed the Researcher to refine the requirements and design of the experimental ELF for the CExp, making it possible to produce information for clarifying procedures for participants during Phase Two.

As in the case of the students, the Technology Acceptance Model (TAM) was applied to assess teachers' attitudes towards the use of eLearning environments and their intentions regarding adopting the new technology. In the case of teachers, "intentions" might not indicate that they have the option to reject the use of eLearning, but whether they engage with it *willingly*, which would have substantial repercussions on the existence or otherwise of proactive commitment and enthusiasm in their approach to eLearning. Questionnaires were distributed to the teachers in the target educational regions in Oman and to those at Shorefields Technology College in Liverpool, UK. The Researcher distributed the questionnaires, collected them and then analyzed the data, again using a mixed approach (quantitative and qualitative).

Table 6.2: Phase One Teacher Questionnaire Items

	Items in Phase One Teacher Questionnaire [for five-point Likert-scale reply]
1	Technology plays an effective and influential role in delivering the Social Studies curriculum in the virtual learning environment
2	I will be able to guide the learner in setting objectives at the beginning of each lesson (*e.g.* .identifying goals, drawing, explaining and interpreting, *etc.*)
3	The definition of new terms and concepts by means of hyper-link will direct students to hyper-multi-media programmes to provide a full explanation
4	The presentation of geographical forms and phenomena by three-dimensional display and through other software does ***not*** lead to a deeper understanding of their different aspects and properties
5	The use of graphic and statistical tables and diagrams through various displays (*e.g.* charts) that can be transformed into different explanatory forms is helpful in analyzing, interpreting and comparing them
6	The provision of screen-pages for discussion and exchange of views and ideas between teacher and learner regarding problems encountered in the Social Studies course does ***not*** actively lead to any support or enrichment of the virtual learning environment
7	The provision of classroom activities in the electronic package simulating real-life leads to a continuance of the learning-process and enhances learners' skills-acquisition
8	Computer-based simulations, educational games, virtual role-playing and field-trips are all methods that increase the effectiveness of learning
9	Computer-based simulations, educational games, virtual role-playing and field-trips are all methods that are ***not*** helpful in enhancing learner performance
10	Self-assessment contributes to the continual improvement and raising of performance
11	I do ***not*** think that the electronic portfolio is an important and effective tool for maintaining the progress and summative assessment of learners
12	It is desirable that final assessment of learner achievement should be made in different sorts of questions (multiple-choice, open-ended)
13	Immediate feedback plays a the main role to motivate and incentivize learners to achieve highest level of competence and performance
14	I do ***not*** think that a virtual learning environment can act ***as a substitute*** for the teacher in the classroom but complements the teacher's role in terms of preparation, organization and supervision
15	**Open ended question–** 'Imagine that you are preparing an educational programme aimed at increasing the capacity and effectivity of the teaching and learning environment in terms of improving the efficacy of the Social Studies course for learners'. What in your view are the features that you would wish to include in this programme to achieve the greatest improvements on what has already been mentioned in this questionnaire?'

6.4 Importance of teachers in the eLearning/web-based learning context

The introduction of new technologies has been a major driver for change in the processes of teaching and learning in the classroom since at least the end of the 1950s, if not earlier. With the advent of the computer, the pace and scope of innovation have begun to increase dramatically on a continuous basis. Information and communications technology (ICT) has to a great extent overcome the constraints imposed by physical space and real time on the education process. Teachers and learners are able to engage with each other within the immediate classroom setting, but through the medium of ICT they can also interact at a distance of place and time. Their options for time-management have become much more flexible. Consequently, it is now more appropriate to talk of the "learning environment" rather than using terms such as "classroom" to refer to the setting for the process of education. The use of ICT also empowers teachers and learners interact with each other more effectively, through the powerful tools that are being developed for imparting knowledge, using information and giving feedback.

The ways of teaching and learning are being transformed wherever ICT is introduced, and there is a constant stream of new studies that seek to incorporate the latest technological innovations into education, specifically in the three key components that make up the educational process: teaching, learning and assessment. These circumstances have serious repercussions for the teacher, requiring positive willingness to make yet further commitments in terms of adaptability, preparation, on-going professional development and other time-demands. The input of the teacher is an essential component in the education process—whether it be of the traditional 'teaching' sort or the modern 'learning' process—and it can be described as the set of real-time and proactive activities organized into a programme of action by the teacher with the purpose of transferring knowledge and/or skills to the learner. But the whole process of knowledge/skills-transfer depends on the quality and quantity of the interaction between several components and elements including teachers, students, the curriculum and other elements (such as physical conditions, availability of resources, *et cetera*) that exist in the classroom or other learning environment. The aim of teaching/training is to provide learners not only with the knowledge/skills that they need but also to improve the ability of learners to learn (Strauss *et al.* 2002). It is not surprising, then, that the teaching process (a universal phenomenon of civilization) has gone through multiple forms and has used many different tools that have been developed in response to current local needs and using whatever contemporary technological knowledge and new discoveries are locally available.

This is the challenge now facing teachers in Oman. The government has long identified human resources as the country's major resource base, and over ten years ago decided to reconfigure its education system, which at that time had been in existence for barely thirty years. The development in the government's strategy has been to shift away from competing at the regional level (Gulf & Middle East) to taking part in the world economy and competing at the global level. In accordance with the *Oman 2020 Vision* strategy, the government has launched the *Digital Oman* organization whose strapline 'Connected to the Community, Wired to the World' indicates the government's goals for developing future generations of Omanis who will be able to fully participate and compete in a knowledge-based economy both nationally and globally (Alrahbi 2011). Hence the importance of instituting the "Geography World" ELF, as part of the overall movement towards helping Omanis gain a global worldview, to promote the acquisition of digital technology skills, and to form the habit of knowledge seeking. These goals necessarily change the manner in which a teacher presents curriculum and instruction, especially in maintaining the interest of the learner.

6.5 Phase Three Survey of Teachers: Oman, UAE and UK

In Section 6.1 above it has already been stated that teachers may not have much scope for choosing whether to accept or reject the new technology that is being introduced into educational services throughout the world. In these circumstances the TAM takes on greater importance in assessing teachers' attitudes and intentions regarding how they react to adopting the new technology (Demetriadis *et al.* 2003). Regarding the questionnaires designed to gather data for measuring teachers' acceptance of eLearning, both quantitative and qualitative approaches have been adopted, to give a balance between purely quantitative data and more particularly qualitative data that can be integrated into a quantitative matrix (Connolly 2007).

Specifically to highlight variations in the TAM values, the questionnaires were aimed at measuring teacher acceptance by comparing culturally influenced values of teachers from three countries, two of which were Gulf Arab countries (Oman, UAE) representing present-day developing countries of similar cultural background that nevertheless have had different trajectories of modern development, whilst the UK represented the culture of long-developed western countries. The questionnaire consisted of 30 items and to measure five main factors contained the TAM designed for this research (demographic, social, cultural, political and TAM constructs). Furthermore, all items measure responses on a five-point Likert scale, where respondents indicated their reactions to a given statement, ranging from 'Strongly Disagree' (1) to 'Strongly Agree' (5). The measurement items used in this research are shown in Appendix Fifteen (pp 373–377).

6.5.1 Teacher Survey Samples in the three countries: Compatibility issues

This survey sought to investigate teachers from Oman, UAE and UK to evaluate the effect of various factors on their acceptance of technology in an eLearning environment. The two Gulf Arab countries represent variations within the Gulf Arab cultural spectrum, whilst the UK represents the western cultural bloc. The three countries selected for this survey, then, have diverse cultures—and this holds true even for the two Gulf Arab countries that share a common border (Barakat 1993; Khalaf 1998; Alsharekh & Springborg 2008). This survey investigates whether and to what extent social and cultural differences can affect the acceptance of eLearning. It is evident from studies that educational practices—both teaching and learning processes—are tied to culture and tradition (Chang & Chin 1999; Bodycott & Walker 2000; Tweed & Lehman 2002; Zhu *et al.* 2008). Therefore, the creation of a virtual learning environment must take into consideration the socio-cultural factors since they may present barriers. Furthermore, it is to be remembered that eLearning is very much a product of western contemporary culture, different from the Islamic culture of Gulf Arabs, which might produce tensions owing to perceptions of western cultural hegemony in the globalization process (Gannon 2004). This research also takes into consideration Hoftstede's (1991) dimension of 'uncertainty avoidance'—the aversion to the unknown in Arab culture. Relevant schools in Oman, UAE and UK were selected for this purpose whilst, considering the importance of choosing a suitable sample-size, the target group was set at 40 participants in each country in order to optimize data analysis and statistical analysis.

6.5.2 Familiarization process for teacher survey sample

The questionnaire contained 30 items. In order that these items might be answered effectively, the Researcher chose different schools in the three target *ERs* in Oman. In order to make sure the teachers were fully aware and familiar with what was required of them in the survey, the Researcher explained the implications of the items to them. The Researcher oversaw the distribution of the questionnaires, then collected them, to reduce the margin of error in sampling. This process was also used in the UK, as permission was sought from the administration to explain the background to the questionnaire items to the teachers at Shorefields Technology College, Liverpool. However, in the case of teachers in the UAE, the Researcher found it difficult to travel to that country, but managed to coordinate matters with the relevant officials in the chosen schools so that full clarifications were available to the respondent teachers there.

6.5.3 Administration of the survey

The ethical issues raised by the questionnaire were addressed by ensuring that the data were used for only the purpose of this research, and that participant details were kept secret. A guarantee of anonymity was given to all respondents in the following sentence before the first part of the questionnaire: "All provided answers will be treated confidentially and will be used only for the purpose of this investigation. The identity of respondents will be kept anonymous". The questionnaire consisted of 30 items with a further five profile questions for the teachers to complete. The questionnaire had the respondents answer the 30 main items by giving a response on a five point Likert scale in the form of 1 ('Strongly Disagree'); 2 ('Disagree'); 3 ('Neutral'); 4 ('Agree'); and 5 ('Strongly Agree') to measure the eLearning technology acceptance variables. The variables that were measured in the survey were first demographic background, and secondly social factors (language, background qualifications and skills, and facilitating conditions). Cultural factors were the third variable (including individualism/collectivism, uncertainty avoidance, and power distance). The fourth variable was political factors (use of social networks and social media). The fifth variable consisted of the Technology Acceptance Model constructs which include perceived usefulness ad perceived ease of use.

The questionnaire was divided into two sections. The first section had questions that provided a list of responses for the teachers to tick. These questions represented the demographic data (gender, age, cultural background, language, and experience with internet). The main section covered the 30 questionnaire items. Social factors were measured by the variables of language, background qualification and skills, and facilitating conditions—represented by Questions 19, 25 and 17 for language, Questions 26, 10 for Qualification/Skills, and Questions 9, 27, 16 and 23 for facilitating conditions. Cultural factors were measured by the variables individualism/collectivism, uncertainty avoidance, and power distance in Questions 8, 30 and 21 for individualism/collectivism, Questions 7 and 14 respectively for uncertainty avoidance, and Questions 11 and 6 for power distance. Political factors were measured by the variables of use of social networks and use of social media, as seen in Questions 22, 15, and 2 for social networks and Questions 29, 13 and 4 for social media. The Technology Acceptance Model constructs were identified by the variables perceived usefulness and perceived ease of use, as seen in Questions 28, 18 and 3 for perceived usefulness and Questions 1,5,12 and 20 for perceived ease of use.

6.5.4 Results of the Phase Three Questionnaire Survey

These were designed to measure the teachers' acceptance of eLearning in terms of cultural values and to identify the extent of the acceptance of new technology among teachers from different cultures.

6.5.4.1 Results from Survey of Omani teachers

The survey results for teachers in Oman showed a 100% response rate from the total of 100 teachers surveyed and responding—50% being male and 50% being female. The results from the questionnaires indicated that the average responses ranged between 4.5–2.4 of 5 as shown in Table 6.3.

Table 6.3: Summary Item means of Omani teachers

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.845	2.400	4.550	2.150	1.896	.405	30

The results from the teachers' responses indicated a high acceptance of eLearning technology, as demonstrated by the items mean of 3.84, which is derived from all the items in the questionnaire that ranged between the responses 1 for 'Strongly Disagree' and 5 for 'Strongly Agree'. The high acceptance of eLearning technology is also indicated by the high response to the items, as indicated by a maximum of 4.550 with a narrow range of 2.150 from the minimum of 2.400.

The fifteen items numbers 23, 6, 10, 16, 3, 24, 27, 26, 1, 5, 28, 18, 11, 21 and 20 had the highest average counts in terms of teachers' responses. In *first* place, item number 23 illustrated the importance of providing technicians to solve computer problems. In joint *second* place came items numbers 6, 10 and 16 reflecting the sample's concern about new and established experience in the field of education: "Using eLearning *should be* limited to certain groups such as managers, highly qualified individuals" and "I think that teachers who are professional in using technology are able to apply eLearning easily". Item 16 indicated sample's perceptions regarding "Availability of computers in learning environment helps me to use eLearning websites". Items numbers 3 and 24 in joint *third* place indicated teacher requirements in "I prefer eLearning websites that provide me with useful learning materials" and 'Attending eLearning workshops will provide me with multiple skills to use on eLearning websites'. Item 27 in the *fourth* place reflects concern about the continuous monitoring of computer devices through regular maintenance. Item 26 in the *fifth* place confirmed that "I think if I have basic skills in using technology that these will support me to achieve success in supporting the learning process".

Items 1, 5, 28 and 8 in *sixth, seventh* and *eighth* places respectively express the views regarding using eLearning websites for their beneficial learning outcomes: "I develop my search skills by using eLearning websites", "Using eLearning websites helps me to save time and effort". Items numbers 11 and 21 in joint *ninth* place indicated the sample's view on participation and cooperation: "I prefer to share my experiences with students and colleagues when I learn new topics from eLearning websites" and "If I face a problem while I am learning new topics from eLearning websites, I will ask friends or technicians". Item number 20 in *tenth* place illustrated "I think it is easy to find information from eLearning websites". The mean values of the survey items indicate that the Omani teachers found eLearning environments useful, providing them with ample news, information and learning materials. The percentages shown for the four main Technology Acceptance factors as exhibited by the Omani teachers (Table 6.4) indicated that the TAM construct had the highest percentage at 28%, followed by cultural factors in with 26%. Social factors stood at 25%, while political factors had 21%.

Table 6.4: Omani teachers' percentages for social/cultural factors

Factors	Means	Percentages
Social	3.7	25%
Cultural	3.9	26%
Political	3.2	21%
TAM construct	4.1	28%

The details for the Technology Acceptance factors means are given in Table 6.5.

Table 6.5: The means of social/cultural factors from Omani teachers' responses

Factors	Means	Mean of Means
Social		
▶ Language	2.6	3.7
▶ Qualification/ Skills	4.3	
▶ Facilitating conditions	4.3	
Cultural		
▶ Individualism/Collectivism	3.7	3.9
▶ Uncertainty Avoidance	3.8	
▶ Power Distance	4.2	
Political		
▶ Social Networks	3.3	3.2
▶ Social Media	3.2	
TAM construct-factors		
▶ Perceived Usefulness	4.2	4.1
▶ Perceived Ease of Use	4.0	

6.5.4.2 Results from Survey of UAE teachers

The survey results for teachers in the UAE came from the questionnaire administered in the academic year 2010/2011, and were obtained from 35 teacher respondents from different educational institutions (ABC School, Al Manhal School, New Horizon School, and Al Khwarizmi International College). Five questionnaires were received blank. The total response-rate of teachers surveyed was 100%, with 43% being male and 57% being female. However, the response-rate from the UAE was only 87.5% since five questionnaires were blank. The results from the completed questionnaires indicated that the average responses ranged between 4.6–2.2 of 5 as shown in Table 6.6.

Table 6.6: Summary Item means of UAE teachers

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.032	2.257	4.600	2.343	2.038	.265	30

The results from the teachers' responses indicated a high acceptance of eLearning technology, indicated by the item mean of 4.03, derived from all the items in the questionnaire that ranged between the responses 1 for 'Strongly Disagree' and 5 for 'Strongly Agree'. The high acceptance the eLearning technology is also indicated by the level of response to items as indicated by a maximum of 4.600 with a narrow range of 2.343 from the minimum of 2.257.

Items numbers 1, 10, 13, 17, 5, 27, 9, 30, 11, 12, 2, 21, 22, 16 and 14 had the highest average response rates. In *first* place item number 1 illustrates the acceptance by the sample of using eLearning websites for their learning. Item number 10 in *second* place indicated "I think the teachers who are professional in using technology are able to apply themselves to eLearning easily". Items numbers 13 and 17 in joint *third* place reflected the sample's lack of interest in "I do not like to read political news and events through electronic newspapers", but their approval to "I think it is easy to explain and interpret learning materials that are downloaded from eLearning websites in other languages". Items numbers 5 and 27 came in joint *fourth* place, with the sample believing in the importance of regular maintenance for eLearning computers and their encouragement to their colleagues and friends to surf eLearning websites.

Items numbers 9 and 30 had joint *fifth* place as they supported ideas "I think administrative support contributes to increasing the effectiveness of using computers" and "I prefer to ask my colleagues or friends if I face a problem when browsing eLearning websites". Items numbers 11 and 12 in joint *sixth* place reflect the sample's orientation to "I believe that the eLearning websites are easy to use" and "I prefer to share my experience with students and colleagues when learning new topics from eLearning websites". Items numbers 2, 21 and 22 had joint *seventh* place and confirmed the sample's interest in using technology for political issues (although this was not so important for them as it came fairly close to the last place), and also confirmed that "If I face a problem while I am learning new topics from eLearning websites, I will ask friends or technicians". Item number 16 had *eighth* place in terms of the sample's recognition of the need to provide computers in the learning environment as this will help them to use eLearning websites easily. Item number 14 in *ninth* place indicated that the sample's desire to surf unknown and unpopular learning websites was not very strong.

The mean values of the survey items indicate that the UAE teachers found eLearning environments useful in providing them with ample news, information and learning materials. The percentages of the four main Technology Acceptance factors by UAE teachers as shown in Table 6.7 showed TAM construct and social factors as having the highest percentages (26% each), followed by cultural and political factors in joint second place, with 24% equally.

Table 6.7: The UAE teachers' percentage of social/cultural factors

Factors	Means	Percentages
Social	4.0	26%
Cultural	3.8	24%
Political	3.7	24%
TAM constructs	4.1	26%

Details of the Technology Acceptance factors means are included in Table 6.8.

Table 6.8: The means of social/cultural factors by UAE teachers' responses

Factors	Means	Mean of Means
Social		
▸ Language	3.7	4.0
▸ Qualification/ Skills	4.1	
▸ Facilitating conditions	4.2	
Cultural		
▸ Individualism/Collectivism	3.8	3.8
▸ Uncertainty Avoidance	3.8	
▸ Power Distance	4.0	
Political		
▸ Social Networks	3.4	3.7
▸ Social Media	4.1	
TAM construct-factors		
▸ Perceived Usefulness	4.0	4.1
▸ Perceived Ease of Use	4.2	

6.5.4.3 Results from Survey of UK teachers

The survey results for UK teachers came from the questionnaire administered in the academic year 2010/2011, obtained from 35 teacher respondents at Shorefields Technology College, Liverpool, while again five questionnaires were returned blank. The response-rate of teachers surveyed was 43% male and 57% female, a cumulative response-rate of 87.5% from the UK teachers, as 5 questionnaires were left unfilled. The results from the questionnaires that were distributed in UK indicated that the average responses ranged between 4.2–3.7 of 5 as shown in Table 6.9.

Table 6.9: Item means of UK teachers

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.211	3.371	4.571	1.200	1.356	.112	30

The results from the UK teachers' responses indicated a high acceptance of eLearning technology as indicated by the item mean of 4.21, derived from all the items in the questionnaire that ranged between the responses 1 for 'Strongly Disagree' and 5 for 'Strongly Agree'.

The high acceptance of eLearning technology is also indicated by the high response to items as indicated by a maximum of 4.571 with a narrow range of 1.200 from the minimum of 3.371. Items numbers 10, 16, 3, 11, 14, 24, 9, 1, 18, 20, 23, 26, 27, 17 and 2 had the highest average response rate in the first 15 items. Item number 10 in *first* place confirmed "I think the teachers who are professional in using technology are able to apply eLearning easily". Item number 16 in *second* place illustrated the sample's views "Availability of computers in the learning environment helps me to use eLearning websites". Items numbers 3, 11, 4 and 24 came in joint *third* place, and indicated the sample's desire to use the eLearning websites that provided useful learning materials, to share with colleagues and students their experiences when learning from eLearning websites, and to surf unknown and unpopular learning websites (which meant they challenged themselves to use any websites, and were prepared to do so without any fear or concern of the unknown). Item number 9 was in *fourth* place, reflecting the sample's view of the importance of administrative support for increasing the effectiveness of using computers. Items numbers 1 and 18 in joint *fifth* place confirmed the sample's view of the need to use eLearning websites to save time and effort. Items number 20, 23 and 26 in joint *sixth* place illustrated their view of the importance of technicians being provided to solve computer problems and that "I think that having basic skills in using technology will support me to achieve successful learning process". Item number 27 in *seventh* place showed the sample as agreeing to the importance of regular maintenance of computers. Item number 17 in *eighth* place reflected the sample's ease of using the eLearning websites in other languages. Item number 2 in *ninth* place agreed "Social networks provide and update me on the latest news of political issues".

The mean values of the survey items indicate that the UK teachers found eLearning environments useful in providing them with ample news, information and learning materials. The percentages for the four main Technology Acceptance factors by the UK teachers (Table 6.10) showed the variance of percentages with TAM construct and social factors have joint highest percentages (26% each) with cultural and political factors in second place with 24% each.

Table 6.10: The UK teachers' percentages for social/cultural factors

Factors	Means	Percentages
Social	4.2	26%
Cultural	3.8	24%
Political	3.9	24%
TAM constructs	4.2	26%

Details of the Technology Acceptance factors means are included in Table 6.11.

Table 6.11: The means of social/cultural factors by UK teachers' responses

Factors	Means	Mean of Means
Social		
▸ Language	3.9	4.2
▸ Qualification/ Skills	4.4	
▸ Facilitating conditions	4.3	
Cultural		
▸ Individualism/Collectivism	3.5	3.8
▸ Uncertainty Avoidance	4.0	
▸ Power Distance	4.1	
Political		
▸ Social Networks	4.1	3.9
▸ Social Media	3.7	
TAM construct-factors		
▸ Perceived Usefulness	4.3	4.2
▸ Perceived Ease of Use	4.2	

6.6 Summary of the Chapter

The results of the experiments and Phase Three survey have underlined how technological applications have played a fundamental role in recent and on-going modernizations in the field of education. This study is an attempt to investigate the potential of current technological resources for supporting the teaching of geography in schools in the Sultanate of Oman, with specific reference to the use of Information and Communication Technology (ICT). In view of the results of the experiments, the study has highlighted ICT as being an effective, interactive and easily-assimilated means by which teachers can communicate concepts easily and smoothly by using a repertory of web-based learning materials that are able to support the required learning outcomes. On the other hand, the flexibility of using the web allows students to interact with its facilities easily and with little prior training, which results in savings of time and effort for both learners and teachers. In addition, the survey conducted to test the acceptance of technology amongst teachers in Oman, the UAE and the UK indicate that several factors affect the acceptance of technology. The survey results indicate that the teacher responses to the TAM-based questionnaire were influenced by cultural factors in relation to their acceptance of technology. The survey results indicate that there are noticeable differences between teachers from Oman, UAE and the UK in the acceptance of technology in learning, and these can be traced to cultural factors.

CHAPTER SEVEN: RESEARCH FINDINGS

7.1 Introduction

This chapter presents a discussion of the significance of the data and information gathered during the various phases of the fieldwork (the exploratory Phase One questionnaire survey, the PExp, the CExp, the Phase Three questionnaire survey on technology acceptance attitudes), and examines issues surrounding the findings from the field. For all parts of the fieldwork relating to learners, the target student populations and samples were drawn from students who had entered into the tenth grade of the *Basic Education* (*BE*) programme in September 2010. It should be noted that the target population was restricted to those students who had received their education *solely* according to the *BE* programme. As the *BE* programme began in academic year 1998/1999, the first students to complete their education under this programme did so at the end of the academic year 2007/2008. Hence, the students targeted for this study were the fourth generation of *BE* tenth-grade students. In the light of practical educational issues and teaching experience, the *BE* system is still being modified and adapted to take account of problems raised and new needs identified. Therefore these students and their predecessors can be considered as pioneer learner-users of the *BE* system. Their teachers cannot lay claim to having the same experience or even similar experience of this new system. Most of the native Omani teachers will have had schooling experience in the previous General Education system, only having been exposed to more modern educational approaches during their tertiary-level education and/or training to become teachers.

7.2 Learner Experiments Data & Results: Accuracy/statistical significance

7.2.1 Pilot Experiment: Control and Experimental Groups

For the PExp, two groups of tenth-grade *BE* students were chosen from the Al-Batinah South *ER*. A quasi-experimental design was adopted at this stage. In a quasi-experimental design a researcher rarely has the opportunity to choose and identify the sample/groups randomly (Shadish *et al.* 2002). This should be accepted as a naturally-occurring constraint with respect to the distribution of the sample/groups (Shadish 2002; Shadish *et al.* 2002). The distribution of the students targeted by this study had already been settled according to their previous school performance and the administrative decisions taken by those previous schools. Consequently, no intervention by the Researcher could possibly arrive at a *truly absolutely random* distribution of the research sample. It was actually impossible to gather such a randomly-distributed group as they had already been distributed by the school administrations according to the standards defined by the schools.

The target population for this study had already been selected purposively, because it had been restricted to second-cycle *BE* students completing their education who had been educated *solely* under the *BE* programme. However, from this purposively-selected population, it was possible to make a truly *random* selection. Specifically, a random selection of students was made by randomly selecting a tenth-grade form from each of two schools that themselves had been selected at random from the pool of eligible *BE* schools in the Al-Batinah South *ER*. The two schools were Al-Rustaq and Al-Nawar. The number in the EG was 30, while the CG contained 28 students and the classification of the balanced groups was conducted based on ninth-grade learning outcomes as shown in Tables 7.1 and 7.2.

Table 7.1: Phase One TGs' Previous Achievement—Mean & Standard Deviation

	TG	N	Mean	Std. Deviation	Std. Error Mean
Achievement levels	Experimental	30	3.0667	1.04826	0.19139
	Control	28	2.9286	0.89974	0.17003

The account of the arithmetical mean of the TGs to measure the level of achievement in the ninth grade showed no difference between the two groups. The average for the EG stood at 3.0667 while for the CG it was 2.9286.

Table 7.2: Phase One TGs' Previous Achievement—*t*-test at 0.05 level of significance

	Levene's test for equality of variances		*t*-test for Equality of Means						
								95% confidence interval of the differences	
Achievement levels	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	2.565	.115	.537	56	.594	.13810	.25737	−.37749	.65368
Equal variances not assumed			.539	55.625	.592	.13810	.25601	−.37483	.65102

The results showed was no statistically-significant difference between the Phase One TGs prior to the PExp. Additionally, it was confirmed that the teachers who taught the two groups had comparable levels of competence and experience, as they were senior teachers in the schools. This was determined by the application of specific standards of competence and experience as defined by the MOE in Oman. Additionally, student variables were regulated that might have affected the experiments—including age, social/economic level, and IT knowledge/experience. The results show the average age of students in the sample as 15 years. The average social/economic level was middle class, whilst background knowledge and experience of computer-use revealed that all students had studied IT from *BE* first to tenth grade.

7.2.2 Pilot Experiment: Pre-tests and Post-tests

In attempting to create an active and effective learning environment for the experiments, use was made of experimental and control groups in order to monitor the impact of the introduction of new teaching methods for supporting teachers in delivering curriculum contents and to enhance learning. CDs containing learning materials from two units for the first semester of the tenth-grade geography curriculum were used with the EG. Pre-tests and post-tests were conducted to evaluate the impact of the programme on the learning process and achievement levels of the learners. The results are shown in Tables 7.3 to 7.6.

Table 7.3: Phase One TGs Pre-Test—Mean & Standard Deviation

	TG	N	Mean	Std. Deviation	Std. Error Mean
Achievement levels	Experimental	30	1.8927	.8982	9.097E-02
	Control	28	1.8829	.8317	.1572

Table 7.4: Phase One TGs Pre-Test—*t*-test for samples at 0.05 level of significance

	Levene's test for equality of variances		*t*-test for Equality of Means						
								95% confidence interval of the differences	
Achievement levels	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	3.156	.081	.677	54	.501	.1786	.2636	–.3499	.7071
Equal variances not assumed			.677	52.519	.501	.1786	.2636	–.3503	.7074

The results of the *t*-test for the pre-test performance results for the Phase One TGs showed that there was no statistically-significant difference at 0.05 level of significance.

Table 7.5: Phase One TGs Post-Test—Mean & Standard Deviation

	TG	N	Mean	Std. Deviation	Std. Error Mean
Achievement levels	Experimental	30	2.6000	.4983	9.097E-02
	Control	28	1.8929	.8317	.1572

Table 7.6: Phase One TGs Post-Test—*t*-test for samples at 0.05 level of significance

	Levene's test for equality of variances		*t*-test for Equality of Means					95% confidence interval of the differences	
Achievement levels	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	7.674	.008	3.959	56	.000	.7071	.1786	.3493	1.0650
Equal variances not assumed			3.894	43.566	.000	.7071	.1816	.3410	1.0733

The results of the *t*-test for the Post-Test performance results for the two Phase One TGs showed a statistically-significant difference at 0.05 level of significance, and that trending was to the EG.

7.2.3 Core Experiment: Control and Experimental Groups

At this stage, the ELF called "Geography World" was presented for teaching, learning and assessment for the fifth unit (four topics) of the geography curriculum in the second semester. The Researcher used a semi-empirical method to divide the sample into two groups—control and experimental—owing to the difficulty of randomly separating and assigning students to the groups for the experiments, as their distribution had previously been determined by school administrations according to their pre-existing criteria. However, the sample was randomly selected from the population of the study, representing *BE* second-cycle students in the Al-Batinah South *ER*. From this *ER* Al-Nawar and Widam Schools were randomly selected, from which two classes were selected, one for the EG (from Al-Nawar School) and the other for the CG (from Widam School). There were 28 students in both the TGs, while it was confirmed that the teachers who were teaching the two groups had the same level of competence and experience. This choice conforms to the specific standards of competence and experience determined by the Ministry of Education. Additionally, student variables were regulated that might have affected the experiments—including age, social/economic level, and IT knowledge/experience. The results show that the average age of students in the sample was

15 years, the average of socio-economic level was middle class, and all sample students had studied IT from *BE* first to tenth grade. In this phase, pupils studied Unit Five of the geography curriculum over a period of two months (March and April 2011).

7.2.4 Core Experiment: Pre-tests and Post-tests

Pre-tests and post-tests were conducted for each group to measure the students' achievements. Pre-test results confirmed that there were no statistically-significant differences between the two groups prior to the CExp, whilst post-test results confirmed that the statistically-significant differences trended towards the EG as shown in Tables 7.7 to 7.10.

Table 7.7: Phase Two TGs Pre-Test—Mean & Standard Deviation

	TG	N	Mean	Std. Deviation	Std. Error Mean
Achievement levels	Experimental	28	2.0000	.6667	.1260
	Control	28	2.1071	.7373	.1393

Table 7.8: Phase Two TGs Pre-Test—*t*-test for samples at 0.05 level of significance

	Levene's test for equality of variances		*t*-test for Equality of Means						
								95% confidence interval of the differences	
Achievement levels	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	1.298	.260	-.570	54	.571	-.1071	.1879	-.4838	.2695
Equal variances not assumed			-.570	53.461	.571	-.1071	.1879	-.4839	.2696

The results of the *t*-test for the pre-test performance results for the Phase Two TGs showed that there was no statistically-significant difference at 0.05 level of significance.

Table 7.9: Phase Two TGs Post-Test—Mean & Standard Deviation

	TG	N	Mean	Std. Deviation	Std. Error Mean
Achievement levels	Experimental	28	2.8929	.31497	.05952
	Control	28	1.0714	.71640	.13539

Table 7.10: Phase Two TGs Post-Test—*t*-test for samples at 0.05 level of significance

	Levene's test for equality of variances		*t*-test for Equality of Means						
								95% confidence interval of the differences	
Achievement levels	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	11.410	.001	5.554	54	.000	.82143	.14789	.052492	1.11794
Equal variances not assumed			5.554	37.062	.000	.82143	.14789	.52178	1.12107

The results of the *t*-test for the Post-Test performance results for the Phase Two TGs showed a statistically-significant difference at 0.05 level of significance, and that trending was to the EG.

7.2.5 Pre-run and Post-run Attitude Scales

To determine the effectiveness of using the ELF, a survey of possible change in the attitudes of the Phase Two EG was made by means of a pre-run and a post-run 'mini-survey'. An attitude survey containing 15 items was prepared specifically for this EG to measure their trends towards eLearning based on a five-point Likert scale. The results in Tables 7.11 and 7.12 below show that there were significant differences between pre-run and post-run student responses. Averages increased in the post-run responses (mean of 4.412) as compared with the pre-run responses (mean of 3.533). The results show that there was a considerable increase in favourable attitude towards eLearning in the EG.

Table 7.11: Summary Item Statistics of Pre-run Students' Attitude Responses in Phase Two

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Std. Deviation	N of Items
Item Means	3.533	2.679	4.107	1.429	1.533	6.27163	15

Table 7.12: Summary Item Statistics of Post-run Students' Attitude Responses in Phase Two

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Std. Deviation	N of Items
Item Means	4.412	3.857	4.714	.857	1.222	4.43098	15

7.2.6 Interview: Open-ended questions

An informal interviews was conducted with a sub-sample of ten students from the EG (at Al-Nawar School) after they had completed their studies using the "Geography World" website, in order to evaluate various aspects of the CExp. The sample size of ten was chosen owing to difficulties (especially time constraints) in meeting all 28 members of the group. The Researcher asked three questions: (1) How they found the new style of learning and teaching in terms of the use of new methods and new technology; (2) What were the information, skills and abilities that they gained by using technology, as compared to the traditional way; (3) What were the obstacles they faced when they began to study using the ELF.

7.3 Learner Experiments: Performance and Assessment of Results

7.3.1 Pilot Experiment: Pre-tests and Post-tests

Prior to the PExp, an initial learning performance test (pre-test) was administered to the TGs. A master CD had been prepared containing seven geography topics designed as web-pages for ease of use by the students in the EG. The CG was to receive lessons in the traditional manner. The objectives of the programme were explained to the EG, and each EG student received a copy of the CD with the stated purpose of supporting them during their studies. In order to ensure that the survey sample understood the requirements of the experiment, the Researcher met the CG and EG at the beginning of the first semester to explain the desired goals of the research, and also to convince them of its importance and seriousness. A check was made to ascertain that all CDs were in working order. Steps were taken to see that all students' comments arising during the implementation of the programme would be communicated to the Researcher. After the completion of all units by both TGs, a follow-up (*i.e.* post-test) survey was conducted to measure the relative impact of the two different learning approaches on students' learning process and achievement. The results show statistically-significant differences between the two groups, trending towards the EG. The implementation of this phase proceeded through October and November 2010, and acted as an exploratory study. The PExp aimed at evaluating and identifying the efficiency of the programme, and addressing any difficulties or obstacles that might arise during the implementation of the CExp in Phase Two. The PExp programme's impact on students' achievements was measured through the performance results of the post-test. This phase afforded the opportunity for measuring the validity and reliability of the tools that were being used, this being achieved through the feedback and observations of students, teachers and other workers in the field of education, and by using the Cronbach alpha-coefficient.

7.3.2 Core Experiment: Pre-Tests and Post-Tests

Two *BE* schools were selected for the CExp: Al-Nawar School (EG) and Widam School (CG). Both schools contained three tenth-grade classes from which target students could be drawn. The equivalence between the two groups was verified by checking their grade-achievements at the end of the preceding semester. The EG underwent the eLearning procedure while the CG was taught by the traditional method. Prior to the CExp, an initial learning performance test was administered to the two groups, and at the end of the CExp a further learning performance test was administered to measure the effectiveness of the eLearning approach *versus* the traditional teaching approach as reflected in the learning achievements of the students. Analysis of the data by SPSS indicated that the pre-test showed no statistically-significant differences previously existing between the two groups in terms of learning performance, whilst the post-test proved that there was a statistically-significant difference in learning performance between the two groups, with trending toward the EG.

7.3.3 Pre-run and Post-run Attitude Scale

To measure the reactions of the EG at Al-Nawar School in terms of their experience of eLearning, a pre-run attitude scale was administered to this group and the mean for their responses was measured using the SPSS statistical programme, which gave a reading of 3.5, whilst the post-test attitude survey showed higher responses that gave a reading of 4.4, demonstrating trending toward a more favourable attitude to eLearning. The scale comprised 15 items. The item that had the highest mean was "Studying geography contents through eLearning provided me with more suspense and motivation compared with traditional learning" (with a reading of 4.7). The second highest mean was to the item "eLearning has eliminated the importance of traditional learning" (4.6), whilst the third highest was "eLearning has encouraged me to self-learning and provided me with immediate feedback" (4.5). The learning-environment engaged and motivated the students to use technological applications in the classroom.

7.3.4 Post-Core Experiment Interview: Open-ended questions

The importance of conducting the informal post-CExp interview of EG students was to measure their reactions towards technological applications in an eLearning environment. The Researcher met a sub-sample of ten students from this group, owing to the difficulty of meeting all of the students. Most of the sub-sample students in answer to the first question said that they found studying from the website very helpful and that they were able to gain access to a wide range of geographical knowledge and information sources. Moreover, the website deepened their understanding of the environment and improved their spatial relationships, as they had the opportunity to experience alternative images of people, places and environments.

In answer to the second question, the students said that they were able to retrieve information easily and could apply it to new situations. They also gained new skills and abilities especially with geography-linked activities such as data collection, investigation, development and presentation of geographical ideas, prediction and problem solving, all of which helped them in making decisions. As for the third question, students indicated that regarding technical support, they did not have sufficient time to search and carry out *all* of the activities from the websites because the time-slot allocated for the sessions was only 40 minutes long, which was short in proportion to what was needed for all the planned activities. Moreover, there was a lack of equipment (computers and technological devices). They also observed that their teachers needed preparation and training to use technology. They also mentioned the difficulties encountered when teachers and students conducted searches in languages other than Arabic, the limited number of Arabic-language eLearning websites, and the fact that some teachers continued to prefer to teach in a traditional way.

7.4 Learner Experiments: Significance for value of eLearning

The success of the transition from traditional education to eLearning depends on the ways in which the features and facilities of the adopted eLearning environment are used to support the different elements and dimensions of the eLearning environment. Results from both PExp and CExp confirmed a positive correlation between the use of eLearning and an enhancement of learner performance. Assuming that all students were equally desirous of the opportunity to use the eLearning system (or at least willing to do so), it can be argued that the 'novelty factor' played some part in the enhancement of learner performance. However, the statistical analysis shows such consistency that it is clear that the use of the eLearning system itself contributed significantly to learner performance, and thus that it played the main role in increasing achievement, effectiveness and efficiency in the learning process. For the EG, in both the PExp and CExp, the results reflected the enhancement their performance owing to their acquisition of new information, skills and abilities that stemmed from their eLearning experiences whilst studying units of the tenth-grade geography curriculum, with the aid of features such as videos, animations and images delivered to them in the form of web-pages.

Regarding the "Geography World" website presented in the CExp, besides containing several features to support students in learning and in managing their learning activities, the platform provided by Moodle also made it possible for students to conduct self-assessments of performance and to interact with the teacher and their fellow students. The answers given during the informal post-experiment interview were on the whole (but not completely) positive about the new learning environment, and indicate that it created an interactive atmosphere between teachers and learners which encouraged them to engage further in using eLearning facilities. If these findings are correct, then eLearning has the potential of facilitating the training of people who are capable of using modern technology and its applications, as also who are motivated to engage in so-called lifelong learning. In addition, these results prove the importance of eLearning, and they answer positively the Research Question "Regarding the effectiveness of developing an adaptive learning environment based on the electronic teaching of geography... to what extent is this dependent upon the achievements and attitudes of tenth-grade *Basic-Education* students in Oman?" Moreover, the results of these experiments are consistent with the results of recent studies such as Lu *et al.* (2003a), Thurab-Nkhosi *et al.* (2003), Welsh *et al.* (2003) and Wang & Hwang (2004) in terms of the importance of the effects of eLearning upon achievement and motivation.

7.5 Learner Questionnaire Surveys: General

7.5.1 Phase One Questionnaire: Accuracy and statistical significance

In attempting to identify the specification requirements for developing an active learning environment for geography, a field questionnaire survey was conducted before the PExp. A draft form of this questionnaire had been examined by referees for their comments and suggestions, and the Researcher incorporated the modifications suggested by the referees. The aim of this Phase One survey was to discover the particular features that users would like to see in an eLearning system, as well as to elicit general opinions regarding aspects of this eLearning development. After modifying the questionnaire statements according to the referees' comments, the Researcher identified three *ER*s (Muscat, Al-Batinah South and Al-Batinah North) for this particular survey. These three were selected from among the seven *ER*s as they had the highest concentrations of schools integrated into the *Basic Education* programme and of students with the necessary exposure to ICT. Furthermore, a sample size of 70 respondents for each region was set (making a total of 210) in order to cover the largest possible number of respondents and to optimize the credibility of the answers. The questionnaire included 16 items designed and based on a five-point Likert scale, whilst the final question was an open-ended question. Average responses ranged between 4.5–3.8 of 5. Copies of the questionnaire were distributed to students in various schools, in order to elicit and assess their feedback. In addition, Cronbach's alpha-coefficient was used to measure tool reliability (as shown in Table 7.13 below). SPSS was used to analyze the responses from this survey and to extract the arithmetic mean and standard deviation.

Table 7.13: Cronbach Alpha reliability test for Phase One Learner Questionnaire returns

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha based on Standardized Items	N of Items
.889	.895	15

The Cronbach Alpha reliability statistics result for the learners' questionnaire items shows that the degree of stability is 0.889, thus confirming the stability of the questionnaire items. With regard to students' responses, the response-item stating "Computer-assisted learning will deepen my understanding of the subjects covered in the geography textbook" came in first place, and agreed with comments in their response to the importance of computer-assisted learning as an exciting and enjoyable means of working through the geography curriculum. Next in order came the item "My self-learning process in acquiring knowledge that corresponds to my needs, inclinations and desires acts as a powerful incentive for me to be self-reliant and confident in my own capabilities", referring to the importance of self-learning for students in acquiring multiple knowledge and skills which leads to the sustainable reinforcement and survival of the learning-outcome and effects. Third in order came the item "My continuous progress in my studies both in strong and weak areas encourages me to improve my strong points and also to address my weak points which will create a positive reflection on my progress and performance", and this is closely linked to the previous item in terms of the importance of self-learning to identify the strengths and weaknesses of learners. A statistical summary of Phase One questionnaire responses is shown in Table 7.14.

Table 7.14: Phase One Learner Questionnaire Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.234	3.814	4.529	.714	1.187	.050	15

Regarding the open-ended question that runs 'For developing an effective learning environment using technological resources, what additional features do you think should be in the programme that would help you understand the contents of the Social Studies course in the best way?' the responses included observations (thematically summarized) such as:

- It should not be complicated.
- Need for a facility to access multiple learning methods and activities.
- Should be complementary to and supporting the traditional education.
- Needs to help students to understand geographical concepts and phenomena.
- The teacher's role has to be as facilitator and organizer in such an environment.
- Delivering contents in interesting and attractive ways by integrating a large amount of multimedia software.

7.5.2 Phase Three Learner Questionnaire

This questionnaire was designed to obtain responses relevant to eLearning technology acceptance factors which measured four main factors contained in the TAM constructed for this study (social, cultural, political, and Technology Acceptance Model constructs) and consisted of 20 items. The success of capturing relevant information required appropriately selected samples of participants from two cultures, in this case comparable students from Oman and the UK. Regarding sample-size, it was decided to target a group of 40 students in each country, totalling 80 participants to provide a suitable number to facilitate data and statistical analysis.

Ethical issues surrounding the questionnaire were addressed by ensuring that the data was used for only the purpose of this research and that all personal details of the participants would be kept secret. The following declaration at the beginning of the questionnaire gave the guarantee: "All answers provided will be treated confidentially and will be used only for the purpose of this investigation. The identity of respondents will be kept anonymous". The aim of the questionnaires was to measure the students' acceptance of eLearning in conjunction with their cultural background and values, which would help to identify the extent of acceptance of new technologies in different cultures. The TAM-based eLearning questionnaire contained 20 questions and 4 further questions to ascertain the profile of participants. A list of classified questions relating to the main factors in the TAM model meant that some questions were similar to each other, and therefore the questions appeared in random order so as to reduce prejudice and bias in the answers. Participants gave their responses to each question on a five-point Likert scale ranging from 1 (Strongly Disagree), 2 (Disagree), 3 (Neutral), 4 (Agree) to 5 (Strongly Agree) to measure respondent reaction to the eLearning technology acceptance variables.

7.6 Phase Three Learner Questionnaires: General Comparison

7.6.1 Oman

The questionnaire sample was selected from students in the tenth grade in different schools, and consisted of 20 males and 20 females (Table 7.15).

Table 7.15: Phase Three Omani Student sample (in percentages)

		Frequency	Per cent	Valid per cent	Cumulative per cent
Valid	Male	20	50.0	50.0	50.0
	Female	20	50.0	50.0	100.0
	Total	40	100.0	100.0	

The results showed that the average responses ranged between 4.3–2.8 of 5 (Table 7.16).

Table 7.16: Phase Three Omani Student sample: Summary Item Means

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.677	2.875	4.300	1.425	1.496	.159	20

The students' responses reflected a high rate of acceptance of eLearning technology as seen in the items mean of 3.67, when all items contained in the questionnaire ranged between 1 (Strongly Disagree) and 5 (Strongly Agree). In Table 7.17 the data analysis shows the ranking of TAM factors by the Omani students

Table 7.17: Classification of TAM factors by ranking of items by Omani students

Ranking of item	Item ID number	Factors	Factor Class
1	13	Facilitating Conditions	Social factors
2	2	Qualification/Skills	Social factors
3	7,12	Social Networks, Qualification/Skills	Political, Social factors
4	20	Perceived Ease of Use	TAM construct factors
5	10	Perceived Ease of Use	TAM construct factors
6	3,4	Facilitating Conditions, Individualism/Collectivism	Social, Cultural factors
7	19	Perceived Usefulness	TAM construct factors
8	6	Power Distance	Cultural factors
9	9,17	Perceived Usefulness, Social networks	Social, Political factors
10	14	Individualism/Collectivism	Cultural factors
11	18	Social Media	TAM construct factors
12	5	Uncertainty Avoidance	Cultural factors
13	16	Power Distance	Cultural factors
14	1	Language	Social factors
15	15	Uncertainty Avoidance	Cultural factors
16	8	Social Media	Political factors
17	11	Language	Social factors

Questionnaire items numbers 13, 2, 7, 12, 20, 10, 3, 19, 6 and 9 had the highest average response in terms of responses in the first ten places. Items numbers 13 and 2 in *first* and *second* place respectively reflected the Omani students' responses regarding the availability of computers in the learning environment and the basic skills in using technology needed to support students in using and searching learning websites. Items numbers 7 and 12 in joint *third* place illustrated that the social networks help to exchange social/political ideas, and also that the opportunities to study the field of information technology (IT) will provide multiple skills for using learning websites. Items numbers 20 and 10 in *fourth* and *fifth* place respectively confirmed students' views regarding the ease of finding information from eLearning websites. Item number 3 in *sixth* place referred to the importance of conducting regular maintenance on computers being used in the eLearning context. Item number 19 in *seventh* place represented the sample's preferences regarding the eLearning websites that provide them with useful learning materials. Item number 6 in *eighth* place reflected the sample's desires to share new experiences from eLearning websites with their friends. Item number 9 in *ninth* place indicated the advantages of eLearning technology for saving time and effort.

Table 7.18 and Figure 7.1 below show the variances of percentages for the four main factor-classes, with TAM constructs having the highest at 26 per cent.

Table 7.18: Omani students' ranking of the four main factors

Factors	Means	Percentages
Social	3.7	25%
Cultural	3.5	24%
Political	3.6	25%
TAM constructs	3.8	26%

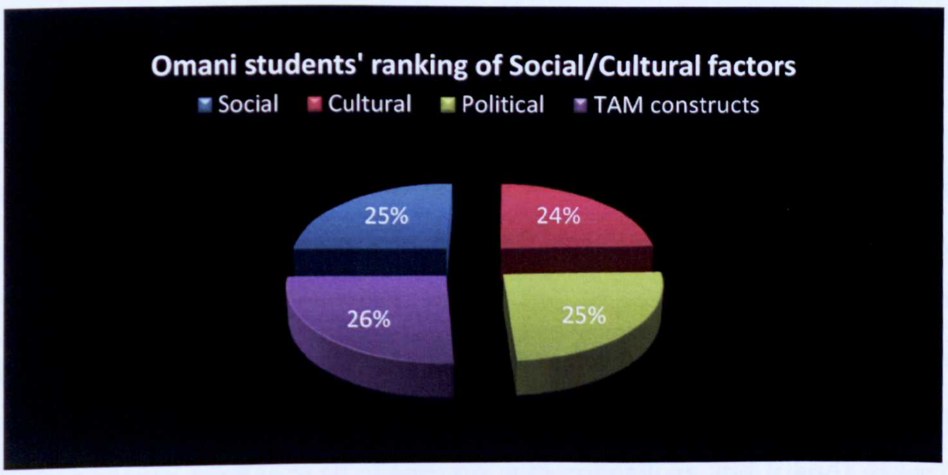

Figure 7.1: Omani students' ranking of the four main factors

7.6.2 The UK

The research sample consisted of students from Shorefields Technology College in Liverpool. The sample of 40 students comprised 22 males and 18 females registered for the academic year 2011/2012 as shown in Table 7.19.

Table 7.19: Phase Three UK Student sample (in percentages)

		Frequency	Per cent	Valid per cent	Cumulative per cent
Valid	Male	22	55.0	55.0	55.0
	Female	18	45.0	45.0	100.0
	Total	40	100.0	100.0	

Questionnaire returns showed that the average responses ranged between 4.0–4.6 of 5 as shown in Table 7.20 below.

Table 7.20: Phase Three UK Student sample: Summary Item Means

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.345	4.025	4.550	.525	1.130	.030	20

The students' responses reflected a high rate of acceptance of eLearning technology as seen in the much higher items mean of 4.34, when all items contained in the questionnaire ranged between 1 (Strongly Disagree) and 5 (Strongly Agree).

Table 7.21 below gives details of the ranking of the questionnaire items by the UK student sample. Questionnaire items numbers 2, 20, 12, 7, 14, 19, 1, 3, 10 and 15 had the highest average response in terms of responses in the first ten places. Items numbers 2 and 20 in joint *first* place confirmed agreement that students should have basic skills in using technology to support them search and find information from eLearning websites. Item number 12 in *second* place concentrated on the importance of studying information technology (IT) to help provide multiple skills for use during eLearning. Items numbers 7, 14 and 19 in joint *third* place represented the role of social networks to exchange socio-political ideas, the respondents' tendency to cooperate with colleagues and friends especially when facing a problem with browsing eLearning sites, and their preference for eLearning websites that provide useful learning materials.

Table 7.21: Classification of TAM factors by ranking of items by UK students

Ranking of items	Item ID number	Factors	Factor Class
1	2,20	Qualification/Skills, Perceived Ease of Use	Social, TAM constructs factors
2	12	Qualification/Skills	Social factors
3	7,19	Social networks, Perceived Usefulness	Political, TAM constructs factors
4	1,3,10,15	Language, Facilitating Conditions, Perceived Ease of Use, Uncertainty Avoidance	Social, TAM construct, Cultural factors
5	13	Facilitating Conditions	Social factors
6	17	Social Networks	Political factors
7	9	Perceived Usefulness	TAM construct factors
8	6	Power Distance	Cultural factors
9	11,16	Language, Power Distance	Social , Cultural factors
10	5	Uncertainty Avoidance	Cultural factors
11	18	Social Media	TAM construct factors
12	8	Social Media	TAM construct factors
13	14	Individualism/Collectivism,	Cultural factors
14	4	Individualism/Collectivism,	Cultural factors

Items numbers 1, 3, 10 and 15 in joint *fourth* place illustrated that they considered themselves as having sufficient skills to use eLearning websites in other languages, as well as their belief in the importance of regular maintenance of computers. In addition, items 10 and 15 reflected their view of the ease of using eLearning websites and their willingness to surf unknown and unpopular learning websites. Table 7.22 and Figure 7.2 below show the variances of percentages for the four main factor-classes, with social factors and TAM constructs jointly having the highest ranking at 26 per cent.

Table 7.22: UK students' ranking of the four main factors

Factors	Means	Percentages
Social	4.3	26%
Cultural	3.8	23%
Political	4.1	25%
TAM constructs	4.3	26%

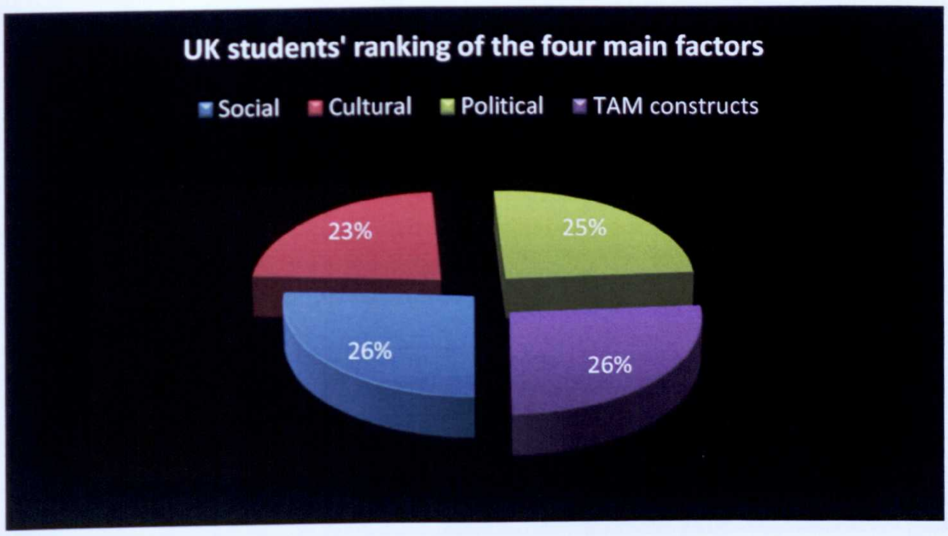

Figure 7.2: UK students' ranking of the four main factors

7.7 Phase Three Student Questionnaire Results: Detailed Comparisons

7.7.1 Social factors

Comparison between the responses of Omani and UK students reveals a substantial discrepancy in only one aspect, that of language. Most of the relevant geography eLearning sites are presented in the English language. Others exist in a range of European and non-European languages but relatively few are in Arabic. The *BE* programme attempts to train all Omani school-goers in English as a second language, but the drive to achieving consistently good results is a slow process (Sergon 2011). As Omani students are normally exposed to learn English before any other language (such as Spanish, French, Chinese), the particular difficulties Omani students face are in the area of non-Arabic language content. This explains the particular discrepancy in the comparative lists of means of social factors (see Table 7.23 and Figures 7.3). In all other aspects Omani students are seen to be close to their UK counterparts.

Table 7.23: Students' Responses: Means of social factors across two cultures (Oman & UK)

Means of social factors		
Factors	*Cultures*	
	Oman	UK
Language	3.1	4.2
Qualification/Skills	4.1	4.5
Facilitating Conditions	4.0	4.4

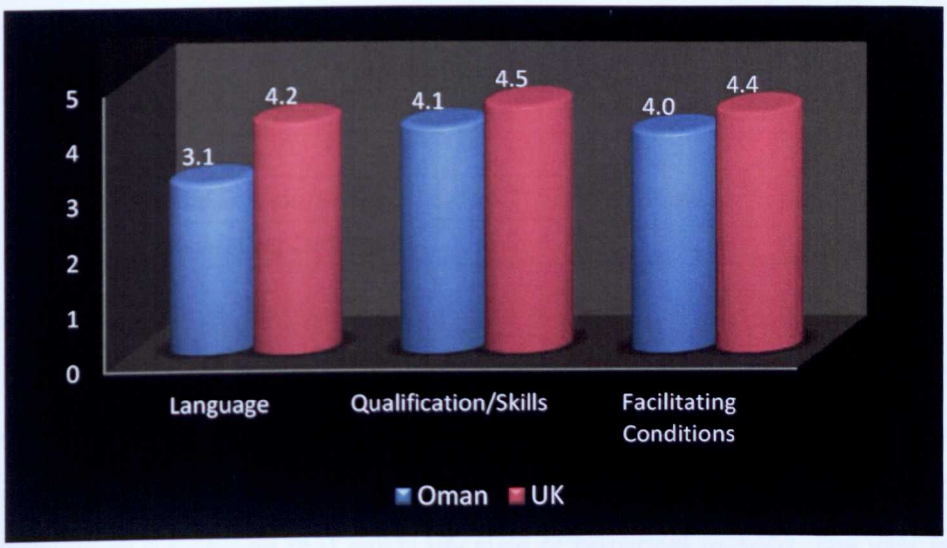

Figure 7.3: Students' Responses: Means of social factors across two cultures (Oman & UK)

Omani students

For Omani students, social factors came in *second* place in the ranking of the four main components of technology acceptance. As stated above, for Omani students the major problem resides in issues surrounding the language in which a particular eLearning website is presented. One useful outcome of this study, then, has been to highlight this particular problem (which exists not only in the subject-field of geography). However, it is noteworthy that this problem has been highlighted by the *voluntary* responses of the Omani students themselves, when they could have allocated reasons for difficulties to other causes, to those outside their own competence or responsibility. So it is encouraging to see that these Omani students are prepared to be open and honest about their difficulties in using languages other than Arabic to search and surf eLearning websites—as is made clear in the responses to items numbers 1 and 11 (having means of 3.3 and 2.9 respectively).

In addition the qualification/skills are the important aspects of the eLearning environment where students need basic skills in using technology gained by studying the information technology (IT), as is clear from items 2 and 12. Facilitating conditions constitute another important factor as indicated in items 3 and 13, pointing to the importance of providing to schools greater numbers of computers and regular maintenance services to facilitate students' (as well as teachers') performance in their eLearning environment. Table 7.24 gives details.

Table 7.24: Means of social factors according to Omani students' responses

Means of social factors		
Factors	Means	Mean of means
Language	3.1	3.7
Qualification/Skills	4.1	
Facilitating Conditions	4.0	

UK students

From the responses of UK students, social factors came in *first* place in the ranking of the four main components of technology acceptance. As social factors comprise *language* skills and competences besides background qualification/skills and facilitating conditions, UK students possess an advantage that exists because of historical reasons. The vast majority of relevant websites are in English, and even though the teaching of modern languages has been in serious decline across the UK (CILT 2011), students in the UK still have better opportunities for exposure to other languages (in the classroom and in real life) than do students in Oman. Accordingly, UK students have few or no problems when using and searching other-language eLearning websites, as is clear from response items numbers 1 and 11 (with means of 4.4 and 4.1). Qualification/skills and facilitating conditions have high response-averages, indicating that the UK students agree with the importance of providing students with basic IT skills and/or IT study-courses to build their capacity in using and makes searches of eLearning websites. Furthermore, they believe that as long as the learning environment remains equipped at a suitable level for eLearning, this will help and support them in their learning. Details are shown in Table 7.25 below.

Table 7.25: Means of social factors according to UK students' responses

Means of social factors		
Factors	Means	Mean of means
Language	4.2	4.3
Qualification/Skills	4.5	
Facilitating Conditions	4.4	

7.7.2 Cultural factors

Comparison between Omani and UK students in cultural factors reveals discrepancies in all aspects, whilst consistency in Omani responses is paralleled by a noticeable internal dichotomy within the UK responses. Uncertainty avoidance and power distance are stronger amongst Omani students. However, the individualizing effect of working on a computer (which introduces an isolating tendency effect amongst students) is offset in the case of Omani students by their stronger culture of cooperation; so that in many cases uncertainty avoidance and power distance are reduced, as Omani students will tend to seek help from their colleagues much sooner than their UK counterparts would consider doing so. Table 7.26 and Figure 7.4 below show the comparative details.

Table 7.26: Students' Responses: Means of cultural factors across two cultures (Oman & UK)

Means of cultural factors		
Factors	*Cultures*	
	Oman	UK
Individualism/Collectivism	3.7	3.2
Uncertainty Avoidance	3.4	4.2
Power Distance	3.5	4.2

Figure 7.4: Students' Responses: Means of cultural factors across two cultures (Oman & UK)

Omani students

Cultural factors (individualism *versus* collectivism, uncertainty avoidance and power distance) came in *fourth* place in the Omani students' ranking of the four main components of technology acceptance. Omani students tend to cooperate and work as a team, in virtue of their strong background of living in a community in which the collective spirit of cooperation and interaction is still strongly alive, even in urban areas. This is illustrated through the high level of agreement in response to the item "Using eLearning rather than traditional instruction creates an isolation atmosphere between me and my friends". They prefer to ask colleagues, friends and technicians when they encounter problems when browsing or learning from eLearning websites, as indicated in the means to response items 4 and 14. Moreover, while Omani students experience anxiety in tackling unknown and unpopular learning websites—perhaps owing to a lacking of browsing skills or through aversion to the unknown—the mean of 3.4 is indicative that they still seek to challenge themselves in the eLearning context. As for power distance, in spite of the response mean of 3.4 for the proposition that using eLearning should be not limited to certain groups (such as mangers and highly qualified individuals), item number 6 clearly shows the trend of respondents to share experiences with their friends when they learn new topics from eLearning websites (a mean of 3.7). In fact these means indicate the problems that Omani students face in relation to this factor, showing their need for guidance and help to gain more confidence in using technology applications by providing more training and to counteract the notion that using technology should be limited to certain groups such as qualified individuals. Table 7.27 shows details.

Table 7.27: The means of cultural factors according to Omani students' responses

Means of cultural factors		
Factors	Means	Mean of means
Individualism/Collectivism	3.7	3.5
Uncertainty Avoidance	3.4	
Power Distance	3.5	

UK students

The same cultural factors came in *third* place in the UK students' ranking of the four main components of technology acceptance. Unlike Omani students, UK students show a high degree of reticence. The UK students did not think that the eLearning process creates isolation between them and their friends, as is clear in their low response mean in item number 4 (a mean of 3.1). However, their response regarding readiness to ask a colleague or friend in case of problems when browsing eLearning websites (item number 14) reflects an individualistic attitude regarding technical competence (and thus a reluctance to turn immediately for help in circumstances of difficulty). Thus when technology is available it tends to foment isolationist attitudes. Additionally, their replies illustrate a lower level of uncertainty avoidance—in response to statements "I prefer to surf the unknown and unpopular learning websites" and "I like to search for and explore new eLearning websites" (items means 4.1 and 4.4 respectively).

Results also reflected weaker power distance effects in responses to "I prefer to share my experience with students and colleagues when learning new topics from eLearning websites" and "Using eLearning should not be limited to certain groups such as highly qualified individuals" (items means 4.3 and 4.1 respectively). However these results support Hofstedes' observations (1980) regarding the lower ambient levels of uncertainty avoidance and power distance in western cultures (Shafeek 2011). Table 7.28 shows details.

Table 7.28: The means of cultural factors according to UK students' responses

Means of cultural factors		
Factors	Means	Mean of means
Individualism/Collectivism	3.2	3.8
Uncertainty Avoidance	4.2	
Power Distance	4.2	

7.7.3 Political factors

Comparison between Omani and UK students in political factors shows internal consistency in each set of responses. Young people in the west have been developing a sub-culture within each western society such that they have become differentiated at rapidly decreasing intervals—the so-called 'Generation X' (from roughly the middle to the end of the 20th century) and 'Generation Y' (beginning by overlap near the end of the 20th century or beginning at the opening of the 21st century)—and these generations have become increasingly differentiated in their own characteristics (Edmunds & Turner 2005; Wilson & Gerber 2008). Thus, young people in the UK (as in other western societies) have had various means of proximate and distance interacting through social facilities that have been available for a long time. Consequently, a constantly developing cultural tradition about social interaction and networking has grown up amongst youth that is being passed down the generations of the younger sectors of the population (Urry 2003).

Owing to the historical background of the late onset of modernization and development in their country, the young generations in Oman have yet to develop a similar sub-culture within the larger society, and this is reflected in the ways in which they tend to use social networks and media, and in the patterns of use and purpose that characterize their habits.

Table 7.29: Students' Responses: Means of political factors across two cultures (Oman & UK)

Means of Political Factors		
Factors	Cultures	
	Oman	UK
Social Networks	3.9	4.3
Social Media	3.3	4.0

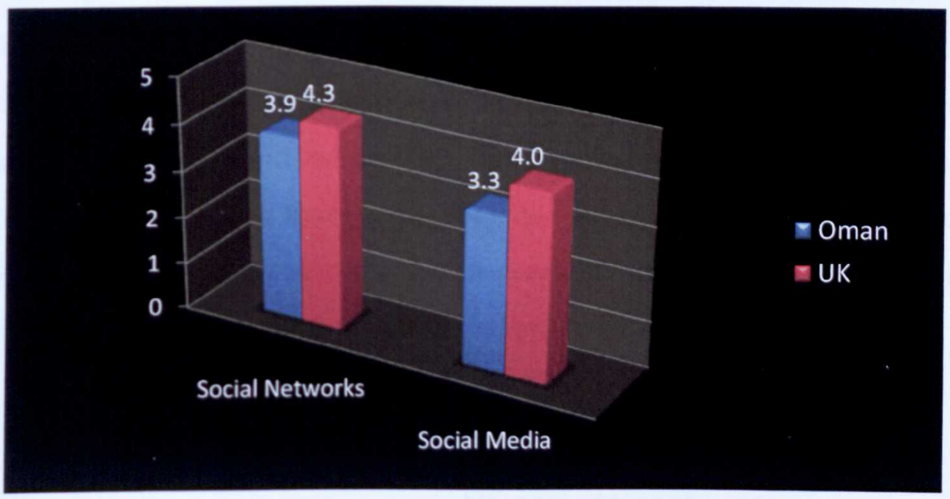

Figure 7.5: Students' Responses: Means of political factors across two cultures (Oman & UK)

Omani students

Political factors (the use of social networks and social media) came in *third* place in the Omani students' ranking of the four main components of technology acceptance. For social networks, items numbers 7 and 17 had responses with means of 4.1 and 3.7 respectively, indicating that *social networks* such Facebook, Twitter, as well as various other forums and blog-sites using enhanced technology play a major role in providing and updating students with the latest news of political and other issues. In contrast, the mean of 3.3 for *social media* indicated the low incidence of using mobiles to follow political and other events.

However, it is noted that the political factors are now playing an increasingly important role in technology acceptance, but only to a certain extent because the government has yet to encourage greater freedom of discussion on various topics such as domestic political issues. This creates a certain amount of reluctance in the take-up of new technology, and it will take time before such a take-up can be stimulated further. Table 7.30 gives details.

Table 7.30: The means of political factors according to Omani students' responses

Means of Political Factors		
Factors	Means	Mean of means
Social Networks	3.9	3.6
Social Media	3.3	

UK students

Political factors (the use of social networks and social media) came in *second* place in the UK students' ranking of the four main components of technology acceptance. Items numbers 7 and 17 had high means (4.4 and 4.3 respectively), indicating that the respondents believe in the important roles that *social networks* play in exchanging, providing and updating information on political and other issues. As for *social media*, items numbers 8 and 18 had the same response mean of 4.0 and this confirmed that UK respondents used internet via mobiles and YouTube to follow up political events and other issues. This usage reflects somewhat the tolerance of UK culture with regard to the discussion of political issues. Details are shown in Table 7.31.

Table 7.31: The means of political factors according to UK students' responses

Means of Political Factors		
Factors	Means	Mean of means
Social Networks	4.3	4.1
Social Media	4.0	

7.7.4 TAM constructs

Perceived usefulness and perceived ease of use were ranked in first place by both sets of respondents, although in the case of the Omani students, the majority in favour was not as high as in the case of the UK students.

Table 7.32: Students' Responses: Means of TAM construct factors across two cultures (Oman & UK)

Means of TAM construct factors		
Factors	*Cultures*	
	Oman	UK
Perceived Usefulness	3.7	4.3
Perceived Ease of Use	3.9	4.4

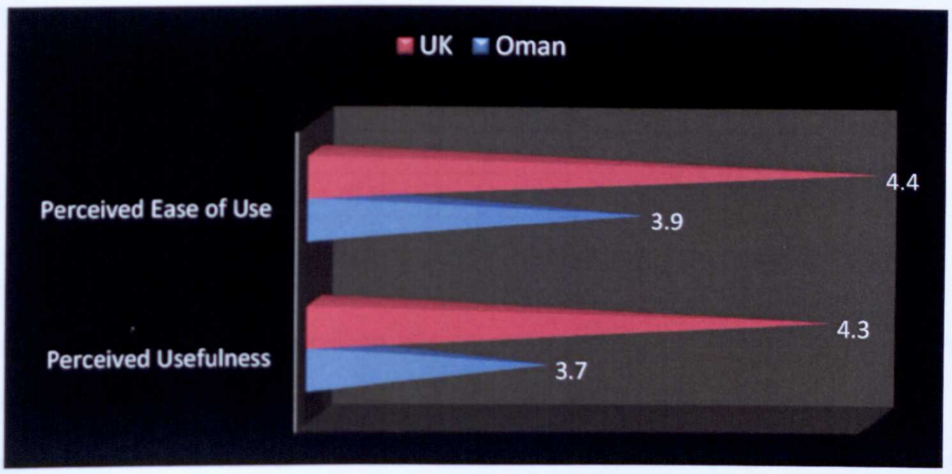

Figure 7.6: Students' Responses: Means of TAM construct factors across two cultures (Oman & UK)

Omani students

Technology Acceptance Model constructs (perceived usefulness and perceived ease of use) came in *first* place in the Omani students' ranking of the four main components of technology acceptance. This response reflected acceptance of these two factors as providing to them many advantages, such as savings in time and effort, providing them with useful learning materials, and making it easy to find information from eLearning websites. However, the majority of the Omani student who accepted these constructs was not as great as that in the case of their UK counterparts. Details are given in Table 7.33.

Table 7.33: The means of TAM constructs factors according to Omani students' responses

Means of (TAM) constructs factors		
Factors	Means	Mean of means
Perceived Usefulness	3.7	3.8
Perceived Ease of Use	3.9	

UK students

Technology Acceptance Model constructs (perceived usefulness and perceived ease of use) also came in *first* place in the UK students' ranking of the four main components of technology acceptance. The UK students reported these two factors as being very important in using eLearning websites. Thus, they agreed that the use of eLearning websites helps to save time and effort helps them to find information easily and provides useful learning materials. Table 7.34 gives details.

Table 7.34: The means of TAM construct factors according to UK students' responses

Means of (TAM) constructs factors		
Factors	Means	Mean of means
Perceived Usefulness	4.3	4.3
Perceived Ease of Use	4.4	

7.7.5 Discussion of results

The detailed comparisons between the responses provided by the students from Oman and the UK indicate patterns that are generally what would be expected, given the historical background to the two countries and their educational systems. Within social factors, Omani students showed a particular disadvantage as regards ability to perform in English and other non-Arabic languages. English has become in many ways the *world language* for technology, and the Omani education system is acting to address this issue. Omani students are also seen as being at a disadvantage in two out of three cultural factors (uncertainty avoidance and power distance), but they are at a comparative advantage in the area of cooperation/collaboration owing to their cultural background. In political factors they are lagging behind UK students especially in their use of social media—the mobile media, especially. Omanis still prefer to communicate face-to-face or by telephone, *i.e.* in real time.

However, as Omani society continues to modernize, Omanis will develop the habit of communicating in more modern ways, and these differences are expected to decrease considerably. Given the responses regarding these three classes of factors (social, cultural, political) it should not be surprising that the majority of Omani students who accept the TAM construct factors is smaller than that among UK students. A lot of what is taken for granted by UK students is still new to students in Oman, although they are adapting rapidly to innovation. However, it would have been very surprising if a *majority* of Omani students did *not* view TAM construct factors favourably.

7.8 Teacher Questionnaires: General Comparison

7.8.1 Phase One Questionnaire: Accuracy and statistical significance

In attempting to identify the specification requirements for developing an active learning environment for geography, a field questionnaire survey was conducted before the PExp. This questionnaire had the aim of discovering the preferences of teachers and students that would guide the Researchers in developing a user-friendly eLearning-environment, as well as other aspects of the research. Copies of the questionnaire were distributed to supervisors and teachers of Social Studies in schools, as well as to lecturers and educators in universities for assessing and giving their feedback, in order to make appropriate adjustments as necessary. In addition, Cronbach's alpha-coefficient was used to measure tool reliability, as shown in Table 7.35. The Cronbach Alpha reliability test result for the teachers' questionnaire items shows that the degree of stability is 0.901, thus confirming the stability of the questionnaire items.

Table 7.35: Cronbach Alpha reliability test for Phase One Teacher Questionnaire returns

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha based on Standardized Items	N of Items
.901	.942	14

After modifying the questionnaire statements according to the referees' comments, the Researcher identified three *ER*s (Muscat, Al-Batinah South and Al-Batinah North) for this particular survey. These three were selected from among the seven *ER*s owing to their having the highest concentrations *BE* schools and of students with the necessary exposure to ICT. Furthermore, a sample-size of 70 respondents for each region was set (making a total of 210) in order to cover the largest possible number of respondents and to optimize the credibility of the answers. SPSS was used to analyze the responses from this survey and to extract the arithmetic mean and standard deviation.

Questionnaires were distributed to teachers in order to identify the specification requirements for developing a learning-environment. The teachers' questionnaire included 14 items designed based on a five-point Likert scale while the last question was also an open question. Average responses ranged between 4.6–3.7 of 5. From the responses of the sample, it was found that all items were approved and accepted by the respondents, but the estimates showed a diversity of averages, for example, response item 1 (which refers to the importance of technology in the delivery and understanding of geographic contents in the virtual learning-environment) came in first place, which confirmed the importance of technology in supporting and enhancing the geography curriculum.

However, item 4 came in second place, thus emphasizing the importance of 3D technology and multimedia for improving the understanding of geographical phenomena. In third place was the item dealing with simulations, game-based learning, virtual role-playing and virtual field-trips, thus indicating the importance of supporting and enhancing the curriculum from the respondents' points of view. The statistical summary of teacher response-items is shown in Table 7.36.

Table 7.36: Phase One Teacher Questionnaire Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.276	3.700	4.600	.900	1.243	.082	14

With regard to the open question (number 15) 'Imagine that you are preparing an educational programme aimed at increasing the capacity and effectivity of the teaching and learning environment in terms of improving the efficacy of the Social Studies course for learners. What in your view are the features that you would wish to include in this programme to achieve the greatest improvements on what has already been mentioned in this questionnaire?' respondents' points included:

- Engage students in cooperative activities.
- Support learners' skills and experience in using computer facilities.
- Ensure that teachers and learners have a rich interactive multimedia experience.
- There has to be an effective and exciting environment for attracting learners to the learning-content.
- Include a variety of maps and websites linked to the curriculum contents, including e-Books and e-Atlas.
- The content and programme run-time should be appropriate to the time allocated for teaching geographic content within the terms of the lesson-plan.
- Include learning-methods by using modern technology that learners can deal with and understand easily.

7.8.2 Phase Three Questionnaire

This questionnaire was designed to obtain responses relevant to eLearning technology acceptance factors which measured four main factors contained in the TAM constructed for this study (social, cultural, political, and Technology Acceptance Model constructs) and consisted of 30 items. The success of capturing relevant information required appropriately selected samples of teacher participants from three cultures, in this case comparable teachers from Oman, the UAE and the UK. Regarding sample-size, it was decided to target a group of 40 students in each country, totalling 120 participants to provide a suitable number to facilitate data and statistical analysis. The ethical issue of the questionnaire was addressed by ensuring that the data was used for only the purpose of this research and that all personal details of the participants would be kept secret. The following declaration at the beginning of the questionnaire gave the guarantee: "All answers provided will be treated confidentially and will be used only for the purpose of this investigation. The identity of respondents will be kept anonymous". The aim of the questionnaires was to measure the teachers' acceptance of eLearning in conjunction with their cultural background and values that help to identify the extent of acceptance of new technologies in different cultures.

The TAM-based eLearning questionnaire contained 30 questions and 5 further questions to ascertain the profile of participants. A list of classified questions relating to the main factors in the TAM model meant that some questions were similar to each other, and therefore the questions appeared in random order so as to reduce prejudice and bias in the answers. Participants gave their responses to each question on a five-point Likert scale ranging from 1 (Strongly Disagree), 2 (Disagree), 3 (Neutral), 4 (Agree) to 5 (Strongly Agree) to measure respondent reaction to the eLearning technology acceptance variables.

7.9 Phase Three Teacher Questionnaires: General Comparison

7.9.1 Oman

The research sample consisted of teachers chosen randomly from different *ERs* in Oman. The sample of 40 teachers was divided equally between 20 males and 20 females, all of whom were registered with the Ministry of Education for the academic year 2010/2011, details shown in Table 7.37 below.

Table 7.37: Omani teacher sample (in percentages)

		Frequency	Per cent	Valid per cent	Cumulative per cent
Valid	Male	20	50.0	50.0	50.0
	Female	20	50.0	50.0	100.0
	Total	40	100.0	100.0	

Questionnaires were distributed and the results showed that the average responses ranged between 2.4–4.5 of 5. Details are shown in Table 7.38.

Table 7.38: Omani teacher sample: Summary item means

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.845	2.400	4.550	2.150	1.896	.405	30

The teachers' responses reflected a strong rate of acceptance of eLearning technology as seen in the items mean of 3.84, when all items contained in the questionnaire ranged between 1 (Strongly Disagree) and 5 (Strongly Agree). Table 7.39 below shows full details of how the items were ranked by Omani teachers.

Questionnaire items numbers 23, 6, 10, 16, 3, 24, 27, 26, 1, 5, 28, 18, 11, 21 and 20 had the highest average response in terms of responses in the first fifteen places. In *first* place item number 23 illustrated the importance of providing technicians in the eLearning context to solve computer problems, while items numbers 6, 10 and 16 in joint *second* place reflected the sample's concern about implementing new experiences in the field of education, as they agreed with "Using eLearning *should be* limited to certain groups such as managers and highly qualified individuals" and "I think the teachers who are professional in using technology are able to apply eLearning easily", while item 16 indicated sample's perceptions of the "Availability of computers in the eLearning environment helps me to use eLearning websites". Items 3 and 24 "I prefer eLearning websites that provide me with useful learning materials" "Attending eLearning workshops provides me with multiple skills to use eLearning websites" came in *third* place. Item 27 regarding the continuous monitoring of computer devices through regular maintenance came in *fourth* place. Item 26 in *fifth* place confirmed that "I think that if I have basic skills in using technology that will support me to achieve successful learning process". Items 1, 5, 28 and 8 in order *six, seven* and *eight* expressed the sample's view "I develop my search skills by using eLearning websites" and "Using eLearning websites help me to save time and effort". Items numbers 11 and 21 in joint *ninth* place indicated the sample's view of participation and cooperation in "I prefer to share my experience with students and colleagues when learning new topics from eLearning websites" and "If faced with a problem while learning new topics from eLearning websites, I will ask friends or technicians". Item number 20 in *tenth* place illustrated "I think it is easy to find information from eLearning websites".

Table 7.39: Classification of TAM factors by ranking of items by Omani teachers

Ranking of items	Item ID number	Factors	Factor Class
1	23	Facilitating Conditions	Social factors
2	6,10,16	Power Distance, Qualification/Skills, Facilitating Conditions	Cultural, Social factors
3	3,24	Perceived Usefulness, Qualification/Skills	TAM construct, Social factors
4	27	Facilitating Conditions	Social factors
5	26	Qualification/Skills	Social factors
6	1	Perceived Ease of Use	TAM construct factors
7	5,28	Perceived Ease of Use, Perceived Usefulness	TAM construct factors
8	18	Perceived Usefulness	TAM construct factors
9	11,21	Power Distance, Individualism/Collectivism	Cultural factors
10	20	Perceived Ease of Use	TAM construct factors
11	30	Individualism/Collectivism	Cultural factors
12	9	Facilitating Conditions	Social factors
13	15	Social Networks	Political factors
14	14	Uncertainty Avoidance	Cultural factors
15	7,12	Uncertainty Avoidance, Perceived Ease of Use	Cultural, TAM construct factors
16	2	Social Networks	Political factors
17	13	Social Media	Political factors
18	4	Social Media	Political factors
19	8	Individualism/Collectivism	Cultural factors
20	29	Social Media	Political factors
21	17	Language	Social factors
22	19	Language	Social factors
23	22	Social Networks	Political factors
24	25	Language	Social factors

Table 7.40 and Figure 7.7 show the relative importance of the four main classes of factors according to cumulative scores of the Omani teacher's responses. TAM construct factors had the highest percentage at 28 per cent.

Table 7.40: Omani teachers' ranking of the four main factors

Factors	Means	Percentages
Social	3.7	25%
Cultural	3.9	26%
Political	3.2	21%
TAM construct	4.1	28%

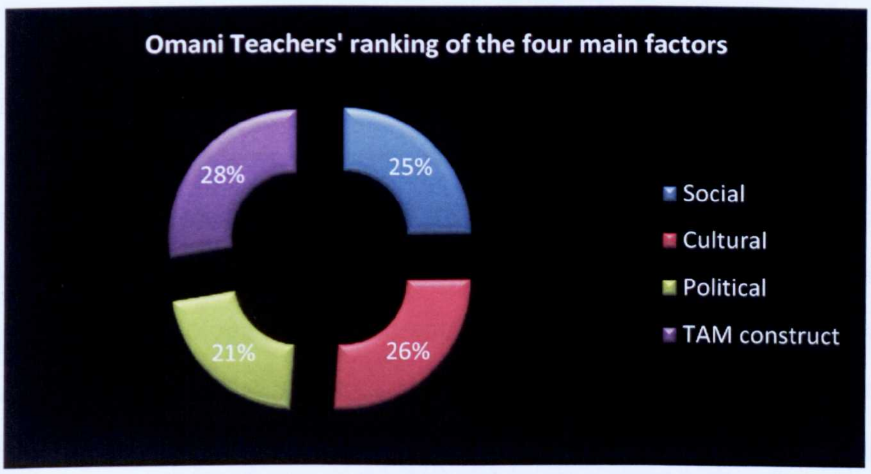

Figure 7.7: Omani teachers' percentages of the four main factors

7.9.2 United Arab Emirates (UAE)

The survey sample consisted of teachers chosen randomly from different educational institutions in the UAE (ABC School, Al-Manhal School, New Horizon School, Al-Khawarizmi International College). The sample size was 35 (including 15 males and 20 females, five questionnaires were returned blank) and all were registered with the Ministry of Education for the academic year 2010/2011. Details are shown in Table 7.41.

Table 7.41: UAE teacher sample (in percentages)

		Frequency	Per cent	Valid per cent	Cumulative per cent
Valid	Male	15	42.9	42.9	42.9
	Female	20	57.1	57.1	100.0
	Total	35	100.0	100.0	

Questionnaires were distributed and the results showed that the average responses ranged between 4.6–2.2 of 5. Details are shown in Table 7.42.

Table 7.42: UAE teacher sample: Summary item means

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.032	2.257	4.600	2.343	2.038	.265	30

The UAE teachers' responses reflected a very high rate of acceptance of eLearning technology as seen in the items mean of 4.03, when all items contained in the questionnaire ranged between 1 (Strongly Disagree) and 5 (Strongly Agree).

Table 7.43 below shows full details of how the items were ranked by the UAE teachers. Questionnaire items numbers 1, 10, 13, 17, 5, 27, 9, 30, 11, 12, 2, 21, 22, 16 and 14 had the highest average response in terms of responses in the first 15 items. In *first* place item number 1 illustrates the acceptance of the sample to use eLearning websites for their learning. Item number 10 in *second* place indicated "I think the teachers who are professional in using technology are able to apply eLearning easily". Items number 13 and 17 in joint *third* place reflected the sample's lack of interest in "I do not like to read political news and events through electronic newspaper" and on the other hand their approval of "I think it is easy to explain and interpret learning materials downloaded from eLearning websites in other languages". Items numbers 5 and 27 came in joint *fourth* place in terms of the sample's belief in the importance of regular computer maintenance in the eLearning context and their encouragement to their colleagues and friends to surf eLearning websites. Items numbers 9 and 30 had joint *fifth* place as they support ideas towards "I think the administrative support contributes in increasing the effectiveness of using computers" and "I prefer to ask my colleagues or friends if I face a problem when browsing eLearning websites". Items numbers 11 and 12 appearing in joint *sixth* place reflect the sample's orientation "I believe that the eLearning websites are easy to use" and "I prefer to share my experience with students and colleagues when learning new topics from eLearning websites".

Table 7.43: Classification of TAM factors by ranking of items by UAE teachers

Ranking of items	Item ID number	Factors	Factor Class
1	1	Perceived Ease of Use	TAM construct factors
2	10	Qualification/Skills	Social factors
3	13,17	Social Media, Language	Political, Social factors
4	4,27	Social Media, Facilitating Conditions	Political, Social factors
5	9,30	Facilitating Conditions, Individualism/Collectivism	Social, Cultural factors
6	11,12	Power Distance, Perceived Ease of Use	Cultural, TAM construct factors
7	2,21,22	Social Networks, Individualism/Collectivism	Political, TAM construct factors
8	16	Facilitating Conditions	Social factors
9	3,13,19	Perceived Usefulness, Social Media, Language	Cultural, TAM construct, Political, Social factors
10	24,28	Qualification/Skills, Perceived Usefulness	Social, TAM construct factors
11	4,15,26	Social Media, Social Networks, Qualification/Skills	Political, Social factors
12	18	Perceived Usefulness	TAM construct factors
13	23,29	Facilitating Conditions, Social Media	Social, Political factors
14	6,20	Power Distance, Perceived Ease of Use	Cultural, TAM construct factors
15	7	Uncertainty Avoidance	Cultural factors
16	8	Individualism/Collectivism	Cultural factors
17	25	Language	Social factors

Items numbers 2, 21 and 22 had joint *seventh* place and confirmed the sample's interest in using technology for political issues, although this was not so important for them as it was ranked last, and also confirmed that "If faced with a problem while am learning new topics from eLearning websites, I will ask friends or technicians". Item number 16 had *eighth* place in terms of sample's opinions on the need to provide computers in learning environment to help people to use eLearning websites easily. Item number 14 in *ninth* place indicated the sample's desire to surf unknown and unpopular learning websites. Table 7.44 and Figure 7.8 below show the relative importance of the four main classes of factors according to cumulative scores of the UAE teacher's responses. TAM construct factors had the highest percentage at 26 per cent.

Table 7.44: UAE teachers' ranking of the four main factors

Factors	Means	Percentages
Social	4.0	26%
Cultural	3.8	24%
Political	3.7	24%
TAM constructs	4.1	26%

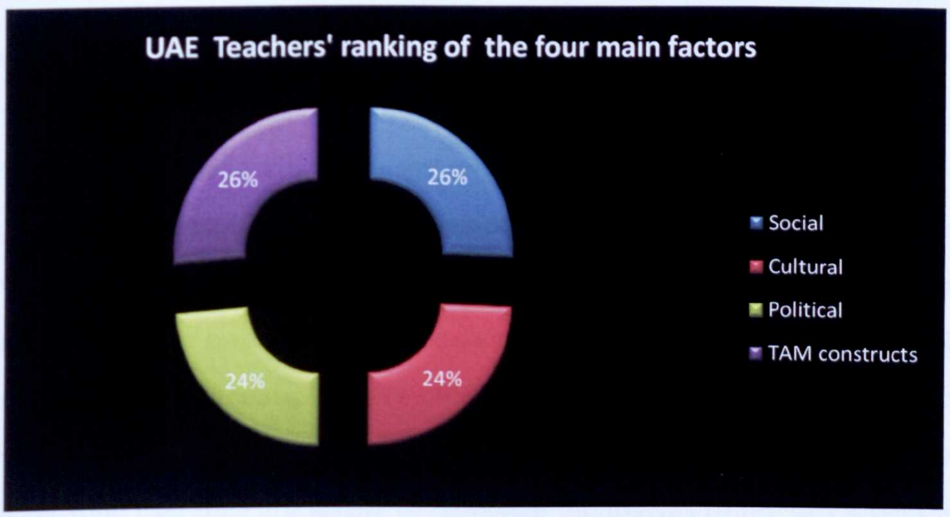

Figure 7.8: The UAE teachers' percentage of the four main factors

7.9.3 United Kingdom (UK)

The research sample consisted of teachers from Shorefields Technology College in Liverpool. There were 35 teachers (13 male and 22 female, with five questionnaires returned blank) and they were registered for the academic year 2011/2012. Details are shown in Table 7.45.

Table 7.45: UK teacher sample (in percentages)

		Frequency	Per cent	Valid per cent	Cumulative per cent
Valid	Male	15	42.9	42.9	42.9
	Female	20	57.1	57.1	100.0
	Total	35	100.0	100.0	

Questionnaires were distributed and the results showed that the average responses ranged between 4.6–3.3 of 5. Details are shown in Table 7.46 below.

Table 7.46: UK teacher sample: Summary item means

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.211	3.371	4.571	1.200	1.356	.112	30

The UK teachers' responses showed an extremely high rate of acceptance of eLearning technology as seen in the items mean of 4.21, when all items contained in the questionnaire ranged between 1 (Strongly Disagree) and 5 (Strongly Agree).

Items No. 10, 16, 3, 11, 14, 24, 9, 1, 18, 20, 23, 26, 27, 17 and 2 have high average response in terms of teachers' responses in first 15 items. Item number 10 in *first* place confirmed that "I think the teachers who are professional in using technology, are able to apply eLearning easily". Item number 16 in *second* place illustrated the sample's views "Availability of computers in learning environment helps me to use eLearning websites". Items numbers 3, 11, 4 and 24 came in joint *third* place, indicating the sample's desire to use the eLearning websites that provide useful learning materials, to share their experiences with their colleagues and students when they are learning from eLearning websites, and to surf unknown and unpopular learning websites, indicating that they are willing to challenge themselves to use any websites and that they do so without fear or concern of the unknown. Item number 9 came in *fourth* place, reflecting the sample's view of the importance of administrative support to increase the effectiveness of using computers. Items numbers 1 and 18 in joint *fifth* place confirmed the need of the sample to use eLearning websites to save time and effort. Items numbers 20, 23 and 26 in joint *sixth* place illustrated that the importance of "Learning context should provide the technicians to solve problem in computers" and "I think if I have basic skills in using technology that will support me to achieve successful learning process". Item number 27 in *seventh* place showed "I believe that the regular maintenance of computers will facilitate their being used for learning purposes". Item number 17 in *eighth* place reflected the ease of use the eLearning websites in other languages. Item number 2 in *ninth* place referred to "Social networks provide and update me for the latest news of political issues". Table 7.47 below shows full details of how the items were ranked by the UK teachers.

Table 7.47: Classification of TAM factors by ranking of items by UK teachers

Ranking of items	Item ID number	Factors	Factor Class
1	10	Qualification/Skills	Social factors
2	16	Facilitating Conditions	Social factors
3	3,11,14,24	Perceived Usefulness, Power Distance, Uncertainty Avoidance, Qualification/Skills	TAM construct, Cultural, Political, Social factors
4	9	Facilitating Conditions	Social factors
5	1,18	Perceived Ease of Use, Perceived Usefulness	TAM construct factors
6	20,23,26	Perceived Ease of Use, Facilitating Conditions, Qualification/Skills	TAM construct, Social factors
7	27	Facilitating Conditions	Social factors
8	17	Language	Social factors
9	2,28	Social Networks, Perceived Usefulness	Political, TAM construct factors
10	5,15	Perceived Ease of Use, Social Networks	TAM construct, Political factors
11	12	Perceived Ease of Use	TAM construct
12	22	Social Networks	Political factors
13	19	Language	Social factors
14	4	Social Media	Political factors
15	29	Social Media	Political factors
16	6	Power Distance	Cultural factors
17	7	Uncertainty Avoidance	Cultural factors
18	30	Individualism/Collectivism	Cultural factors
19	8	Individualism/Collectivism	Cultural factors
20	25	Perceived Ease of Use	TAM contracts factors
21	13	Social Media	Political factors

Table 7.48 and Figure 7.9 below show the relative importance of the four main classes of factors according to cumulative scores of the UK teacher's responses. TAM construct factors and social factors jointly had the highest percentage at 26 per cent.

Table 7.48: The UK teachers' ranking of the four main factors

Factors	Means	Percentages
Social	4.2	26%
Cultural	3.8	24%
Political	3.9	24%
TAM constructs	4.2	26%

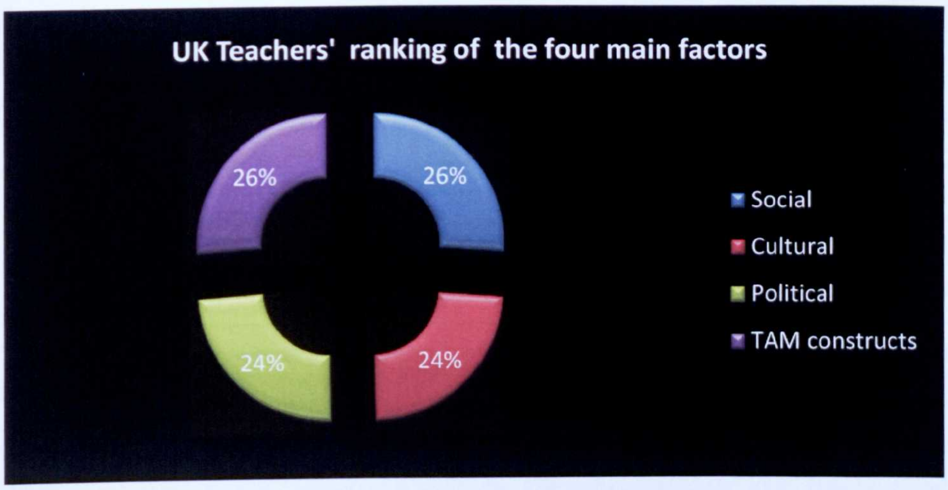

Figure 7.9: The UK teachers' ranking of the four main factors

7.10 Phase Three Teacher Questionnaire Results: Detailed Comparisons

7.10.1 Social factors

Comparison between the responses of Omani, UAE and UK teachers, as in the case of the students, reveals substantial difference in one major aspect, that of language. Most of the relevant geography eLearning sites are presented in the English language. Others exist in a range of European and non-European languages but relatively few are in Arabic. As Omani teachers have been exposed to the former *General Education* system, their exposure to foreign languages other than English has been scanty. Hence, the particular difficulties faced by Omani teachers are in the area of non-Arabic language content. The same remarks apply to a lesser extent to the teacher respondents in the UAE, owing to the fact that the UAE education system has been developing for longer than that of Oman. The UK teachers come from a practitioner background in which the use of computers in the educational environment has a much longer tradition (since the mid-1970s). Thus their responses, as expected, are different to those of Omani and UAE teachers. As English is still the predominant language of the internet, they face relatively fewer problems. However, what is significant is the way in which both Omani and UAE teachers are catching up to their UK counterparts in terms of attitudes and readiness to acquire the new skills required for operating effectively in their eLearning environment.

Table 7.49: Teachers' Responses:
Means of social factors across three cultures (Oman & UAE and UK)

Means of Social Factors			
Factors	*Cultures*		
	Oman	UAE	UK
Language	2.6	3.7	3.9
Qualification/Skills	4.3	4.1	4.4
Facilitating Conditions	4.3	4.2	4.3

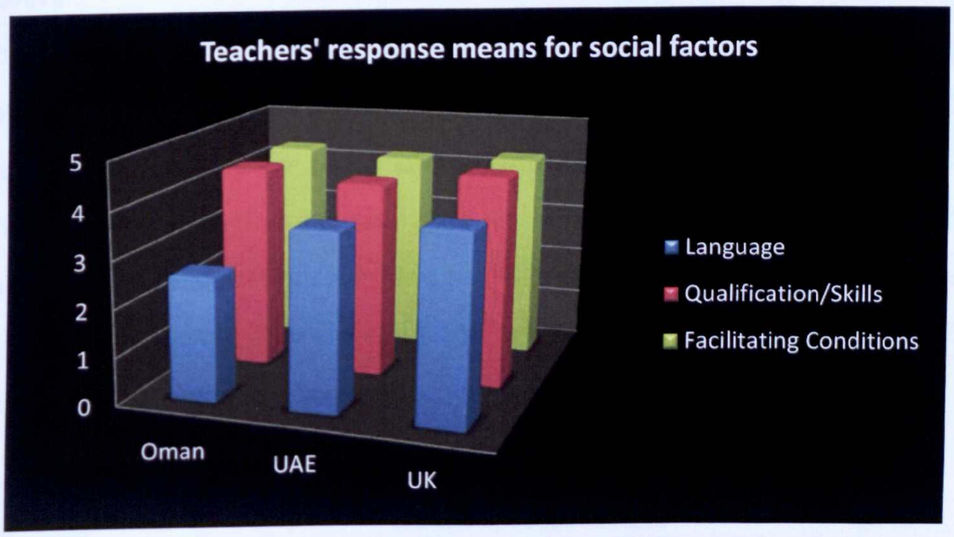

Figure 7.10: Teachers' Responses:
Means of social factors across three cultures (Oman & UAE and UK)

Omani teachers

Social factors came in *third* place in the Omani teachers' ranking of the four main components of technology acceptance. It is noted that, the language issue formed a problem for Omani teachers (with a mean of 2.6) in browsing and surfing eLearning websites in languages other than Arabic. In addition they experienced difficulties in explaining and interpreting learning materials downloaded from non-Arabic-language eLearning websites. Regarding background qualifications and skills, results illustrated the need of respondents for qualifications and training to use eLearning; this is clear from their acceptance of the questionnaire statements relating to qualification requirements such as basic skills in using technology and attending eLearning workshops to provide multiple skills to use eLearning websites. Facilitating conditions formed another important factor from these respondents' view, as their responses reached 4.3 in terms of facilitating the eLearning context by administrative support, regular maintenance and technicians to help and solve computer problems. Details are shown in Table 7.50 below.

Table 7.50: The means of social factors according to Omani teachers' responses

Means of social factors		
Factors	Means	Mean of means
Language	2.6	3.7
Qualification/Skills	4.3	
Facilitating Conditions	4.3	

UAE teachers

Social factors came in *second* place in the UAE teachers' ranking of the four main components of technology acceptance, where the language factor (with a mean of 3.7) is considered to be important by UAE teachers' in terms of web-browsing and accessing eLearning websites sources in other languages, thus increasing the teachers' surfing of such web-sites with greater ease. In addition the qualification/skills and facilitating conditions have high response-means, reflecting the respondents' firm belief in the necessity of training qualified teachers and facilitating the environment for eLearning requirements. Table 7.51 gives details.

Table 7.51: The means of social factors according to UAE teachers' responses

Means of social factors		
Factors	Means	Mean of means
Language	3.7	4.0
Qualification/Skills	4.1	
Facilitating Conditions	4.2	

UK teachers

Social factors came in *first* place in the UK teachers' ranking of the four main components of technology acceptance, whilst respondents gave second-highest rating (mean of 4.3) to facilitating conditions, *i.e.* the availability of computers in the learning environment and of technicians to solve computer problems, but put more emphasis on the proper training and qualifications of teachers to take part in and run eLearning programmes. UK teachers did not have report any problem with social factors. Seeing that their native language is English, they are able to use and browse the eLearning websites much more easily than their counterparts in Oman and the UAE. Qualification/skills and facilitating conditions both have high means ratings as the UK education system has been in existence for the longest period of time and should, therefore, have established systems to manage innovation and the rise of new needs in such areas as procurement and training programmes. Table 7.52 below gives details.

Table 7.52: The means of social factors according to UK teachers' responses

Means of social factors		
Factors	Means	Mean of means
Language	3.9	4.2
Qualification/Skills	4.4	
Facilitating Conditions	4.3	

7.10.2 Cultural factors

It was expected that the responses of Omani and UAE teachers would resemble each other more closely than they would resemble those of UK teachers. This is indeed the case, although it is once more noted that their responses exhibit a relatively small margin of discrepancy from those of the UK teachers. One surprising outcome of the results for cultural factors is the startling degree to which the UK teachers' responses regarding power distance resemble those of the Arab teachers. It is unfortunate that there was no opportunity to ask the UK teachers to give their reasons for this surprising response. As it stands, it is thus impossible to ascertain whether the results are to be explained as simply an accidental blip or as pointing to some significant issue that UK teachers have in this matter.

Table 7.53: Teachers' Responses:
Means of cultural factors across three cultures (Oman & UAE and UK)

Means of cultural factors			
Factors	*Cultures*		
	Oman	UAE	UK
Individualism/Collectivism	3.7	3.8	3.5
Uncertainty Avoidance	3.8	3.8	4.0
Power Distance	4.2	4.0	4.1

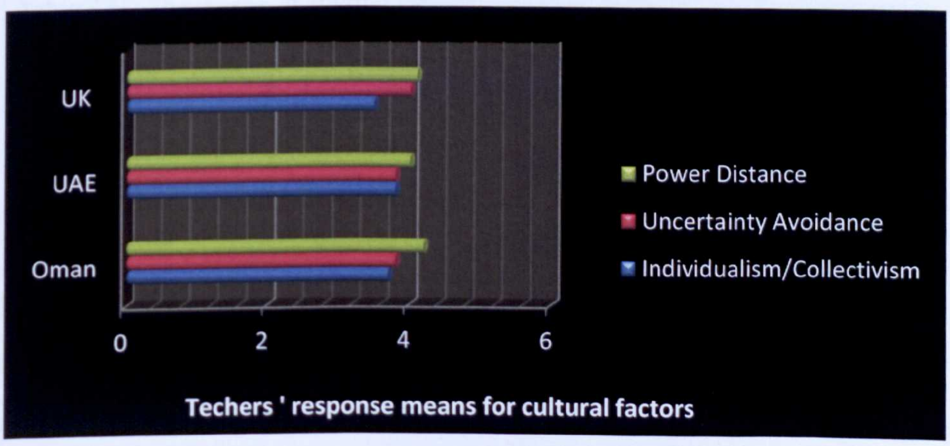

Figure 7.11: Teachers' Responses:
Means of cultural factors across three cultures (Oman & UAE and UK)

Omani teachers

Cultural factors (individualism/collectivism, uncertainty avoidance and power distance) came in *second* place in the Omani teachers' ranking of the four main components of technology acceptance. Omani teachers tend to cooperate and to work as a team; this is a reflection of the collective spirit in the wider social community in Oman. This is illustrated through the moderate response rate to the item "eLearning creates an isolative atmosphere between teachers and students". They prefer to ask colleagues, friends and technicians if they have problems when browsing or learning from eLearning websites, as can be seen in their high response-means in items 30 and 8 (with means of 4.0 and 3.0 respectively). Teachers did not admit to anxiety from the unknown—perhaps because the respondents have sufficient skills to browse the internet or because they actually enjoy exploring new eLearning websites. Although their response mean for this factor was 3.8, but it is still appropriate to say that they ought to challenge themselves in the eLearning context. Power distance is reflected in the high response mean of 4.2, despite the high response mean of 4.1 for the item that refers to the sharing of new experiences between teachers and their colleagues and students, when learning new topics from eLearning websites. On the other hand the high response mean of 4.4 of the sample is noted for power distance, indicating that using eLearning should be limited to certain groups such as mangers and highly qualified individuals. The sample reflects their desire to receive for more training so that they can progress in the use of eLearning applications, so as to acquire greater skills and confidence, which has the corollary of counteracting the limitation of technology use to particular groups or individuals. Table 7.54 gives details.

Table 7.54: The means of cultural factors according to Omani teachers' responses

Means of cultural factors		
Factors	Means	Mean of means
Individualism/Collectivism	3.7	3.9
Uncertainty Avoidance	3.8	
Power Distance	4.2	

UAE teachers

Cultural factors (individualism/collectivism, uncertainty avoidance and power distance) came in *third* place in the UAE teachers' ranking of the four main components of technology acceptance. The responses of the UAE teachers indicate that they have a level of sociability similar to that of the Omani teachers. This becomes clear from their moderate response mean to the item proposing that using eLearning will create an isolative atmosphere between teachers and students, whilst they agree with collaborating with their colleagues and friends when they have any problem in using eLearning applications. The UAE teachers gave a 3.8 response mean to uncertainty avoidance, whilst in contrast to this their responses to items 14 and 7 indicated that they have the confidence to search unfamiliar eLearning websites and to explore new eLearning websites. Their response-means to power distance was high, reaching 4.0. Table 7.55 shows details.

Table 7.55: The means of cultural factors according to UAE teachers' responses

Means of cultural factors		
Factors	Means	Mean of means
Individualism/Collectivism	3.8	3.8
Uncertainty Avoidance	3.8	
Power Distance	4.0	

UK teachers

Cultural factors (individualism/collectivism, uncertainty avoidance and power distance) came in *second* place in the UK teachers' ranking of the four main components of technology acceptance. In contrast with Omani and UAE teachers, the individualism/collectivism factor has a response mean of 3.8 from UK teachers, which illustrates the looser ties existing in UK society, as is clear from the low response-means of respondents in items 21 and 30. UK teachers showed a far greater willingness to search and explore new eLearning websites and to surf unknown/unpopular learning websites, indicating that they are subject to far less uncertainty avoidance because the UK culture's tolerance of change and its acceptance of changeable environments and situations. Moreover, the availability of high-speed internet services in UK, as well the fact that individuals do not usually face restrictions when surfing websites (unlike in Oman and the UAE) tend to mitigate uncertainty avoidance within UK culture.

As for power distance, the UK response mean reached 4.1. In item 11 teachers indicated that they prefer to share experiences with students and colleagues when learning from eLearning websites, but their responses to item 6 came very unexpectedly, as they agree with the proposition "Using eLearning should be limited to certain groups such as managers and highly qualified individuals", which reached 3.8. These results are not compatible to some extent with Hofstedes' study (1980) that proved the weaker effect of power distance in western cultures (Shafeek 2011).

Table 7.56: The means of cultural factors according to UK teachers' responses

Means of cultural factors		
Factors	Means	Mean of means
Individualism/Collectivism	3.5	3.8
Uncertainty Avoidance	4.0	
Power Distance	4.1	

7.10.3 Political factors

The teachers' responses regarding political factors show some interesting results. The political environments of Oman and the UAE are very similar to each other, whilst that of the UK is radically different. Surprisingly, the responses of the UAE teachers are seen to be closer to those of their UK counterparts than to those of the Omani teachers. In 1995 the UAE grant its citizens access to the internet (Mirza & Al-Abdulkareem 2011), and the UAE has followed an aggressive policy of introducing cutting-edge ICT for over ten years. Examples of this are the establishment of Dubai Internet City in October 2000 and Dubai Media City in January 2001. In 2008, the UAE had the highest diffusion of the internet by region: at the end of 2008 an estimated 25 per cent of the population were connected to the internet, whilst ADSL/Broadband penetration was estimated at 11 per cent (Ati & Guessoum 2010:1016). Accordingly, although the UAE teachers live in an environment similar to their Omani counterparts, they have had a wider opportunity to become acclimatized to social networks and social media.

Table 7.57: Teachers' Responses:
Means of political factors across three cultures (Oman & UAE and UK)

Means of political factors			
Factors	*Cultures*		
	Oman	UAE	UK
Social Networks	3.3	3.4	4.1
Social Media	3.2	4.1	3.7

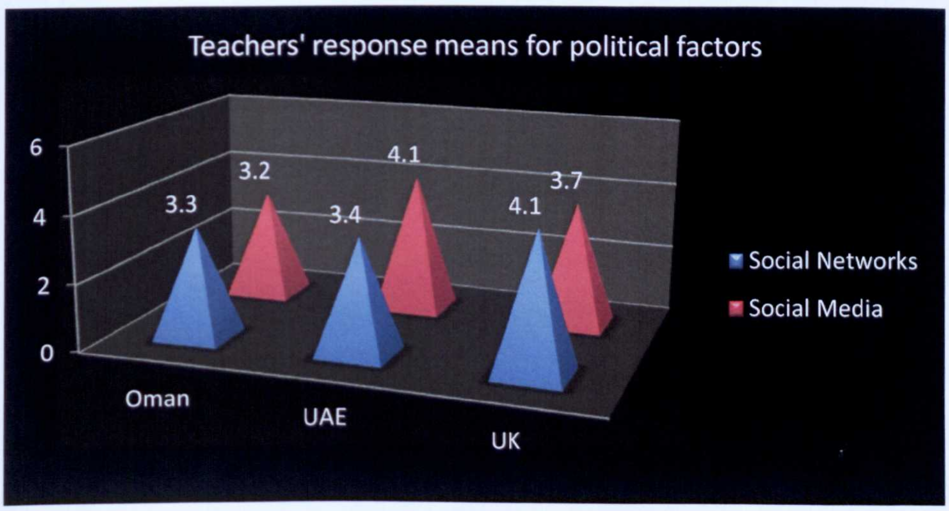

Figure 7.12: Teachers' Responses:
Means of political factors across three cultures (Oman & UAE and UK)

Omani teachers

Political factors (use of social networks and social media) came in *fourth* place in the Omani teachers' ranking of the four main components of technology acceptance. This indicates that the political factors do not play a particularly important role because of the stability of the political situation in the country and the regime's programme of reform. On the other hand, item number 15 had responses with a mean of 4.0 indicating that the social networks such as Facebook, Twitter, forums and blog-sites using enhanced technology do indeed act as a conduit for political issues, whilst item number 13 indicates the sample's habit of reading about political news and events via electronic news-sites. However, their response regarding the use of chat-rooms to discuss political issues was low (a mean of 2.5) because the government does not allow in-depth discussion of political issues. Details are shown in Table 7.58.

Table 7.58: The means of political factors according to Omani teachers' responses

Means of political factors		
Factors	Means	Mean of means
Social Networks	3.2	3.2
Social Media	3.2	

UAE teachers

Political factors (use of social networks and social media) came in *fourth* place also in the UAE teachers' ranking of the four main components of technology acceptance. This indicates that in the UAE political factors do not play a particularly important role because of the stability of the political situation and the regime's seeking to reform, and also owing to the absence of political parties and organizations that might generate different effects in that country. However, it is to be noted that the UAE and Qatar have been ranked by a non-Gulf scholar (of Egyptian nationality, writing about the effects of the so-called 'Arab Spring') as the most stable of the GCC countries in terms of political aspects (Salama 2011). Regarding social networks, the UAE teachers have confirmed that they use them for updates on the latest news of political issues (a mean of 4.0) whilst on the other hand they did not respond highly to the item that refers to the use of chat-rooms to discuss political issues (mean of 2.2). In social media teachers promote their acceptance in using technology applications for political issues. Details are shown in Table 7.59.

Table 7.59: The means of political factors according to UAE teachers' responses

Means of political factors		
Factors	Means	Mean of means
Social Networks	3.4	3.7
Social Media	4.1	

UK teachers

Political factors (use of social networks and social media) came in *second* place in the UK teachers' ranking of the four main components of technology acceptance. UK teachers noted that the social networks updated them with the latest news of social/political issues especially with regard to Facebook, Twitter, forums and blogs. Unlike Oman and UAE teachers, they gave high responses to item 22 indicating their orientation to using chat-rooms with others to discuss political issues, because British culture does not impose strict penalties on those who publicize or discuss political issues (unlike many Arab societies, in which those who criticize the political situation may often be prosecuted). Thus, the internet in the UK is allowed for airing political issues whilst in Arab cultures such chat-rooms are normally closed down. As for social media, UK teachers confirmed that they used them to follow political events. Details are given in Table 7.60.

Table 7.60: The means of political factors according to UK teachers' responses

Means of political factors		
Factors	Means	Mean of means
Social Networks	4.1	3.9
Social Media	3.7	

7.10.4 TAM construct factors

The teachers' responses regarding TAM construct factors show most encouraging results. Although UK and UAE teachers have had far greater opportunity to become acclimatized to modern ICT, the Omani teachers show great willingness, as evidenced by their results, which are very similar to those of their UAE counterparts, whilst both sets of Arab teachers show only a very small margin of discrepancy with the UK teachers.

Table 7.61: Teachers' Responses:
Means of TAM construct factors across three cultures (Oman & UAE and UK)

Means of (TAM) construct factors			
Factors	*Cultures*		
	Oman	UAE	UK
Perceived Usefulness	4.2	4.0	4.3
Perceived Ease of Use	4.0	4.2	4.2

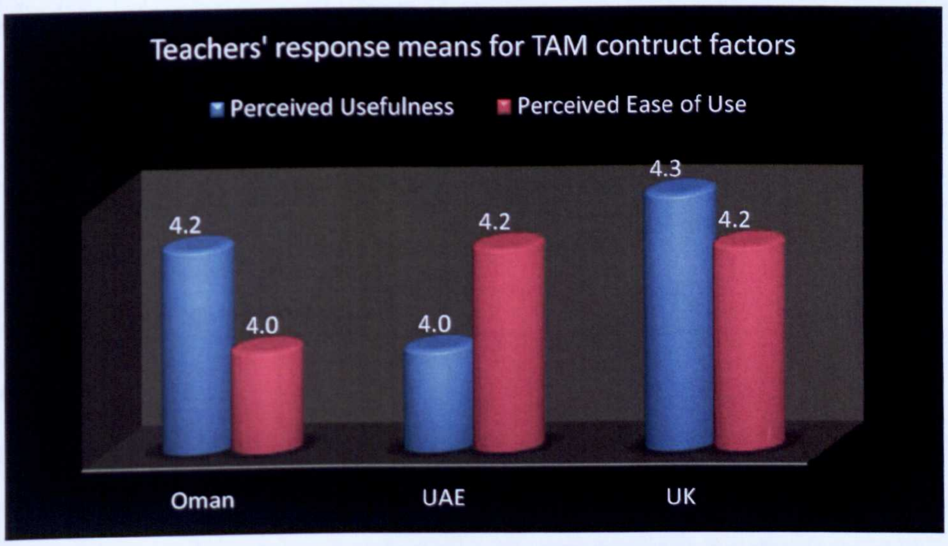

Figure 7.13: Teachers' Responses:
Means of TAM construct factors across three cultures (Oman & UAE and UK)

Omani teachers

Technology Acceptance Model constructs (perceived usefulness and perceived ease of use) came in *first* place in the Omani teachers' ranking of the four main components of technology acceptance. Omani teachers have faced new experiences in learning and teaching, discovering many advantages when teaching students in terms of employing useful learning materials, saving time and effort, increasing search skills, appreciating the usefulness of using eLearning websites, and finding it easy to locate information from eLearning websites. The results confirm the high average of teachers' response in the TAM construct factors (Table 7.62 below).

Table 7.62: The means of political factors according to Omani teachers' responses

Means of (TAM) constructs factors		
Factors	Means	Mean of means
Perceived Usefulness	4.2	4.1
Perceived Ease of Use	4.0	

UAE teachers

Technology Acceptance Model constructs (perceived usefulness and perceived ease of use) also came in *first* place in the UAE teachers' ranking of the four main components of technology acceptance, where the items means are ranked between 3.8–4.6. As for the Omani teachers, the UAE teachers appreciated the importance of factors in using technology such as usefulness and ease of use, as appears in their high responses for TAM construct issues such as developing search skills, saving time and effort, gaining useful learning materials, finding information easily from eLearning websites, and making recommendation to colleagues and friends to surf eLearning websites. Details are shown in Table 7.63.

Table 7.63: The means of political factors according to UAE teachers' responses

Means of (TAM) constructs factors		
Factors	Means	Mean of means
Perceived Usefulness	4.0	4.1
Perceived Ease of Use	4.2	

UK teachers

Technology Acceptance Model constructs (perceived usefulness and perceived ease of use) also came in *first* place in the UK teachers' ranking of the four main components of technology acceptance, for whom this factor was considered to be the main determinant to any experience in terms of the perceived usefulness and ease of use. These high responses reflected the UK teachers' acceptance of these two factors as the basis for eLearning should be to focus on the usefulness and ease of use of any eLearning applications. Details are shown in Table 7.64.

Table 7.64: The means of political factors according to UK teachers' responses

Means of (TAM) constructs factors		
Factors	Means	Mean of means
Perceived Usefulness	4.3	4.2
Perceived Ease of Use	4.2	

7.10.5 Discussion of results

The detailed comparisons between the responses provided by the teachers from Oman, the UAE and the UK indicate patterns that reflect very closely the actual background in which they live and work. Especially in the area of political factors, the teachers from the Arab countries are reticent in their use of electronic networks and media for anything but professional purposes. This might have an impact on their on-going development of capacity in keeping pace with technology and gaining greater familiarity with what is available. However, what cannot be denied is their commitment to taking advantage of the pedagogical and knowledge-building opportunities that the new technology offers.

In terms of their responses to social and cultural factors, it can be seen that although the Omani and UAE teachers are subject to at several disadvantages (particularly in the area of language) they are in no way deterred from meeting the challenge posed by the new technology. In the case of the teachers from the Arab countries, it can be seen that they have similar levels of commitment to using educational technology, even though the environments in which they live continue to impose restrictions on their scope for action. These restrictions are of a physical nature (in the way of the availability of electronic resources and facilities), personal (especially in the way of language acquisition), besides those that are political/societal, that have already been mentioned. The close paralleling of the Arab teachers' responses in their nature (if not exactly in their scale) with those of their UK counterparts shows that educational technology has taken hold on the imaginations of these teachers, and the item mean ratings show that whatever reluctance there might be among some teachers to use the new technology, it is a minority trend.

7.11 Evaluation of feedback from learners and teachers

7.11.1 Learners' feedback

This study sought to develop an adaptive learning environment which is appropriate to the requirements of eLearning, in which the interaction between teachers and students and the positive results that have been achieved are all reflected in the learning outcomes and the survey responses. The study was conducted through three fieldwork phases that generated results that reflected positive attitudes among teachers and students towards using eLearning applications in terms of effectiveness and efficiency, and also gave different indications about the role of cultural factors in influencing the acceptance of eLearning. Regarding students' responses in the ***first questionnaire survey***, in terms of requirements for developing the ELF, results indicated a high average in the responses, which reached 4.5–3.8 of 5, indicating the respondents' desire to incorporate eLearning experiences in the classrooms.

According to the respondents, the important issue with which the sample agrees is that computer-assisted learning will deepen their understanding of the subjects covered in the geography textbook. In next place "My self-learning process in acquiring knowledge that corresponds to my needs, inclinations and desires acts as a powerful incentive for me to be self-reliant and confident in my own capabilities". This is indicated in the study by Dowell & Small (2011) in terms of how self-regulating can motivate students to choose the specific goals and then employ different strategies to achieve these goals which will lead to create an effective learning environment. In third place "My continuous progress in my studies both in strong and weak areas encourages me to improve my strong points and also to address my weak points, which will create a positive reflection on my progress and performance" and this item is closely link to the previous item in terms of the importance of self-learning to identify the strengths and weaknesses points on learners' learning progress (Eilam & Aharon 2003, Nota *et al.* 2004). The open-ended question in the same questionnaire refers to respondents' opinion of the specific requirements that they would wish to be included in an eLearning environment, their answers being summarized in the following phrases: should not be complicated; ability to access multiple learning methods and activities; complementary to and supporting the traditional education; helping to understand geography concepts and phenomena; teachers' role has to be as facilitator and organizer and delivering content in interesting and attractive ways by integrating a large amount of multimedia software. Most of these issues are addressed in studies by Yang *et al.* (2010), Lidón *et al.* (2011), and Chen & Tseng (2012).

For the ***Core Experiment***, pre-run and post-run attitude scales were used to measure EG feedback regarding their reactions to engaging in eLearning experiences. Their highest-ranking response was their confirmation that eLearning provided a greater level of motivation compared with traditional classroom teaching (Tüzün *et al.* 2009; Gomez *et al.* 2010). In addition, items in second place confirmed that eLearning environments have tended to challenge and replace the traditional classroom; however, although many studies have proved the role of eLearning environments in increasing the efficiency and performance of learning outcomes (Piccoli *et al.* 2001; Abraham 2002; Yengin *et al.* 2010), other studies have confirmed the necessity of incorporating technological applications to support traditional classrooms (Backer *et al.* 2012, Chen *et al.* 2009; Wright 2010, De Winter *et al.* 2010). In third place comes "eLearning encourages me to self-learning and provides me with immediate feedback" (Krause *et al.* 2009). Moreover, according to respondents' comments made during the post-CExp interview, they found many advantages when using the "Geography World" ELF in terms of its being helpful, enabling them to access a wide range of geographical information sources; this deepened their understanding of the environment, improved their sense of spatial relationships, and gave them experience of alternative images of peoples, places and environments. In addition they mentioned that they gained new geography-related skills such data collection, investigating, presentation of geographical ideas, prediction and problem solving. In contrast, they found some difficulties in technical support, the lack of time to search websites owing to the limited session-length (40 minutes), lack of equipment, computers and technological devices, and difficulties encountered when searching in another language. It is normal for new experiences to have drawbacks as well as advantages, but the important point is that all such feedback and comments can be useful for enhancing the experience (Dennis *et al.* 2010; Oncu & Cakir 2011).

In the ***second questionnaire survey of students***, the results obtained showed the differences between two cultures (Oman and UK) in terms of Technology Acceptance. The proposed TAM has four main factors to measure students' tendencies in using eLearning technologies and websites. The response-means of Omani students shows the ranking of cultural/social factors as being TAM constructs, social, political and cultural factors respectively. TAM constructs (usefulness and ease of use) were ranked highest, because the respondents indicated that new experiences and the interface with website facilities are important to understand and use the technology (Saadé & Bahli 2005). Social factors came in second place in terms of the respondents' awareness that the facilitating conditions and qualification/skills are important factors to develop the effective learning environment, where facilitating conditions require the recognition of environment elements such as knowledge, time, financial resources, equipment, and access to hardware/software: these are the initial requirements for any learning environment (Mathieson *et al.* 2001). However, language presented a problem for respondents as they found difficulty in searching and surfing in eLearning websites using another language (in this case, English), as the number of relevant Arabic-language websites available was limited. Political factors came in third place in terms of social media, social networks and their role to provide and update students with the latest news of social/political issues. Cultural factors came in last place, as students reflected their collective community spirit and their aversion to unknown and unpopular learning websites, owing to their not having sufficient skills to browse the internet or because they were unwilling to explore new eLearning websites. In addition, they had another problem arising from their belief that using technology should be limited to certain groups such as qualified individuals, thus illustrating their need for greater confidence in using technology applications. To overcome this shyness, they need to be provided with more training for the necessary skills and abilities.

The UK students' response-means in terms of the four main factors were ranked as TAM constructs, social, cultural and political factors respectively. UK and Omani students agree on the importance of TAM construct factors (ease of use and usefulness) in terms of using eLearning websites. In contrast, unlike Omani students, UK students did not face language problems when they searched in English, as it is their mother tongue. Moreover, unlike Omani students, UK students represented the individualistic aspect of their community culture in using technology, because of their speed and dexterity in the use of technology networks and services in contrast to the students from Oman. They were thus not so much thrown back on checking with their peers when they encountered problems. The results also showed that they were much less subject to uncertainty avoidance and power distance within the UK culture, this being in line with Hofstede's study (1980) that demonstrated the lower effect of uncertainty avoidance and power distance in western cultures (Shafeek 2011). Political factors took the last place, which means that social media and social networks played a major role in exchanging, providing and updating the UK students on social/political issues, this being reflected in the tolerance of UK culture with respect to following and discussing socio-political issues, unlike in Omani culture.

7.11.2 Teachers' feedback

Regarding teachers ***surveyed by questionnaire in Phase One***, results indicated in terms of the requirements for developing the learning environment the high average responses, which reached 4.6–3.7 of 5, reflecting the sample's desire to incorporate eLearning experiences in the classroom. According to the respondents, the most important issue that the sample identified was that technology plays an effective and influential role in delivering the geography curriculum in the virtual learning environment, thus agreeing with studies such as Carano & Berson (2007) and Van der Westhuizen *et al.* (2010). In next place respondents confirmed the importance of 3D technology applications and multimedia for improving the understanding of geographical phenomena, agreeing with Anthamatten & Ziegler (2006), who illustrated the importance of employing 3D technology applications to support the geography curriculum. In third place came "computer-based simulations, educational games, virtual role-playing and field-trips are all methods that increase the effectiveness of learning" (compare Depradine 2007; Wu *et al.* 2012).

The open-ended question in the same questionnaire elicited respondents' opinion of the specific requirements that they would wish included in an eLearning environment; their answers included such key phrases as 'must engage students in cooperative activities', 'must support learners' skills and experience in using computer facilities', 'ensure that teachers and learners have rich interactive multimedia experiences', 'it has to be an effective and exciting environment for attracting learners to the learning-content', 'must include a variety of maps, websites linked to the curriculum contents, e-books and an e-Atlas', 'the content and programme run-time should be appropriate to the time allocated for teaching geographic content in terms of the lesson-plan', and finally 'it must include learning methods using modern technology that learners can deal with and understand easily'. Most of these issues are addressed in studies by Gudanescu (2010), Huang *et al.* (2010), Biasutti (2011) and Özdamlı (2011).

In the ***Phase Three questionnaire survey***, the results obtained showed the differences between three cultures (Oman, UAE and UK) in terms of the Technology Acceptance. The TAM had four main factors to measure teachers' tendencies in using eLearning technologies and websites. The response-means of Omani teachers gave the ranking of cultural/social factors in the order TAM constructs, Cultural, social and political factors. TAM constructs (usefulness and ease of use) are represented as the most important because the teachers found many advantages when teaching students in terms of useful learning materials, savings in time and effort, increased search skills, the usefulness of existing eLearning websites, and easy of finding information from eLearning websites. Significantly, the fact that TAM construct factors rank high in the averages of teachers' responses reflects the importance of these factors in terms of acceptance of new technologies (Shen *et al.* 2010).

Cultural factors came in second place, as teachers' responses reflected the collective nature of Omani social culture, agreeing with the findings of the recent study by Klassen *et al.* (2011). Moreover, the Omani teachers have little or no aversion to unknown or unpopular learning websites, because they have sufficient skills to browse the internet and/or because they like to explore new eLearning websites. However, they had a problem regarding their belief that using technology should be limited to certain groups such as qualified individuals. This illustrates their need to be much more confident in their own status, as well as in using the latest technology applications; to solve this problem they should be provided with on-going professional development training to acquire the necessary updated skills and abilities, as also to confirm their worth as key professional workers (compare Al-Nofli 2010). Social factors came in third place, where Omani teachers (like Omani students) have problem in browsing and surfing in other languages, while they gave high responses regarding qualification/skills and facilitating conditions, which reflects teachers' awareness of the importance of preparing and qualifying teachers for operating in eLearning environments and acquiring specific skills in eLearning contexts regarding computers, administrative support, regular maintenance and knowing when to call in technicians to solve problems in computers. Political factors came in the last place in terms of social media/social networks and their role in providing teachers with the latest social/political news. The low ranking of the political factor reflects the stability of the domestic political situation and the regime's drive for reform, whilst the government does not encourage discussion of certain specific political issues.

UAE teachers' mean responses in terms of the four main factors were ranked in order TAM constructs, social, cultural and political factors respectively. Like Omani teachers, UAE teachers considered usefulness and ease of use to be the most important factors in using new technology and searching eLearning websites. UAE teachers, unlike Omani teachers, did not experience problems in browsing and accessing eLearning websites using other language, possibly because the UAE government has provided internet access to its people since 1995, being the first of the GCC countries to install this service, owing to GCC governments' reluctance to expose their populations to online pornography or extremist political influences (Mirza & Al-Abdulkareem 2011:84). Furthermore they have high means in responses on qualification/skills and facilitating conditions, which reflects their belief regarding the necessity of preparing and qualifying teachers for using technology within eLearning environments, and adapting their own teaching environment to make it amenable to eLearning experiences (Zitter *et al.* 2009; Cheng & Wang 2011). Results for cultural factors in terms of individualism/collectivism reflected a collectivist culture, whilst for uncertainty avoidance the results indicated the confidence of respondents in searching unfamiliar eLearning websites and exploring new eLearning websites. The response for power distance was to some extent high, indicating a need for further experiences in eLearning to become more familiar with the latest technology applications. As for political factors, they indicated a high acceptance of technology in terms of their use of social networks to update them for the latest news of social/political issues, whilst in contrast they rejected the item referring to their use of chat-rooms or chatting to discuss political issues. The political situation in the UAE and Oman is described as stable, as the regimes seek to make reforms, whilst here are no political parties in either country. However the UAE and Qatar are ranked as the most stable countries in terms of political aspects among the Gulf countries (Salama 2011).

UK teachers' response-means in terms of the four main factors are ranked in order TAM constructs, social, cultural and political factors respectively. TAM constructs factors have high response-means among Omani, UAE and UK teachers because of the importance of these factors for understanding and using new technology experiences. Unlike Omani and UAE teachers, UK teachers have not any problems with language in terms of social factors because English is their native language as well as being a world language for technology, and they can browse and use eLearning websites and applications easily. Qualification/skills and facilitating conditions have high response-means, reflecting the respondents' awareness that teachers who have high qualifications and skills in eLearning will have obviously greater competence in the overall learning environment (Law 2010). Likewise, the environment that is facilitated with suitable equipment will more successfully support the eLearning context. The UK education system has been in existence for the longest period of time, having been first organized in the mid-nineteenth century and extended nationwide at the end of the nineteenth century and the beginning of the twentieth century. It is not surprising then that according to the UK government, British schools are equipped to embrace eLearning systems and their teachers are qualified and have sufficient skills to engage in such systems (DfES 2003, 2004).

In contrast with Omani and UAE teachers, UK teachers have high response-means for individualist/collectivist cultural factors, illustrating the weakness of social relations in British society, whilst UK teachers have less uncertainty avoidance because the UK culture tolerates change and accepts a changeable environment. Furthermore, no restrictions have been placed on the availability of high-speed internet services or on individuals when surfing websites, unlike Oman and UAE. All these aspects generate less uncertainty avoidance. Regarding power distance, teachers gave unexpected responses in terms of power distance, showing a certain acceptance of low expectations regarding their personal capacity and expertise in technological matters. These results are not consonant with those of Hofstede's study (1980) which demonstrated the lower effect of power distance in western cultures (Shafeek 2011). It is not clear whether teachers see themselves as 'non-technicians' or have other issues regarding their own capacity-building in ICT, but further clarification might lead to interesting findings. As for political factors, UK teachers noted that the social networks update them with the latest news of social and political issues. Unlike Omani and UAE teachers, UK teachers have high responses in this regard because British culture does not impose restrictions or penalties on those who discuss political issues.

7.12 Summary of the Chapter

This chapter has reviewed in detail the findings derived from analyzing the data and other information derived from the teacher and student respondents covered in this research. In the great majority of cases, the findings have been consistent with the previous literature in this field, although it is be noted that the amount of previous literature that deals specifically with Gulf Arab countries is not extensive in this field. Reference has had to be made to studies that are now somewhat dated (e.g. Hofstede 1980), although a search of the references gathered for this study shows that not much new literature is being produced that specifically deals with the Gulf Arab States and even more specifically with Oman (Al-Nofli 2010).

Regarding the students surveyed, the results and their findings showed that the background factors of Omani students identified for measuring technology adaptation and acceptance reflect the findings published in other literature regarding Middle Eastern countries, where students' attitudes and lack of previous knowledge and/or experience of using ICT have been found to be major factors affecting their acceptance of eLearning (Selim 2007; Abbad *et al.* 2009; Özkan & Köseler 2009), whilst the great lack of online repositories containing Arabic-language educational material has been indicated by previous studies besides the present one (for instance, Al-Khalifa 2008). The findings for the UK students are typically different from those for Omani students, and are in line with the findings in the extensive literature on students in those countries of whose culture the UK is the representative.

Regarding the teachers surveyed, in general the results and their findings reveal that the background factors of UAE and Omani teachers identified for measuring technology adaptation and acceptance demonstrate certain parallels with those for Omani students (no UAE students having been surveyed). The similarities between the responses of Omani teachers and students arise from their sharing a common social background. There are, however, noticeable differences between Omani teachers and students, owing to the teachers' greater experience of undergoing tertiary education and/or training. The similarities between Omani and UAE teachers arise from their sharing a very similar social background, whilst the differences between them can be explained by the fact that the UAE has enjoyed the internet and related technologies for a longer period than in the case of Oman. The differences demonstrated by UK teachers are in line with the findings of the extensive literature existing on technology adaptation and acceptance by teachers in western countries. It is to be regretted that it was not possible to survey UAE students during this research, owing to unforeseen circumstances. It is possible that the results and findings might have shown trends in attitudes and responds of UAE students in the direction of their UK counterparts, owing to the longer establishment of the internet in their country, in a similar way to the small but significant differences existing between UAE and Omani teachers.

CHAPTER EIGHT: CONCLUSION, RECOMMENDATIONS & FUTURE WORK

This chapter opens with a review of the thesis study, including the study aims and outcomes for each chapter. This is followed by the conclusions drawn from the research and observations regarding the implementation of eLearning applications in Oman's *BE* second-cycle for the tenth-grade geography curriculum. It also deals with the conclusions drawn regarding technology acceptance in the environments of the three target countries (Oman, UAE and UK) that represent two cultures (Gulf Arab and Western). It also considers the strengths and limitations of the study, the achievements of the study, and offers recommendations and further opportunities for research.

8.1 Review of the Thesis

This research investigated the integration of technology into Oman's secondary-school education system using the tenth-grade *BE* geography curriculum as a case-study. The research also made an assessment of this integration using the TAM developed for this purpose. This research aimed to answer the following questions:

Research Question #1 (eLearning for geography in Oman)

Regarding the effectiveness of developing an adaptive learning environment based on the electronic teaching of geography... to what extent is this dependent upon the achievements and attitudes of tenth-grade Basic-Education students in Oman? There are certain points that are relevant to posing and answering this question, as follows:

Q.1.1—What are the difficulties that might face the introduction of a geographical eLearning framework in schools in the second cycle of *Basic Education* at the tenth grade?

Q.1.2—What are the quality and interactive aspects of an eLearning framework that can assist the teacher to reduce learner resistance to eLearning and technology?

Q.1.3—What are the specification-requirements for developing an eLearning framework to support geography teaching/learning?

Q.1.4—How can the development of an eLearning framework for teaching, learning and assessment contribute to improving the progress and learning outcomes of *BE* tenth-grade students in Oman?

Research Question #2 (Use of the TAM)

How can we utilize the Technology Acceptance Model to understand the factors that affect teachers' and students' acceptance of eLearning systems and websites?

Q.2.1—What is the relationship between the technology-acceptance factors and teachers'/students' attitudes towards using eLearning?

Q.2.2—To what extent can developing a learning environment influence students' attitudes towards using technology within the *BE* tenth grade?

Q.2.3—How do we utilize a Technology Acceptance Model for evaluating eLearning?

Research Question #3 (Comparative study)

How do we contrast two different cultures, to see if social and cultural differences can affect the acceptance of eLearning—through a comparison between teachers/students in the UK (western culture) and two Arab countries (Middle Eastern Arab culture)?

Q.3.1—What factors are identified in the literature for comparing different cultures for technology acceptance?

Q.3.2—How to assess social and cultural factors and to explore the relationship between these and the teachers' and students' acceptance of eLearning?

The specific objectives of the research have been:

1. To produce an adaptive eLearning framework for tenth-grade geography students in Oman that will be of positive pedagogic benefit and might also be extended by other researchers for use in other educational field in the Omani education system;

2. To develop and evaluate a Technology Acceptance Model for eLearning, to ensure that such an extension and/or adaptation of the experimental eLearning framework can be achieved;

3. To consider social and cultural factors, and to investigate the relationship between cultural/social factors and the teachers' and students' acceptance of eLearning, both from the academic standpoint of refining the experimental TAM, and for practical pedagogic purposes in serving the needs of the Omani education system;

4. To contrast two different cultures, to ascertain whether social and cultural differences can affect the acceptance of eLearning—through a comparison between teachers/students in the UK (western culture) and two Arab countries (Middle Eastern Arab culture), to determine the differences between them.

The integration of technology into Omani *BE* tenth-grade classes is an important consideration, because the *BE* tenth grade surveyed in this study contains *only the fourth generation of students* who have been educated from the beginning in the *BE* programme. As the *BE* programme is still undergoing major refinements, these students can thus be considered as pioneer learner-users of the present-day system that has replaced the original state schooling system. This study has combined the integration of technology in geography classrooms with an evaluation of a particular eLearning environment for Oman, and therefore it can be considered the *first study* of its kind in this field for Oman. Furthermore, in line with one of the study's objectives, the results of this research might help to promote the implementation of educational technology applications across the Omani school system at various grades and in different curricula. The results of this study might also help in identifying the barriers that can affect such implementation, and thus to help conduct effective reforms in educational practice.

Chapter One concentrated on eLearning as a fundamental concept for this study, with focus on the Omani education system and the integration of eLearning in such a system. Reference was made to education systems in the UAE and UK which represented comparative cultures in terms of eLearning technology acceptance with regard to Omani culture. The background to education in Oman, the UAE and UK was reviewed. Then the chapter made mention of the relationship between technology acceptance and cultural factors that might affect the acceptance of eLearning technology. Finally it stated the importance and listed the research questions for this study.

Chapter Two reviewed various educational theories and their application to learning in practice, and their particular relevance to eLearning. This study searched for an eLearning system that would encourage secondary students taking geography to be more autonomous in their learning, to help them in acquiring problem-solving and other skills, and guiding them towards creating their own knowledge from the teaching process. This chapter focused on the identification of the key elements of the education process—teaching, learning and assessment—and the role of teachers and learners in creating an appropriate learning environment supporting an increase in active and effective learning, engaging learners in learning activities and broadening the interaction between teachers and learners to achieve the desired learning and teaching outcomes. This chapter reflected the literature recommendations in terms of developing education frameworks and systems based on the relevant educational theories and researches to achieve the appropriate interaction between teachers, learners and content by using technological applications and practices. Evaluation, assessment and feedback constitute the fundamental requirements for gaining success; feedback is an especially important aspect of an effective eLearning environment, and is derived from assessment and evaluation of teaching and learning outcomes. The teachers' and students' acceptance of technological innovation—particularly in eLearning—was examined by using cultural factors measuring teachers' and students' attitudes towards eLearning.

The various conceptual elements that inform the design of the ELF constructed for the field experiments were discussed in Chapter Three. The important point to emphasize here is that the ELF was constructed with a view to promoting active interaction between all the components and actors within the system. More than that, in order that the system should function properly, it is essential that multi-directional interaction takes place. This chapter presented the conceptual design of the research by means of diagrams that illustrated the full significance of the importance of multi-directional interaction, these interactions making the system highly productive in terms of knowledge acquisition and exchange, as well as the building of skills in reasoning and critical thinking.

A mixed-method approach to the research was discussed in Chapter Four regarding ways of evaluating the extent of the effectiveness of an ELF designed for teaching geography in ways appropriate to the achievements and attitudes of tenth-grade students in the Omani *BE* school system. For an adaptive ELF for teaching geography in Oman, it was necessary to adopt a mixed-method approach for the field survey. In order to make performance comparisons there was a need to gather quantifiable data. Hence there was a need for a quantitative element. However, the users of the ELF are human beings, and so it was obviously necessary to incorporate a qualitative element. Through a mixed-method approach, the research measured and analyzed data from two questionnaire surveys and two field experiments for this study using measurement techniques including questionnaires, tests, scales, interviews and open-ended questions. The quantitative approach was used to measure the learners' actual performance in the ELF. A quantitative analysis was also applied to the data gathered through the questionnaires distributed to Omani teachers and students in Phases One and Three. In Phase Three, questionnaires were also distributed to respondents in other educational contexts: to teachers and students in the UK, and to teachers in the UAE. The qualitative approach was used to interpret data gathered and analyzed by quantitative methods.

Chapter Five presented the research conducted on Omani students. This research used both quantitative and qualitative data-collection methods and a mixed-method approach to analyze the data collected. Apart from two questionnaire surveys, the Researcher made use of two experiments, as well as observation methods, to collect data from students concerning the use of an ELF for teaching geography. In the first questionnaire survey, a sample of 70 tenth-grade *BE* students in each of three *ER*s were surveyed for their opinions and preferences regarding an eLearning system, and their responses contributed to developing a prototype ELF used in web-page format stored on CD for testing in the PExp. Moreover, pre-tests and post-tests were administered to both TGs selected for the PExp to measure their geography knowledge levels before and after the experiment, and thus any difference in their learning performance pre-PExp and post-PExp. The results from the first questionnaire survey and the PExp obtained in this phase allowed the Researcher to modify and refine the requirements and design of the ELF for the CExp. Pre-tests and post-tests were also applied to the CG and EG in the CExp, whilst pre-run and post-run attitude scales were applied to the EG, with a post-CExp informal interview being held with some members of the EG. The purpose of these additional procedures was to verify data gained from the CExp and also to evaluate any attitude changes on the part of members of the EG. In Phase Three a questionnaire survey based on TAM criteria was conducted to assess the effect of cultural factors on technology acceptance amongst samples of students in Oman and the UK, using criteria from a TAM that comprised specific cultural and background factors. The target group was 40 participants in each country to facilitate data analysis and statistical analysis.

The survey measured the effect of social and cultural differences on the acceptance of eLearning, by comparing students in the UK (western culture) and Oman (Gulf Arab culture) to determine the differences between them.

Chapter Six covered the teachers' surveys, using both quantitative and qualitative data-collection methods and the same mixed-method approach to analyzing the data collected. The Researcher made use of questionnaire surveys and observation methods in order to collect data from teachers concerning the use of an ELF for teaching geography. Questionnaires were distributed in Phase One (before the PExp) to tenth-grade *BE* teachers in three *ER*s in Oman (Muscat, Al-Batinah South and Al-Batinah North). A sample-size of 70 teacher-respondents was selected in each region to gather feedback to help develop a prototype ELF for testing in the PExp in Oman. In Phase Three, the Researcher applied the TAM criteria to constructing a questionnaire for assessing teachers' attitudes and intentions regarding their adopting the new technology. This questionnaire was distributed to teachers in different *ER*s in Oman, to teachers in the UAE, and to teachers from Shorefields Technology College in Liverpool, UK.

The findings of this research were presented in Chapter Seven, combining the results of from the three phases of fieldwork conducted through investigations guided by the Research Questions. Thus the findings of research covered in Chapter Five for learners and Chapter Six for teachers were examined. In attempting to identify the specification requirements for developing an active learning environment to support geography pedagogy, the questionnaire survey in Phase One had been conducted with the aim of identifying the features preferred by teachers and students for inclusion in an ELF, as well as other aspects of this development. The questionnaire for students included 16 items, whilst that for teachers included 15 items, all of which were based on a five-point Likert scale. The survey results indicated that information technologies are important tools in providing effective, interactive and easily-assimilated means of learning. Both sets of respondents provided positive suggestions to create an effective ELF. Moreover, in attempting to create such an environment to be applied in the CExp, two groups (experimental and control) were selected to make an assessment of the prototype ELF that was used to deliver the curriculum contents of Units 1 and 2 of the tenth-grade geography curriculum to the EG. Pre-tests and post-tests were conducted to evaluate the impact that use of the ELF had on the learning process and achievement levels of the learners. The improvement of learning for those who used the ELF was demonstrated by the results of the pre-tests and post-tests, which showed that prior to the PExp the TGs did not show significant differences in performance in geography achievement levels. However, after the use of the ELF by the EG, there were significant differences in the performance levels of the TGs in the post-tests.

In the CExp, the "Geography World" ELF was introduced to support the geography curriculum. From *BE* second-cycle students in Al-Batinah South *ER* an EG and a CG were selected. Pre-tests and post-tests were administered to each group to measure the students' learning performance before and after the CExp. The results confirmed that there were no statistically-significant differences between them in the pre-test. However, the post-test results showed statistically-significant differences, with improvements trending towards the EG. Additionally, to monitor possible changes in attitudes towards eLearning amongst the EG, an attitude scale to measure such trends was administered to that group before and after the CExp. The results showed significant differences between pre-run and post-run responses from the EG, with a great improvement in favourable attitudes being demonstrated after the CExp. Finally, an interview with a sub-sample of ten members from the EG was conducted afterwards to further evaluate their experience of the experiment.

The Phase Three questionnaire survey of students and teachers incorporated the TAM criteria developed for this study and used them to evaluate teachers' and students' attitudes and intentions in general regarding their adopting new educational technology. The questionnaire was designed to obtain responses relevant to eLearning technology acceptance factors. Four main factors (social, cultural, political and Technology Acceptance Model constructs) were contained in the TAM-based questionnaire, which consisted of 20 items for students (Oman and UK) and of 30 items for teachers (Oman, UAE and UK). The results of the survey indicated that several factors affect the acceptance of technology in each culture. The survey results indicated that the TAM-based ELF was influenced by the cultural factors of the students and teachers in relation to their motivations for and/or against acceptance of new technology. The survey showed that for an eLearning system based on TAM factors, influences such as social, cultural, political and TAM construct factors are indeed relevant. The survey results indicated that there are significant differences between students from Oman and UK, as well significant (but not huge) differences between teachers from Oman, UAE and UK in the acceptance of technology owing to cultural factors.

8.2 Conclusions and Recommendations

The conclusions and recommendations of this study are identified on the basis of the results and findings presented in Chapter Seven, in which certain issues emerged that relate to the main questions underlying this research. The first question addressed the effectiveness of developing an adaptive learning environment based on the electronic teaching of geography, and sought to investigate the extent to which such effectiveness is dependent upon the achievements and attitudes of *BE* tenth-grade students in Oman. The second question addressed the ways in which the TAM could be utilized to understand the factors that affect teachers' and students' acceptance of eLearning systems and websites. The conclusions and recommendations that arise from the findings to these two questions are presented below under five headings representing the five major findings of this study: (1) the need to increase the internet speed in Oman; (2) the current existence of inadequate eLearning resources; (3) issues surrounding the management of eLearning integration; (4) issues surrounding teachers' and students' eLearning training and skills issues; (5) the ways in which different cultures affect the acceptance of technology.

8.2.1 Increasing the Internet Speed

The telecommunications companies that work in the Sultanate have provided Government, private institutions and the population with internet infrastructure having speeds that vary from place to place depending on the support provided by these contractors (Al-Sabbagh & Molla 2004; Khalfan *et al* 2006). For example, in the Muscat Governorate, schools connected to the internet enjoy high speeds owing to the proximate location of the major hub for government services in Muscat. However, for schools in other governorates the internet speed depends on the relative location of network-support stations. Therefore the MOE is seeking to roll out the provision of educational services by internet through the MOE website *eOman Educational Portal*. Thus it is necessary to ensure that a consistent high internet speed is provided throughout the country for all the MOE schools, to facilitate the various educational and administrative transactions among and between the individual schools, the *ER*s and the MOE.

To promote the success of e-educational services, it is not only important but even essential to provide a uniform high-speed internet network. Whilst certain schools are now serviced by an asymmetric digital subscriber line (ADSL), other schools are still suffering from slow internet services owing to their particular location. This Researcher faced problems during the CExp at Al-Nawar School when she attempted to install the ELF website, owing to the slow speed of the internet services available to that school. This situation made it necessary to spend a longer period of time to conduct the experiment with the learners there. It is also logical for MOE to install a network that enjoys a speed compatible with that of networks in the developed world, as the vast majority of the websites and web-based facilities are stored in servers in those countries.

8.2.2 Inadequate eLearning Resources

The MOE is seeking to integrate eLearning applications for all its schools in the Sultanate through increased investments in this field. However, as explained in Chapter One, this is still at the planning stage. This research demonstrates the effectiveness and efficiency of eLearning and its beneficial effects on the achievement and performance of learners, confirming the importance and relevance of the MOE plans to integrate eLearning within all levels and curricula. Currently each school is provided with a number of desk-top and lap-top computers (ranging from 65 to 100) that are available in its Learning Resources Centre for learners to use in accordance with the school's timetable. From the experience of running the experiments in the schools, it is clear that the existing provision-levels for computers are inadequate to support eLearning use, especially taking into account the high numbers of learners in each school and their current demand, even before the increased demand that would be generated by the integration of eLearning.

Moreover, a great many students currently do not have a computer at home, and levels of domestic connections to the internet are as yet low compared to developed countries, although rising quickly. Few official figures are currently available to illustrate these problems, but the UN agency the *International Telecommunication Union* (ITU) records that in 2010 some 41.7 per cent of the Omani population were internet users (IWS 2012). This figure is not disaggregated to show ages of users or whether they access the internet from home, but the overall figure does perhaps indicate that a large proportion of school pupils are affected by the lack of access to computers and internet at home. In any event, the wide variation in the speed of domestic internet connections in Oman (as even still continues to a certain extent in the UK) remains problematic for the foreseeable future in Oman in relation to the MOE plans for eLearning integration. Consequently, students will be compelled to use computers at school for a long time to come, thus emphasizing the absolute necessity for MOE to bring forward in time the requisite upgrade of computer provision to its schools.

8.2.3 Management of eLearning Integration

Several studies have confirmed the importance of providing an appropriate environment for eLearning applications and activities (Miller & Miller 2000; Weigel 2002; Kim & Bonk 2006). Although it is quite arguable that traditional classroom learning still has a role to play (O'Malley & McCraw 1999) especially in a blended learning approach (Singh 2003), the provision of eLearning is becoming increasingly important for students. It is well recognized that, besides up-to-date relevant knowledge, it is essential for present-day students to acquire the necessary mental disciplines and ICT skills that they need to enable them to compete in the regional and world economies, which are making new demands on economically-active people at an ever-increasing rate (Curtain 2001; Machin 2001; Brown *et al.* 2003; Garrido *et al.* 2010; Brynjolfsson & McAfee 2011). It is therefore argued that the amount of time spent at school by students in eLearning activities should certainly not be less but rather should be greater than the time spent in traditional classroom activities.

As was mentioned regarding the provision of computers and internet services in the previous section, so also as regards the management strategy for integrating eLearning and providing qualified personnel, the MOE needs to scale up its plans and bring them forward in time. The Researcher's experience with the EGs has confirmed that currently Omani students require a relatively long period of time to search and access online, as well as to perform various activities in the geography curriculum. In addition, technical support is an issue of great importance: each school needs at least one dedicated in-house ICT technician to solve problems and perform maintenance for hardware and software. At present there are specified technicians who visit schools once a week, but this provision does not cover the schools' needs for technical support and follow-up. The eLearning experiments conducted for this research faced many technical obstacles, but fortunately these were resolved.

8.2.4 Teachers and Students: eLearning Training and Skills Issues

ICT has introduced new approaches and methods, experiences, demands for skills and abilities in teaching and learning; accordingly, both teachers and students must be ready for meeting such innovations (Roschelle *et al.* 2000; Brooker 2003; Eugene 2006; Bingimlas 2009). The results of this research indicate that, besides other areas of competence, issues surrounding knowledge of languages other than Arabic present a problem for Omani teachers and students in browsing and surfing eLearning websites in other languages. In addition, both teacher and student respondents experience difficulties in explaining and interpreting non-Arabic-language learning materials downloaded from eLearning websites. Regarding the skills and qualifications necessary for using ICT, the respondents indicated their need for further training in ICT skills and in other languages for them to be able to make optimum use of eLearning. Consequently, the MOE needs to coordinate timely action with other relevant government agencies in order to upgrade the teaching of English for educational purposes to both teachers and students. This comment is applicable to many countries in the Middle East, not only Oman (Mirza & Al-Abdulkareem 2011:92, a paper covering all Arab countries east of Egypt, and also includes Iran). The MOE should also speedily implement a year-round programme of workshops to provide teachers with multiple skills not only in using ICT but also in passing ICT skills on to their students (Russell *et al.* 2003; Bebell *et al.* 2004; Smith *et al.* 2008; Altun *et al.* 2009).

It is true that currently MOE provides workshops for teachers during the summer vacation, but the findings of this research, together with certain comments made by certain teachers, indicate that the existing programme needs to be expanded as a matter of urgency. It is also true that MOE does provide training courses leading to the qualifications ICDL and Ic3 to increase teachers' skills in ICT, there is a continuing problem affecting teachers in terms of their utilizing the most recent technology applications and programs (MOE 2007). Similar problems persist for students. As this research confirms, even though they study IT from Level 1 to Level 11 they need to concentrate more diligently on improving their foreign-language skills (*i.e.* in English, owing to the existing school curriculum, which only offers this language). Such improvements are possible if decision-makers introduce delivery of the IT curriculum in English, and if at the same time they conduct summer-school workshops in ICT and English skills for learners, as they do for teachers. The 'digital revolution' is compelling educational institutions to change the traditional views of teacher preparation and formation in terms of content, curricula and teaching strategies (Beetham *et al.* 2009; Collins & Halverson 2009; Brynjolfsson & McAfee 2011). In common with educational authorities world-wide, the MOE needs urgently to promote teachers' abilities to meet the technological challenges and to achieve the desired learning outcomes.

8.2.5 Cultures and the acceptance of technology

The findings of this study arising from the comparison between teachers and students in different cultures (Gulf Arab and Western) show that there are significance differences between people in the two cultures in terms of the factors that influence technology acceptance. This not unexpected or surprising, owing to the historical differences pertaining to the period of integration of eLearning in the education system of each individual country surveyed. The UK state education system has been in existence for the longest period of time, having been extended nationwide at the end of the nineteenth century and the beginning of the twentieth century. The UAE state education system was initiated in its present form beginning in the late 1950s and early 1960s. The Oman state education system was launched in 1972. The differences between the results for each of the three countries to a certain extent show parallels with the relative age of the state education system of each country. However, the relatively small discrepancies between the figures given in Chapter Seven for respondents from the three countries show how much the UAE and Oman have made headway in rolling out their ICT and eLearning programmes.

8.3 The Importance of this Study

The importance of this research can be summarized under three main headings, according to its applicability. In first place is the immediate topic of geographical pedagogy in Oman, as this research is focused on the area of teaching expertise of the author. Beginning from the base of geographical eLearning, it is hoped that this study will motivate other researchers to carry out studies in extending eLearning to other subject-areas in the Omani education system. In the second place, this research seeks to raise wider issues regarding educational innovation and eLearning in Oman. In the third place, all competent research should be able to act as a seed-bed for further academic endeavour and for professional development. The ideas of the author are therefore listed under the following three main headings in accordance with the foregoing comments. These ideas are offered as starting-points for further discussion and research, in the hope that they will act as a 'seed-bed', in order that other ideas might grow out of them.

(A) Geographical pedagogy in Oman

A.1—By improving and raising the achievement-level of students in the geography curriculum through the application of an experimental learning-environment/new learning software, this research work seeks to illustrate the benefits of adopting eLearning and new teaching approaches. The wider aim is to effect improvements in the transfer of geographical knowledge and multiple skills (including ICT skills) to secondary-level geography students in Oman and, later, to learners of geography at all levels in the *Basic Education* system.

A.2—To create an effective and interactive learning-environment between teachers and learners, using innovative strategies and methods for teaching geography through a *blended learning* strategy incorporating face-to-face teaching to make the most effective use of all educational resources.

A.3—To devise and introduce best practice for developing and improving the process of teaching, learning and assessment in geography based on modern technological systems/techniques and support.

A.4—To assist Omani geography teachers in acquiring new skills for managing eLearning and ICT systems, as well as for their *continuing professional development* (CPD) in the geographical and pedagogical fields.

(B) Educational innovation and eLearning in Oman and other Arab countries

B.1—To help prepare the way for the development and modernization of relevant aspects of the Omani educational system in terms of integrating technology into the education sector across subjects and administrations.

B.2—To help prepare the way for the adoption of modern theories of learning such as learning-by-doing and learner-centred-learning in the practice of current teachers, and to introduce these approaches into the syllabus in Oman's teacher-training colleges.

B.3—To develop a positive trend in attitudes towards eLearning and towards properly managed educational innovation throughout the Omani education system.

B.4—To encourage the setting-up of structures (especially through ICT channels) inside Oman in order to enable teaching practitioners and administrators to share best educational practice internally and externally.

B.5—Through the setting up of eLearning networks for geography, to enable teachers/administrators to detect obstacles and difficulties that prevent the application of eLearning in the *BE* second-cycle schools in Oman. The aim is to roll this programme out across all schools in Oman as soon as possible.

(C) Further academic activities and professional development

C.1—One longer-term goal is to encourage colleagues to work towards facilitating a new generation of Omanis that are capable of using modern technology and its applications, as well as so-called lifelong learning.

C.2—Another longer-term goal is to encourage Omani education practitioners to network on a regular basis informally with colleagues inside and outside Oman.

C.3—The results of this study may help to inform and influence those who are interested in increasing their effectiveness and efficiency in this field, especially in the Omani Ministry of Education, and to help colleagues engage in professional dialogue within the formal structures inside Oman and externally with colleagues in other countries.

C.4—It is hoped that this research will provide people in the educational field with further knowledge regarding eLearning, and will stimulate publications and contributions in relevant periodicals such as the *British Journal of Education* and other education research journals. It is also hoped that, in recognition of the importance of rolling out eLearning within Oman, a dedicated Research Unit might be formed in some suitable institution (such as Sultan Qaboos University) to monitor, record and disseminate past and present publications regarding ICT, eLearning and related fields, in Oman and other Gulf Arab states.

C.5—Using the Omani experience as an example, a comprehensive framework might be suggested with additional features that could strengthen eLearning in the Middle East, and could be used as a model for other developing countries.

8.4 The Contributions of this Study

Technology and the internet have entered into countless aspects of daily life for teachers, students and ordinary people alike. It is therefore necessary for educational authorities to keep close track of such developments and to prepare programmes to enable present and future citizens to function in the resulting environment (Castells 1999; Kellner 2000). Teachers thus need to become familiar with all relevant technological applications, and to transfer their knowledge and skills to their students (Mishra & Koehler 2006). In developed and developing countries alike, the education system is now placed to be the key player in preparing citizens to function in the modern economic climate (Dahlmann 2007) and to engage in the increasingly necessary activity of lifelong learning (Longworth & Davies 1997; Chapman & Aspin 2000; World Bank 2003). Additionally, the role of eLearning in lifelong learning is steadily increasing (Gray 1999; Sharples 2000; Friesen & Anderson 2004).

Thus, this research can offer relevant findings for the condition of eLearning and lifelong learning in Oman (and other Gulf Arab states). It supports previous studies regarding the relationship between culture and technology acceptance. It also highlights aspects of the importance of optimizing the use of learning technology to improve students' achievements and (consequentially) to enhance their attitudes towards technology within the learning environment, particularly with regard to the *BE* tenth-grade. The great majority of the Omani students who used the experimental ELF reported higher performance levels and expressed generally positive attitudes towards the eLearning experience. In addition this study's findings illustrate the obstacles that can affect teachers and learners in respect of using technology, and their responses have highlighted suggestions to solve these problems.

This study has described the construction of an adaptive learning framework for a specific environment in the Omani state education system, and has discussed the arguments regarding the introduction of a hybrid pedagogical approach suitable for use in the new environment (Mirza & Al-Abdulkareem 2011), irrespective of whether the constituent approaches happen to be currently fashionable or otherwise. A review of the literature has revealed that a broad variation in views on pedagogic method is to be found in scholars who research eLearning. This study adopted a pragmatic mixed approach in the design of the experimental ELF, with a view to facilitating active interaction between all the components and actors within the system. These interactions enable the framework to be highly productive in terms of knowledge acquisition and exchange, as well as helping students to build skills in reasoning and critical thinking. This framework seeks to deliver the sort of pedagogy that is required for the present-day world, in which whilst it is important to *acquire* and *retain* knowledge, it is more important to gain a proper *understanding* of such knowledge and even more important to be able to make *effective use* of such knowledge (Lankshear & Knobel 2003).

8.5 Limitations of this Study

Any study such as this is subject to limitations of time and space. Even without accidental mishaps such as the failure of certain teacher respondents to fill out questionnaires (see Sections 6.4.4.2 and 6.4.4.3), practical constraints have limited the size of the samples that could conveniently be taken, and the data becomes frozen in time as soon as it has been stored for use, and thus might be superseded by developments on the ground even before data analysis has been performed. Most of the fieldwork for this study took place in Oman between 2010 and 2012, where teachers and students were sampled from the *BE* tenth grade in schools located in Muscat, Al-Batinah South and Al-Batinah North *ER*s. A further part of the fieldwork took place in the UAE and UK for comparative purposes, where teachers (in the UAE and UK) and students (in the UK) were selected from grades equivalent to the Omani tenth grade. It might therefore be difficult to generalize the results to contexts that are different, for example to other educational environments (such as primary schools) and other respondents' characteristics (such as Far Eastern students). However, fellow researchers in Oman and other GCC countries might benefit from using the approach adopted in this study as a template for research in their own particular eLearning field. They might wish to compare their findings with those given in this thesis, for purposes of triangulation or simply for critical appraisal of this particular study. In terms of the fieldwork, comparison was finally made between two contiguous GCC states and the UK, owing to time and funding constraints affecting travel involving more than three countries. Other GCC states could have been involved if the time and funding were available, as also other places in the UK or other developed countries. Certainly, the scope for further study in Oman and the GCC states is extremely broad, to say the least.

8.6 Specific Achievements of this Study

Despite its limitations, this study makes an original contribution to knowledge for a variety of reasons. In a study published in 2004, two staff-members at Sultan Qaboos University said

> "Research evidence on the effectiveness of e-learning to face the challenge of ever-increasing Omani secondary school graduates still needs to be obtained" (Al-Musawi & Abdelraheem 2004:365).

The study they proposed was to investigate how eLearning at tertiary level in Oman could help institutions cope with the increasing numbers of entrants to university and college, and how these institutions could deliver effective programmes with the help of eLearning. In the whole of the preparatory research for the Literature Review, this was the only mention of secondary education to be found in any of the studies on eLearning in Oman. They had all focused on education *after* secondary school.

Based on an extensive search in the hard-copy literature, on the internet and through enquiries conducted by colleagues in Oman, it appears that *this research is the first to be published that makes a focused study on eLearning in Basic Education schools in Oman*. It has not been possible to find any previous published study of the sort called for by Al-Musawi & Abdelraheem in 2004 that might have also investigated students and teachers in the secondary-school classroom. One study published by a member of Sultan Qaboos University in 2010 did indeed cover the eLearning experiences and attitudes of Omani students and teaching staff. This paper—Osman (2010), dealing with high-school use of the Oman Educational Portal—investigated differences in the patterns of use of the Portal. A questionnaire was sent to 400 users of the Portal who were identified as being involved with high-school education—including not only students and teachers, but also school administrators and the parents of high-school students. The paper did not describe how the questionnaire was sent but, owing to the large sample size, was probably administered online for respondents to complete by themselves. That survey was necessarily limited to people already using internet facilities. It can be safely assumed that the respondents in that study were already motivated to use those facilities. That survey did not address basic issues of eLearning performance and attitudes as compared with those under traditional teaching methods. It did not investigate the deeper issues of technology acceptance.

This present study is the first to be published that concentrates on secondary-level students and teachers in Oman. Regarding the other countries around the Gulf (Iraq, Kuwait, Saudi Arabia, Bahrain, Qatar, the UAE and Iran) no other study has been done on the same scale as this study (with the partial exception of Zewayed 2012, as mentioned below). This present study used experimental and control groups to test the effectiveness of eLearning, and it also used questionnaire surveys to survey attitudes to eLearning and technology acceptance, not only in Oman but in another two countries. In spite of making an extensive search of the literature covering GCC and other Gulf countries, this Researcher has not found a study that employs the full approach used in this current research. A short eLearning study was mentioned as being done in a secondary-school mathematics class in Riyadh, Saudi Arabia in 2007. This was cited in a student report by Aldraiby *et al.* (2010) at King Saʿûd University, but the study cited is not accessible. More interestingly, a presentation by Al-Doubakhi & Woollard of the University of Southampton was made at a conference on eLearning in Singapore in 2011, titled *Evaluation of Asynchronous E-learning in Geography Curriculum: Enriching Learning Quality in Saudi High Schools*; however, the PowerPoint presentation accessible online does not clearly describe the methodology used in the evaluation. No definitive information had been obtained in answer to e-mails sent to Dr

Woollard (on 11 August and 14 October 2012) by the time that this section was written on 17 October 2012. A Bahraini scholar (Al-Slaise 2005) studied the implementation of an eLearning platform called *Eduwave* in a Bahraini secondary school, where he interviewed five persons (three staff members and two students) and also distributed a questionnaire consisting of eleven items (using a five-point Likert-scale) to 50 students at Leeds Metropolitan University, although it is not clear from his dissertation how many of the 50 students gave responses. In Saudi Arabia, Alblehai (2011) did a survey of ten Saudi secondary-school teachers to evaluate their understanding of the various elements involved in setting up eLearning courses.

Another Bahraini scholar (Zewayed 2012) studied attitudes to and acceptance of eLearning by students in Bahraini secondary schools. In a paper published by Zewayed *et al.* in 2011, a report was made on her study—

> "conducted to investigate and identify the main factors affecting students' acceptance of e-learning in Bahrain Secondary schools. An extended version of the Technology Acceptance Model (TAM) was developed to identify the underlying factors that influence students' intention to use an e-learning system. Data was collected from 926 students through questionnaires distributed to eight secondary schools in Kingdom of Bahrain. Regression analysis was used to explore relationships among research variables and to test the research hypotheses. Results showed that students' attitudes and enjoyment are the most critical factors influencing students' adoption of the e-learning system" (Zewayed *et al.* 2011: Abstract).

The scale of Zewayed's questionnaire coverage was certainly much larger than that conducted for the present research, and it may fairly be claimed that her study is truly ground-breaking. However, as it has not been possible to view the paper or the PhD thesis completed by Zewayed in 2012, further comment on the work cannot be made, except to point out that the study was confined (1) to students and (2) to Bahrain. Hence, teaching staff were not surveyed, and there was no international dimension. Thus the only comparative element would have been between the responses of the students themselves. In the absence of further information regarding these aforesaid studies, it might well be true that none of these studies included a comparative study of actual student eLearning performance using experimental and control groups. In that case, it is likely that the present study is the first to publish research about eLearning in secondary schools that has been done in or for any Gulf Arab country.

With regard to Iran, Kargiban & Kaffash published a paper in 2011 describing a study they conducted on the effects of eLearning on a sample of secondary-school pupils studying English in Iran. The sample consisted of 24 female students in Tehran enrolled in the eleventh grade during Spring Term, 2010. It shares some of the features of the present research, including the use of a Moodle-based eLearning system and a questionnaire survey administered at the end of research period to elicit the attitudes of the students towards their eLearning experience. The questionnaire contained 15 items for response on a five-point Likert scale. In the Introduction to their paper, they made reference to analyzing

> "the effect of MOODLE technology on students; 1) to determine students' attitude toward MOODLE resources; 2) to explore the relationship between students' access to MOODLE and their results according to the teaching modality (e-learning and traditional education)" (Kargiban & Kaffash 2011:398).

However, there was no description of whether or how the sample was divided into experimental and control groups, no data on comparative studying/learning performance was included, and the paper did not enter very deeply into the issues of technology acceptance.

The achievement of this research is that it is the first study published for Oman—and probably for any Gulf Arab country—that has conducted a full-scale field-study, combining the three main elements listed below. It is likely at this time of writing (October 2012) that no other study for any Gulf Arab country has been published that has implemented research (either on the same scale as in this study, or indeed at all) using these elements—

ONE: a comparative performance field experiment to gain quantitative data about learner performance under eLearning conditions and traditional learning conditions;

TWO: conducting a TAM-based questionnaire survey of teachers *and* students to gain their attitudes to and acceptance of eLearning (as well as a group interview with some students);

AND THREE: extending that questionnaire survey to another Gulf Arab country and to the UK, in order to gain comparative data on attitudes and acceptance in different cultural environments.

8.7 Future Work

Many ideas have been suggested in Section 8.3 above, beginning with those relating specifically to geographical pedagogy in Oman. Many different studies could be undertaken using this research as a starting-point. Geography has been identified as one of the subjects that offer multiple skills to those who study it (Gerber 2000). The study of geography offers opportunities for engaging students in many different activities that help them not only to achieve a clearer view of the modern world and their place in it, but also to acquire transferable skills that enhance their employability and life-skills (Le Heron & Hathaway 2000; Machon & Walkington 2000; Reinfried 2001; Rooney *et al.* 2006). Consequently, the teaching of geography is very relevant to the principles stated in the *Oman Vision 2020* policy document that makes the development of its human resources one of Oman's major sustainable development goals (MONE 2008). Therefore, it would be interesting for other studies to make further investigations into the teaching of geography using eLearning and other technologies in a blended-learning strategy from Grade One to Grade Ten in Omani schools. Other studies might look at the issues surrounding the implementation of eLearning for other subject areas in the national curriculum across the Omani educational system. Following on the similarities discovered between teachers in Oman and the UAE, and using an approach such as that adopted in the paper by Hardy *et al.* (2008), further studies could focus on similarities and differences in the approaches of teachers to geography and other subjects in Gulf Arab countries, with a view to garnering best practice. These would form the foundation for studying the further academic activities and professional development outlined in sub-section C of Section 8.3 above.

Subsequent studies can extend the research aspects in terms of the samples of students and teachers selected and the cultures identified for comparison in order to further develop theory and practice for the integration of technology in the various educational contexts (primary, secondary, tertiary). But in tandem with the integration of technology there is a need for continuing research into the factors that can enhance technology acceptance in Oman, other Gulf Arab countries, and elsewhere in the developing world. Comparisons can usefully be made between different local variations on a cultural spectrum, such as that which exists in the Gulf Arab countries from Kuwait in the north to Oman in the south, and even including other Middle Eastern countries. It is no doubt interesting to make comparisons between western and non-western cultures regarding technology acceptance. However, the globalized western culture is still the dominant culture within the technological field (Ginsburg 1991; Norris 2001; Latukefu 2006). It might perhaps be more interesting to make comparisons between various non-western cultures to investigate how these different cultures react and adapt to ICT and the westernized culture of globalization, as communicated through ICT (Landzelius 2006).

The TAM that has evolved in the literature since Davis (1986, 1989) has passed by adaptation and extension through various versions, all of which, however, have been developed mainly by researchers who are grounded in the globalized western culture that underlies the technology in question. In the field of eLearning, it appears from various studies that even where there are differences in cultural background and characteristics, acceptance behaviour regarding eLearning on the whole converges according to the TAM model, as for instance the study by Arenas-Gaitán *et al.* (2001) comparing samples of Spanish and Chilean tertiary-level students. Most of the focus on acceptance of ICT has been placed on *perceived usefulness* and *perceived ease of use*, which are necessarily utilitarian criteria. Ben Zakour (2004) raises the question of 'national culture', but despite a concise overview of technology acceptance modelling, the emphasis remains heavily utilitarian. Studies such as that by Masrom (2007) endorse the position that positive perception of the usefulness of technology is crucial in the gaining of acceptance, whilst a user's personal *attitude* towards using the technology may well not be equally as important. In other words, technology acceptance is based on utilitarian considerations, whilst acceptance of the culture that produces the technology is a separate issue. A case in point might be the use by the Al-Qāˁidah network of the technologies developed by the cultures against which they wage war.

A significant piece of research would be to investigate deep attitudinal cultural acceptance models, in other words, models that measure and predict the extent to which users might be prepared to integrate technology into their personal lives *as a matter of cultural preference*, rather than merely on the basis of its usefulness in furthering their utilitarian goals. Such research would probably lie outside the remit of computer and IT studies, and would fall within the territory of psychology and cultural anthropology. Nevertheless, as a proposition for some future researcher, the idea should at least be mentioned at this point. TAM models so far have tended to be utilitarian-based and thus (arguably) self-fulfilling in their predictive modelling. Alternative models for technology acceptance might yield quite different results and findings.

8.8 Final Comments

A significant element in the background of this research has been my personal experience. I remember that, at the beginning of my career with the MOE as a teacher in 1995, I used to put questions to learners but received no answers. This moved me to ask myself what the problem might be. The realization came to me that I should change my teaching strategies. In my daily experience, with the on-going development of educational theories, events have confirmed that the most effective way to deliver learning to learners is to make knowledge acquisition user-friendly in terms not only of retention but of *deep understanding*, so that the knowledge can be applied to new situations and experiences. Knowledge can only be retained and subsequently applied if it is *understood sufficiently*. Different learners have different approaches to understanding and retention, and eLearning gives them the best chance of working at their own pace in their own way to achieve this. Most Omani students, in my experience, will continue to need the guidance of teachers in face-to-face situations in the classroom environment, at least for the foreseeable future. The integrating of technology into the Omani education system is the best way of achieving the personal goals of each individual, and the national goals of sustainable development through optimum use of national human resources.

This thesis began from the belief that technology can lead to improvements in teaching and learning in the schools in the Sultanate of Oman, leading thereby to improvements in learning outcomes for Omani students. This thesis has been written in the hope that the research will provide people in the educational field with further knowledge regarding eLearning and, moreover, by using the Omani experience as an example, that researchers can suggest a comprehensive framework with additional features that could strengthen eLearning in the Gulf, the Middle East, and could be used as a model for other countries besides.

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