School of Education

The Adoption and Diffusion of Information & Communication Technologies Among Teaching Staff at AL-Jouf University in Saudi Arabia

Zayed Fadhel Z Alruwaili

This thesis is presented for the Degree of
Doctor of Philosophy
of
Curtin University

November 2014

Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Signature: …….

Date: ……...

Acknowledgements

I thank Allah for giving me the opportunity, health, and the ability to complete this work, I cannot thank Him enough for all his mercy, guidance, and unlimited favours and blessings. I would like to acknowledge and thank a number of people for their continuous support and kind help during my PhD journey. Firstly, a big thanks to my extremely inspiring, extraordinary and kind supervisor Dr Lina Pelliccione - thanks for believing in me and guiding me. It has been an honour to be your student. I could not have done this without you and your insights. Your expertise and competence is tremendous. Thank you to “The late comer”, Professor Rob Cavanagh who entered my journey in the last stage and helped me through to finish with his wisdom, patience and support. I would like to express my profound gratitude for your supervision.

A very special thank you to all study participants, without your participation this study could not have occurred. I thank you for your time, your insight and your feedback. Thank you for all the faculty members at the School of Education and in Curtin University of Technology.

Finally, My deepest appreciation and sincere gratitude go to my parents, brothers, and sisters for their support, patience, and encouragement. Special and deep thanks goes to my lovely family, my beloved wife Ahlam Alruwaili and my children Sultan, Layan,Turki, Rayan, Mohannad, and Abdulmalek for their encouragement, patience, and support. Thank you for your love and support as you have guided me through my Ph.D. program from beginning to end. Thank you for all the sacrifices you made and patience you had when I was away from you working on my dissertation

Abstract

There are a number of reasons why a study that is interested in ICT adoption and use in the higher education system of one nation should be particularly focused on teacher training and why it should be conducted at one institution. These include the fact that future teachers' approaches to ICT will be greatly influential on the attitudes and beliefs of following generations and that, as shown in this study, other work in this field at various institutions within Saudi Arabia and further afield have different findings that, if generalised, would be unlikely to appropriately influence future policies or, indeed, significantly add to existing knowledge. This study used a mixed methods and exploratory research design and approach. Enumerated data was collected from study participants at the College of Education (COE) at Al-Jouf University (n = 164) who partook in a quantitative survey and from 15 participants who took part in a qualitative study using semi-structured interviews. The results show that there were distinct differences in attitudes—for example, towards adoption—between departments and between participants based on age, experience and self-perceived levels of self-confidence in ICT. The mixed methods approach meant that conjoint analysis could be used between the two studies and, with some exceptions, the narrative data not only supported the survey results but also gave them a strong and articulate voice. These results led to some specific conclusions that included a much stronger departmental influence than has been found in other studies, that while most staff members have positive or very positive attitudes towards ICT, there is a lack of institutional support, and that while there are similarities in attitudes and approaches to ICT within departments, there are very divergent ones between them. They also led to a series of recommendations, for example that the factors responsible for differences in ICT use and adoption should be identified and that a consistent and standard measure for establishing existing ICT skills should be employed. In a broader sense, the recommendations also include a contention that progress in this field can be most rewarding if studies such as this are used as building blocks towards a true national picture that avoids the convenient but reductionist approach of aggregation, extrapolation and assumption.

Contents

List of Figures

List of Tables

List of Abbreviations

CAD	computer-aided design
CAM	computer-aided manufacturing
COE	College of Education
DOI	diffusion of innovations
EFL	English as a foreign language
ERP	enterprise resource planning
ICT	information and communications technology
NCELDL	National Centre for E-Learning and Distance Learning

Chapter 1: Introduction

The potential for the use of information and communications technology (ICT) in education generally and in higher education particularly has long been recognised. This recognition can be seen as being positioned within a wide and extensive societal change that has been enabled by the introduction and use of technology, to the extent that it touches the daily lives of many if not most people in terms of their jobs, their entertainment and even how and when they socialise. The incentives for constant innovations in technology, furthermore, mean that people are being confronted with new technologies on an almost daily basis, such as new generations of smart phones, applications and performance systems.

With technological development comes an ability to be involved to a greater extent and to compete at ever-changing levels of intricacy and abilities, and the same applies to education. Indeed, it can be argued that the disadvantaged students of the present and future will be those who have limited or no access to technology and the enhanced learning environments that it can deliver, both within and outside the classroom.

However, while there is little doubt that students are better enabled to succeed in higher education, and that they can benefit from the existence and constant development and innovation of technology within the learning sphere, this does not mean that their expectations, based on their own abilities and knowledge of what technology can offer, can be delivered by the institutions themselves (Williams, Foulger & Wetzel, 2009). This is because the use of technology in higher education goes to the heart of the learning process and experience, and this must be seen from the view of the institutions and their staff as well as from a view that considers students' expectations. In many instances, the problem lies not in the acquisition of hardware or software but, rather, in the inability of higher educational cultural change to keep pace with the technological changes that are enabled and increasingly likely to be demanded and expected by students (Lambert & Gong, 2010). While there may be a willingness and a societal and student-led incentive for higher education institutions to acquire and even train their staff in the use of an ever-increasing array of technological capabilities, this does not automatically or seamlessly translate into the ability of educators to deliver the content of their courses by utilising these enhancements (Rutherford, 2013).

One specific area of higher education where a significant contribution to the resolution of these issues could be made is in institutions that are involved in teacher training. The obvious reason for this is that the learners are not only students but also future teachers who will, with varying degrees of proficiency, use ICT, which in turn will influence future generations of learners. The challenge, however, is that while levels of enthusiasm among both staff and learners with regard to ICT are consistently reported as being high, the outcomes from the perspectives of students and the implementation of ICT-based learning in schools have been seen as being below expectations (Alev, 2003; Coutinho, 2006; Sahin, 2006). The extent of this problem is often considerable. For example, even where colleges and universities offering pre-service training have made strenuous efforts to ensure that the course requirements initially identified are delivered by staff, these have become outdated by the time students graduate, so that they lack the necessary skills and abilities for teaching the next generation (Williams et al., 2009).

Therefore, the processes that can lead to high levels of ICT adoption must be understood by institutions and educators of pre-service trainee teachers, as well as the trainees themselves. Moreover, the process should be ongoing and iterative rather than with periodic updates and training courses. In other words, rather than waiting for change to be brought to them, a culture of investigating, understanding and implementing technological change should be inculcated within teacher training courses by those who teach them. The staff of colleges of education and other teacher training institutions should not only be aware of the technological skills and abilities that are required for the twenty-first century but must be able to transfer them. They should also acquire the accompanying necessary mindset and become role models for future practice. One example of such an approach is in Coutinho (2006), who led her trainee teachers through a process of mutual learning and experimentation with technology by building and developing new and innovative learning methods, to the extent that some of her students went beyond the bounds that she had set and towards further areas of technology-based learning.

It is difficult to underestimate the importance of ensuring that trainee teachers are equipped with the abilities and skills to successfully teach following generations to take themselves and their nations forward. Whether students are within a developing or an advanced economic environment, and whether their underlying motivation is to catch up or to stay ahead economically, their ability to embrace and

use technology will be strongly influenced by classroom learning environments and this, in turn, will be strongly influenced by the strengths, skills and abilities of twenty-first century teachers.

It is argued that these strengths, skills and abilities will in turn be strongly influenced by the abilities and skills of the staff who train teachers in being able to adapt and thrive within technology-rich learning and teaching environments. However, the reality appears to be that 'in many colleges of education faculty have not widely adopted the use of technology or had time for training', and therefore technology has not yet been used to create a 'paradigmatic shift in classrooms as it has in other areas of society' (Lambert & Gong, 2010, p. 55). Yet this general statement does not reveal the picture at local or even national levels. One example of a nation that has invested heavily in ICT but whose pre-service teacher-training abilities has been questioned in this regard is Saudi Arabia. Therefore, an investigation of the approaches, views and beliefs concerning ICT of the critical group, the academic members of Al-Jouf University's College of Education (COE), will shed insight into the true state of affairs and enable effective recommendations for change to be made.

1.1 Statement of the Problem

It is necessary and relevant to consider the context within which the problem is positioned to see its extent and relative importance. The use of ICT in education has now become an accepted part of systems to enhance the knowledge and abilities of students. Indeed, it is not only accepted but can also be seen as being embedded within theories of learning and teaching; for example, it is very well placed for use in accord with a constructivist learning context (Asabere & Ahmed, 2013; Kharade & Thakkar, 2012).

However, while such recognition has become widespread, the use of ICT in the classroom is contingent upon a number of human and normative factors, which effectively means that students will only gain its true benefits and lasting advantages if such factors are favourably positioned for them. For example, the opinions and beliefs of institutional managers are of great importance because they will make decisions concerning ICT investment. If the stance taken is that ICT in education has similar implications with regard to implementation and use as it does in business, for example, strategic planners may feel satisfied if systems are in place and some

training is provided. However, there are stark differences between ICT in education and in business. In business, ICT may be seen as a critical tool that better enables competitive advantages to be gained, and its use can be relatively easily monitored, evaluated and maximised by management. However, in education, its use can go far beyond such purposes and can be intrinsic to the teaching and learning processes, which are less easy factors to monitor.

In order to achieve optimal implementation and use, teaching staff must have an intrinsic ability and belief in the educational benefit of using ICT in learning, but studies have consistently found that this is all too often not the case. For instance, research has found a growing use of ICT for basic functions such as Internet and email use among staff, and for PowerPoint presentations or similar applications as classroom aids, but there remains a chasm between such uses and those that embrace knowledge-seeking paradigms such as constructed learning and interactive student participation via the use of technology (Howell, 2007). There are a wide range of theories and propositions that attempt to explain why such a chasm exists within many if not most educational establishments, placing the fault, for example, predominantly with administrators (Oyaid, 2009), a lack of training and professional development (Pelliccione, 2001), or a lack of belief by teachers and academic staff in the relative benefits and advantages of ICT use, and associating these factors with a general lack of ability and confidence among instructors.

As with many areas of human behaviour, it is likely that a combination of factors drives the reluctance of many teachers and instructors to adopt and embrace ICT, but one striking factor is that there is far less reluctance among students, a fact that is particularly highlighted within a Saudi Arabian context (Kamal, 2013). Thus, there would appear to be a gap not only within the key group (teachers and academic staff) between those that may or may not fully embrace ICT use in education but also between their levels of adoption and the wishes of student populations.

Of all the teaching institutions whose actions may affect the future use and adoption of ICT, surely none are more important that those that are responsible for training future teachers. The extent and types of ICT use in these institutions are likely to strongly influence its use in classrooms by their graduates because the purpose of these institutions is not only to teach but also to guide best practice in classrooms of the future. While there has been some research into issues concerning ICT adoption in teacher training, no generalised picture has emerged, with different

researchers placing emphasis and differing levels of importance in various directions. This is not surprising because each institution and its environment and culture is unique, and only one or a few institutions were examined in each study. For example, Al-Sarrani (2010) found no association between the characteristics of instructors and their levels of ICT adoption, whereas Almalki and Williams (2012) found that the age and experience of instructors were significant and Al-Asmari (2005) found that expertise and availability were more important.

Such variant findings suggest varying reasons for ICT adoption across institutions of higher education generally and those that train future teachers specifically because each is unique and has a unique blend and setting of humans and human behaviours that crosses between and interacts with the management, faculty, staff and students. Thus, any temptation to generalise the findings from one study, or even a group of studies, beyond their specific contexts is a mistake that could, in the final analysis, lead to the implementation of inappropriate and damaging policies. Therefore, the only way to properly understand the issues and challenges faced by a given institution is to conduct research within that entity, with the results of each study contributing to a widening understanding constructed across a nation or other entity.

Despite the fact that Al-Jouf University has four campuses and a large trainee-teacher student population, no such study has to date been conducted there, partly because it has been established for less than a decade. Considering its size and its potential to influence the next generation of teachers in Saudi Arabia, this is a considerable deficiency and gap in current knowledge – a problem that this study attempts to address.

1.2 Significance of the Study

The Kingdom of Saudi Arabia and its government have long recognised the importance of education and the critical role that ICT can play in enabling the policy of being among the leading nations in terms of the education and higher education systems. The commitment to such a policy can be seen through the levels of public investment made in ensuring that the campuses and facilities exist and the ICT hardware and software are in place to fulfil the ambitious goals set.

However, it is increasingly recognised that while the investments can be and have been made, and training and personal development plans can be produced and financed to enhance staff skills and abilities, there is a gap among many of these staff with regard to the implementation of ICT for teaching and learning. Furthermore, there remains a lack of understanding of how policies can be developed, and research is yet to be conducted into the beliefs, values and opinions of academic staff with regard to ICT adoption. Al-Jouf University falls within this category of institutions. The gathering of appropriate data in this study will, it is hoped and anticipated, contribute significant value in several areas as follows:

- Make empirically based recommendations for the strategic managers of Al-Jouf University with regard to the implementation of appropriate policies that can significantly improve the levels of ICT adoption and use.
- Through an analysis of the results of the study, enable sustainable long-term human resources and recruitment policies for academic staff that focus on the ongoing development of ICT at Al-Jouf University.
- Contribute towards a national picture of ICT use and adoption by staff, which may in the future better guide policies at a national level.
- Help to enhance ICT abilities and use by future generations of teachers in Saudi Arabia.
- Provide a contribution towards a better understanding among staff and university administrators of the importance of introducing new pedagogies and extending existing ones, for example in the areas of blended learning and constructivist philosophies.

By exploring and evaluating the human behaviour aspects of teaching and staff responses at an individual level, it is hoped that this study will provide a much clearer picture of the challenges facing Al-Jouf University with regard to ICT adoption and use, which in turn may enable some important conclusions to be reached and practical changes to be made.

1.3 Study Objectives and Research Questions

This study seeks to contribute to the literature on ICT adoption in tertiary education generally and in the field of teacher education specifically. As noted above, this area holds the key, if ICT levels of use are optimally used, to positively

influence a far larger and far more significant population of learners than the trainee teachers themselves. Conversely, it may be the most important juncture that leads to the relative failure of future generations of Saudis in acquiring the necessary skills for the nation to truly reach an advanced stage of development.

The research questions set for this study are outlined below.

RQ1: *How do the COE academic staff describe the current ICT environment at Al-Jouf University?*

This has three subsidiary questions:

(a) *What ICT resources do the academic staff have access to?*

(b) *How do the academic staff use ICT?*

(c) *What level of ICT skills do the academic staff possess?*

(d) *What are the attitudes of the COE academic staff towards ICT adoption in teaching and learning?*

RQ2: *What are the factors that impact the use of ICT by academic staff in their teaching and learning?*

RQ3: *What strategies need to be implemented by AL-Jouf University in order to help academic staff adopt ICT in their teaching and learning so they can meet the needs of students in the digital age?*

RQ4: *How do the personal characteristics and demographic variables (e.g., gender, experience, age, discipline) of the academic staff at Al-Jouf University influence their ICT use and skills?*

The key general question driving the study is whether the COE academic staff have the skills and knowledge required to educate and prepare pre-service teachers to function effectively in the digital age. The implications of this question open further avenues of interest and enquiry. First, a phenomenon observed by the researcher over time was that academic staff had varying levels of ICT adoption and use and these levels, in some respects at least, seemed to be based on their own values and opinions rather than on the needs of students. Second, from the extensive literature review undertaken before and during the writing of this thesis, the observations made were seen as being a wider problem that pervades the academic world to varying degrees not only in Saudi Arabia but across the globe. This highlighted key areas to be researched at an institutional level, including the relative importance and nature of institutional support that is provided; the extent to which strategic planning is properly aligned to the requirements and values of academic

staff; the extent to which sub-cultures may exist at departmental levels, which support or detract from ICT adoption; and the real attitudes and fears or the perceived inadequacies of staff members that lead to only superficial and minimum levels of adoption. A further point of investigation is whether self-perceived existing ICT skills are accurate or are more driven by levels of self-confidence and self-efficacy, in which case false assumptions and inappropriate levels of training and development may be inhibiting adoption.

In order to address the core question and these key areas within it, the following additional research objectives are set:

- To gain a better understanding of the ICT profile of the academic staff at Al-Jouf University.
- To investigate the levels of ICT resources available to the academic staff.
- To explore the levels of ICT use by the academic staff at individual and departmental levels.
- To explore how the academic staff use ICT in teaching and learning.
- To explore the relative importance of factors that influence ICT adoption and use in teaching and learning.
- To explore the barriers to ICT use that exist for the academic staff.
- To explore the strategies and changes that should be implemented so that ICT use for teaching and learning can be most appropriately adopted.

1.4 Study Context

One key aspect of the epistemological and ontological drivers of this study is that an analysis and understanding of values, beliefs and opinions with regard to higher education in Saudi Arabia generally and in colleges of education specifically can only be gained by research conducted where the tertiary education and teacher training takes place. Therefore, this section provides a brief overview of Saudi Arabia, Al-Jouf University, and the COE, which is where the study participants and the research itself was located.

1.4.1 Saudi Arabia

The Kingdom of Saudi Arabia is within the continent of Asia and, located as it is within the Middle East, can be seen as being at the juncture of two further

continents, Europe and Africa. It is the largest country in the region and the fourteenth largest in the world (Almalki, 2011). It has a growing and relatively young population (median age 26.4 years in 2014) that was estimated to be in excess of 27 million in 2013; approximately 30 per cent are believed to be immigrants/expatriate workers. Saudi Arabia is commonly described as a high-income developing nation, which is exemplified by its per capita GDP that was estimated to be $31,300 in 2013 (Index Mundi, 2014).

Saudi Arabia can be described as being culturally homogenous within the wider Islamic world, where the nation and its people carry a responsibility to maintain two of the most sacred Islamic places and to the many pilgrims who visit them annually. This homogeneity is reflected by the fact that the population is wholly Muslim and approximately 95 per cent are Sunni (Al-Rasheed, 2003).

1.4.2 Higher education and ICT adoption in Saudi Arabia

Since the establishment of the first university in Saudi Arabia in 1949, the higher education system has grown and developed alongside the adoption of an aim and a policy for tertiary education to be in parallel with that of the most advanced nations. Very significant investments in both infrastructure and human capital have been made, with $15 billion being invested in 2007 alone, with no tuition fees being charged and with all expenses being covered by central government.

ICT adoption and use is seen as a cornerstone of higher education policies generally. A number of plans and policy goals have been adopted with this in mind, such as the national plan for ICT adoption that was created in 2005, followed by further five-year plans that now extend to 2020. In 2007, the King Abdullah Project for developing education was initiated, which again had higher education and ICT adoption at its heart. A nine-step plan to improve ICT adoption in universities generally and in colleges of education specifically included a requirement that every institution should be connected by high-speed DSL networks and that every student and academic staff member should be given a laptop.

ICT adoption policies have evolved from a period when e-learning was seen as a key for providing opportunities to a greater number of citizens to an understanding that e-learning alone is not sufficient if standards are to be maintained and improved. Through a recent (9th) plan, from 2010 to 2014, and under the leadership of King Saud University, King Fahd University, Islamic University and

King Abdulaziz University, the policy has moved towards e-learning as an important supplement within traditional academic settings (Almalki, 2011).

1.4.3 Al-Jouf University

As part of the ambitious and far-reaching plans for higher education in Saudi Arabia, Al-Jouf University was established in 2005 as the focal point for higher education in the Al-Jouf Region. The university has a total of 16 colleges, of which 10 are located in Sakaka City, and some of which (including the COE) were formerly local colleges and centres for specific fields. All such colleges throughout the Kingdom were attached to universities under a royal decree issued in 2007.

1.4.4 College of Education

Teacher training in Saudi Arabia has been through five stages of historical development, beginning with elementary teacher institutions in 1953 through to the last significant change, in 1989, when teacher colleges were established and when the length of training was extended from two to four years (Al-Degether, 2009). Teacher colleges in Saudi Arabia share a number of key objectives to maintain important ethical and teaching principles. These include being good citizens, developing a range of skills, understanding the principles of education and key theories that drive these principles within cultural and historical settings, education management and processes, curricula and lesson planning, and setting education within modern technological environments (Alzaydi, 2010).

Although the COE has only been a part of Al-Jouf University since colleges were amalgamated into universities in the Kingdom in 2007, it was founded in 1984 as the Al-Jouf Education College. Its relative importance as a centre for teacher training of teachers can be seen by the fact that it is the only such centre in the entire Northern Province (Almorshid, 2003). The college has expanded in recent years and now has 11 departments: Mathematics Education, Educational Foundation and Psychology, Curriculum and Instruction, Arabic Education, Computer Education, Educational Technology, Art Education, Physical Education, Islamic Studies, Social Studies and Science Education.

The CoE trains teachers in both primary and secondary education and offers first degree courses in subject areas as well as the final diploma that is a certificate confirming qualification as a teacher.

1.5 Limitations of the Study

All studies inevitably have limitations. As this study is limited to one institution, its results cannot be generalised beyond that institution and its specific departments from which participants were selected. Moreover, the study assumes that all participants accurately report their beliefs, values and opinions and that these responses are not driven by any other criteria. While all available staff participated in the quantitative survey, the numbers for the qualitative part were limited and their selection was based on subjective evaluations of their extent of knowledge.

Finally, although the use of academic staff only as participants may be rational as they are the key group that will determine levels of ICT adoption and use, two other stakeholder groups may have values and opinions that also drive the process: institutional staff and students. Therefore, their exclusion from this study may also be seen as being a limitation. On the other hand, another stakeholder group, the governing society, does inevitably influence the study and the fact that traditional practices with regard to gender separation in education have to be adhered to has some influence on the work and on the ways in which ICT adoption and adaptation can be considered.

Chapter 2: Literature Review

2.1 Introduction

It is not an exaggeration to suggest that the role of ICT in changing many areas of the lives of people over the last few decades has been revolutionary. Just a few examples include the ability of businesses to grow and compete on a global scale, and of people to connect with each other across the world in different ways and at different levels, regardless of geographical distances, by social media and interfaced telecommunications. Nowhere, it is argued, have the changes enabled by ICT been more keenly felt than in education and in higher education in particular. One only has to consider what students and lecturers once had to go through to produce their work in the offline world to see the extent to which education has fundamentally changed.

Many areas have been fruitfully studied in the field of ICT in education, such as the benefits and limitations of ICT-enabled distance learning (Alsadoon, 2009), the extent to which computer and telecommunications technology may enhance language teaching (Shaabi, 2010) and the extent to which the characteristics of learners may be suited to the use of ICT-based teaching (Almuqayteeb, 2009). This thesis hopes to add to this field by providing insights and further paths of exploration with regard to the use of ICT in teaching and learning in teacher education programmes within higher education generally and the Saudi Arabian context specifically. This chapter will therefore review the most relevant work in both these general and specific subject areas.

Although there are many ways to approach a literature review, the approach taken here was to first scrutinise as wide a range of literature within the field as possible and then systematically reduce the number of articles to those that are most relevant and helpful in guiding the research (Rowley & Slack, 2004). The review was then separated into sections that will usefully guide the reader through it (Rowley & Slack, 2004).

A significant part of this review will focus on ICT and higher education in Saudi Arabia, as it is the subject of this study. However, it is important to contextualise this specific focus within studies and theories that have been developed elsewhere. Therefore, these two separate but nonetheless very connected areas are presented in turn in this chapter. Section 2.2 focuses on the wider international

sphere and consists of four sections: change and innovation, the diffusion of technology, ICT in higher education and factors affecting ICT adoption in teaching and learning. Section 2.3 focuses on these topics in the Saudi Arabian context. Section 2.4 summarises the chapter.

2.2 ICT in the International Sphere

2.2.1 Change.

Changes within an organisation involve humans and human emotions, beliefs and fears. Therefore, in order to gain an understanding of how change may be effective, it is also necessary to understand and explore these emotions and what they mean within the psyche of individuals. Within the multiple-stranded arena of change, people are likely to have a number of fears, such as a fear of the unknown, that something of the working culture and environment with which they are familiar is being removed (Cameron, 2004). Perceptions will be made about the consequence of change and the extent to which personal benefits or disadvantages will result from it (Agboola & Salawu, 2011), and substantial resistance to change will be inevitable.

The extent to which change is successful will thus be at least partly contingent on the amount and nature of resistance to it, which in turn will be dependent on the way in which change is implemented. As change is usually developed by senior management, it will inevitably be seen as being an imposed, top-down procedure, which in itself is liable to engender fears and resistance (Chew, Cheng & Lazarevik, 2006) and so steps can be taken to develop inclusive strategies for change, to impart a sense of ownership on the change process (Cameron, 2004) and a belief in the positiveness of change (Chew et al., 2006). A further aspect of seeking successful change is an understanding of different opinions through a philosophical lens, which can be seen as ‘philosophies-in-practice,’ an understanding of different preferred teaching methods and how suited they are to ICT (Kanuka 2008, p. 92).

Pelliccione (2001) further endorses the importance of understanding the human side of change but points out that while the ways in which a change is introduced or imposed may make the task easier, it is ‘rarely understood’ initially and therefore ambivalence tends to ‘pervade the transition’ (p. 33). Before an innovation can be properly adopted by those who will be required to change in order

to use it, there must be a shared meaning, a common understanding of what it is, what it implies and the benefits it will bring. These views are echoed by numerous authors, such as Wang (2008), who suggested that e-learning is a socio-cultural phenomenon, and Arouri (2013), who found that trainee teachers felt disadvantaged, even disillusioned, by not having had ICT facilities earlier in their school careers.

In a different sense, and perhaps taking these points a stage further, it can be suggested that the use of ICT in education sits uncomfortably when compared with its use in other productive areas of human life. Although the challenges facing companies, for example, with regard to introducing enterprise resource planning (ERP) and customer management systems, are often difficult and require considerable investments in time and energy, they may be less onerous than those facing teachers in school and institutes of higher education. If a company wishes to introduce a new system or even install ICT for the first time, it must overcome barriers to change and ensure that its employees are competently trained in the use of ICT and the specific system that is being installed. While this may improve efficiency and productivity and even mean fewer staff, the job that is being done after the ICT installation or upgrade is often the same as the job that was being done before, only enhanced by technology. When ICT was first introduced in education, it was also seen as being a functional tool that could, for example, be used to teach computer literacy (Cairncross & Poysti, 2004). However, its role has stretched considerably beyond this to become an anticipated and expected part of the learning process and an integral part of a constructivist learning paradigm.

This further suggests that when considering change within an educational environment generally and within higher education specifically, it may never be enough to consider areas of change in isolation. Indeed, some authors are concerned with aspects such as the availability, reliability and functionality of ICT implementation (Webb, 2007), the lack of training or of ‘technical and administrative support’ (Nyirongo, 2009), instructional technologies (Kadzera, 2006) and attitudes of teaching staff and trainee teachers towards a specific item of technology such as computers (Ridzuan, Sam & Ahmad, 2001). However, none of these aspects, it can be argued, should be seen as encapsulating anything other than often practical challenges within a change process. Surely a holistic conceptualisation of the whole problem of change within the overall challenge that ICT dictates is the most positive way of looking at ICT in education, an

understanding that ICT in education and in e-learning should be seen as a 'social presence,' one which supports learners in projecting themselves 'socially and affectively into a community of enquiry' (Anderson 2008, p. 223). Although companies face similar challenges in terms of finding the investment, installing and training their staff, in an educational setting, it is perhaps more important to consider the level of users, teachers and trainee teachers in terms of their uptake of ICT within their national cultures before considering factors such as resistance to change. Within an Australian higher educational context, Howell (2007) found that the starting point with his study participants was that all, from the 'highly innovative to the late technology adopters' had used email, the worldwide web, administrative tasks and ICT in the 'preparation and presentation of their lectures' (p. 1). Thus, the context was important because many if not most of the commonly cited constraints had been overcome within it. However, Howell (2007) found that a constructivist educational approach was not linked to the adoption and use of technology but rather to the participants' individual beliefs that were in conflict with their experiences with university practice, which in turn reflected a lack of 'institutional leadership'.

As shown in other sections of this chapter, the issues surrounding the uptake of ICT in education generally and higher education specifically vary greatly between nations and between cultures. However, even among the various practical problems that are discussed, there is often a delineation of perceptions between stakeholders within educational settings. The most common is between the aims and aspirations of the institutional and management hierarchies (and in some cases national policy makers) on the one hand and education professionals and their students, who are the actual users and potential beneficiaries of ICT change and innovation, on the other. One fundamental reason for this is that institutions and their strategic decision makers may be seeing ICT as business organisations do – essentially to ensure that the ICT infrastructure, software and hardware is in place and that staff know how to use it –while the reality in education settings generally and in higher education specifically is that the requirement is to go beyond the functional and into the realms of teaching methodologies and practices and what it means to be innovative and adaptive teaching professionals. This leads to a discussion of institutional support.

2.2.2 Institutional support

From Section 2.2.1, the importance of institutional support can be seen as a critical factor brought to attention by a number of authors and the generally negative view of it (institutional support) can be contrasted with the positive attitude found among teachers as individuals and as a group (Alev, 2003). These opinions pervade the literature – Shamaoil (2005) conducted a study of teachers in a secondary school in Victoria, Australia, who were using 'Blackboard' technology, and found a belief among them that they lacked ongoing professional development, leadership support and the integration of technologies within classroom settings. Similarly, Oyaid (2009) found that while teachers on the whole had positive views of ICT, they believed that they were hindered in using it in three main areas: time constraints, a lack of training and a lack of finances.

2.2.3 Innovation

Innovation as a driver of change has become a very popular theme and computer and telecommunications technology has been at the forefront of the perceived benefits of change. Whereas innovation in the past came relatively slowly, with the influence of new technology enduring for long periods, this is an age of ongoing innovation that has been embraced not just by private institutions, but also by governments, which are identified as the key factor that can bring competitive advantage and lead to more innovation and greater advantages (MIT, 2013; UK Government, 2012; UNCTAD, 2012).

Nowhere are the priorities of governments in terms of innovation strategies more keenly felt than in the field of education, such as lifelong learning, distance learning, and learning to learn (OECD, 2009), as well as on enabling future generations to compete and to thrive in an increasingly competitive world (Ofsted, 2011). These drives to compete and to ensure that an innovative future is built has meant that there has been a very strong focus on investment in education across the world –for example, with major investments by state governments and the Australian Government in ensuring that the infrastructure and the wider aspects of ICT are in place and available (Victorian Government, 2013) and ICT being compulsory in UK state schools for students aged five to 16 by virtue of an Act of Parliament that was passed in 1988 (Ofsted, 2011).

These points suggest that there is a strong role to be played by institutions. Pelliccione (2001) noted that changes in education have three possible parameters: the use of new materials, new approaches and 'the possible alteration of beliefs' (p. 34). As ICT implies a simultaneous change in all three of these areas, the extent to which change can be enabled and encouraged must go beyond the provision of the necessary equipment and facilities through investment and should be focused on the teaching staff themselves. Shamaoil (2005) acknowledged this sometimes undervalued area, stating that 'it is important to understand what change means for the people directly affected by it, and what factors assist and/or hinder in adapting effectively to the process of change'. A common theme is the lack of institutional support as well as a perceived misdirecting of priorities by these bodies. However, further findings (discussed below) suggest that there may be a tendency to effectively shift blame from teachers and lecturers onto institutions and management and in these terms some balance of responsibility may be required.

2.2.4 Role of teaching staff

Since Piaget (Gauvain & Cole, 2005) convincingly showed that children go through stages of cognitive development and that they gained knowledge by experiencing the world around them, the views that are centred around constructivist learning have developed to the extent that the paradigm has extensively influenced classroom teaching over the last few decades, and it has often replaced traditional, instruction-based learning, with teaching taking place within varying educational environments. ICT has an enormous and recognised potential within this area to assist teachers as they develop new ideas and methods in their classrooms that can enable the construction of lessons that will allow their pupils and students to learn by doing, by interacting with the realities of the world that can be enabled by ICT and driven by the tasks set by teachers (Kharade & Thakkar, 2012).

The above points suggest that the use of ICT in classrooms should not be seen as effectively switching from a focus on the teacher to constructivist learning through the use of ICT but, rather, as a means of enhancing the qualities that have developed good teaching practices, such as having strong interactions with learners (Asabere & Ahmed, 2013). In this sense, ICT can be seen as a key participant in the higher education sector and the role of the teacher is to integrate it so that it becomes a part of the classroom. It can also be the facilitating mechanism that brings the

distant student to the teacher and enables students to construct their knowledge through doing and interacting. While this may suggest a dichotomy between the extent to which the teacher or ICT is the learning facilitator, such a tension can, rationally, only exist in the mind of the teacher. In this sense, the role of the teacher in optimising the benefits of ICT does not come from taking a semantics-based stance but, rather, in integrating successfully him or herself, the student and the ICT (Iniesta-Bonillo, Sanchez-Fernandez & Schlesinger, 2013).

While the influence of practical factors is acknowledged – such as time and space, the previous experiences that the teacher has had with learning, the relationships they had with their teachers and the ability of these teachers to integrate the strengths of teaching into their classrooms and into their e-learning constructs – there is a view that being a 'good' teacher will be the most important determinant. Thus, particularly in teacher education programmes, where future teachers are currently learners, the role of the teacher remains pivotal. Afshari, Abu Bakar, Su Luan, Abu Samah and Fooi (2009) support such an integrated understanding of ICT within education and suggest that one indication of this is for it to be viewed as a cross-curricula tool as opposed to something taught as a separate topic or subject area. Surely, argue Afshari et al. (2009), moving away from a view that seeks to give an impression that ICT is a subject in its own right to one of it as being integrated within every subject and teaching scenario will better enable an understanding of its true benefits, particularly in a student-centred teaching environment.

However, while it may be useful to make some generalisations, the relative importance of these factors can perhaps best be evaluated by seeing them through a comparative lens. In other words, if the attitude of teachers can be traced to the educational ICT culture that has evolved or is evolving within the institutional framework and if this can be seen to have an impact on how teachers teach, then it may become important to trace back to the early experiences of future teachers and learners to find key areas that will lead to future positive attitudes or constraints on learning and teaching. Such a comparative study was conducted by Kusano et al. (2013) between elementary schools in the US and Japan, which noted that while the wider home and business cultures of both nations have embraced technology (e.g., approximately 75% of homes in each nation have a computer), Japanese cultural attitudes towards education are more deferential, teacher-focused, quiet and conservative. This attitude pervades the Japanese educational system to the point of

university entrance and therefore ‘keeps everything new and innovative like learning with technology off the lesson contents in high schools’ (Kusano et al., 2013, p. 32).

The scepticism inherent within the Japanese pre-university education system includes the attitude of teachers, who were found to have an intrinsic and developed cultural belief that ICT and interactive learning was not generally the most appropriate method for teaching younger children (Joshi, Pan, Murakami & Narayanan, 2010). This suggests that the institutional environment is significantly influenced by the ingrained cultural beliefs and attitudes towards education, which means that there is likely to be less investment in ICT. It is also a commonly held belief that younger teachers who have grown and developed within a wider computational environment will be more likely to perceive the benefits of ICT in education (e.g., Inan & Lowther, 2010), though this may be relative to the prevailing cultural environment. This was supported by Kusano et al. (2013), who noted that while there was far less attention to ICT in Japanese classrooms, the perceived usefulness of ICT in education was related to age both in Japan and the US. However, as noted, there was far less ICT technology available to Japanese teachers who, as a group, perceived it to be less useful than US primary school teachers did.

In this area, as in many others, Japanese attitudes may seem, through non-Japanese eyes, to be somewhat paradoxical in that the nation remains a leader in developing ICT and particularly digital technology while keeping it at arm’s length in its classrooms. Nevertheless, one important question that arises from Kusano et al.’s (2013) study is how critical early exposure to ICT learning is in shaping the opinions of future teachers – whether the educational culture is of greatest importance (as in the case of Japan) or whether a strong exposure to ICT, during higher education and teacher training for example, has the potential to be the most influential aspect in terms of shaping proficiency and perceptions of ICT value.

The implications of this are profound because if the most important factors are early influence and wider cultural beliefs, the process of change is likely to be slow, at least in some nations. If, however, it can be seen that a strong intervention during training and strong emphasis on ICT may be most influential, the possibility exists of an ability to quickly gain ground in terms of the critical role of the teacher in innovating with ICT. It is therefore of interest to note that some research has found strong positive connections between prospective teachers who had used ICT-based teaching methods in a series of learning exercises and those who had not:

Hismanoglu (2012) found that teachers who had completed five teacher training modules that used ICT had statistically significant different attitudes towards ICT before and after in comparison to a group that had used traditional and non-ICT methods. This is supported by Goktas, Yildrim and Yildrim (2009), whose work led to recommendations that ICT should be integrated across the whole of a teacher training programme and appropriately contextualised, and that trainee teacher students should have extensive experiences of 'innovative ICT supported learning'.

While the above strongly supports a view that an appropriate level of intensity and ICT resource provision may enhance the enthusiasm, adeptness and the positive willingness of prospective teachers to use ICT in their future careers, it does not pay any attention to the fact that they are individuals and will therefore have different levels of responsiveness to ICT during their training. While individual characteristics and qualifications may be a part of the selection process for those who wish to take up teacher training, it is unlikely that adaptability and enthusiasm for ICT would be a critical factor in this process. Nevertheless, as the importance of ICT in the classroom grows, this factor may come more to the fore. Therefore, it is relevant to consider whether there are isolable characteristics that may be indicative of this. It is also relevant to align this factor against others that have been discussed, such as the relative importance of pre-university and early exposure to ICT.

Drent and Meelissen (2008), who used both explorative path analysis and case studies in their study, found that the most important intrinsic factors that determined the attitude and approaches of teachers towards ICT in the classroom were a willingness to 'keep extensive contacts with colleagues and experts in the area of ICT for the sake of his own professional development (personal entrepreneurship)', that the 'teacher educator sees and experiences the advantages of the innovative use of ICT in his education (ICT attitude and perceived change)', if the 'pedagogical approach of the teacher educator can be described as student-oriented' and if 'the ICT competence of the teacher educator complies with his pedagogical approach'. The study also found that while school-level endogenous factors did not have a direct impact on teacher willingness to develop innovative ICT approaches, support for their efforts at this level was identified by participants as being an important motivator.

This leads to the question of whether the process of ICT integration into schools and its innovation by teachers should, from an institutional point of view, be

seen as a top-down or bottom-up process. Drent and Meelissen's (2008) study appears to indicate that a bottom-up process would be the most useful approach, with emphasis being placed on developing networks of 'cooperative communities' between teachers, allowing reflective time for innovation to be properly analysed, enabling periods when their ideas can be developed and encouraging teachers to play to their own strengths. However, while such initiatives may be instigated to a degree at the school level, they would be difficult to sustain without institutional (top-down) support in terms of enabling sufficient non-teaching time and, of course, in providing the appropriate hardware and software. These points lead Fullan (2007) to the contention that both top-down and bottom-up initiatives are required, and it is clear that the alignment of both is important if substantial progress is to be made.

2.2.5 Change theories

There are numerous theories of change but it is neither relevant nor possible to discuss all in sufficient detail to warrant their inclusion. Therefore, four are chosen based on the subjective opinion of the writer with regard to their relative worth and on the basis that they provide a contrast between a general theory of change, a theory of educational change, a change theory which is specific to the adoption of theory in pedagogical settings and a technology integration model.

2.2.5.1 Diffusion of innovations theory

2.2.5.1.1 Overview of DOI theory.

The diffusion of innovations (DOI) theory researched by Rogers (2003) delivers a framework for determining the process of diffusion whereby the process of decision-making is associated with the acceptance and different classes of acceptance in a social system. Fundamentally, DOI theory defines how, why, and to what degree new and innovative technology and ideas disseminate via cultures (Rogers, 2003). Several technologists consider that advantageous innovations will sell themselves and in this sense it is clear that the advantages of an innovative idea will be extensively recognised through possible adopters, so that innovation will merge quickly (Rogers, 2003, p. 7).

Rogers (2003, p. 12) describes an innovation as being like an idea, object or practice that is observed through some unit of adoption by an individual. Innovation-

decision-making is a process by which some decision-making unit or some individual goes through a path from the major knowledge of the innovation, to a decision to accept or discard, to develop an attitude towards the invention, to execute the innovative idea and to approve such decisions (Rogers, 2003, p. 20). It also has the potential to have an impact on the process, for example with regard to the previous situation, features of the decision-making unit, observed features of the invention and channels of communication (Dooley & Murphy, 2000). When faced with problems in the process of innovation diffusion, this framework and its philosophies can provide support in terms of modifying the opinions of organisers leading an innovation in accepting the important problems involved in the innovation process. It comprises the characteristics of innovations that support or delay their adoption, types of adopters, and the process of innovation-decision happens in using invention as well as in the authority of opinion leaders in the process of adoption (Petherbridge, 2007, p. 39).

Rogers' DOI theory is very suitable for examining the adoption of expertise and technology educational environments in higher education (Medlin, 2001; Parisot, 1997). As much diffusion research contains technological inventions, Rogers (2003) frequently utilises the words 'innovation' and 'technology' like substitutes, defining a technology as a strategy for complicated action, which decreases the doubt in the cause-effect relationship that is concerned with the preferred outcome (p. 13). It consists of two parts, software and hardware, where software is 'an information based tool' (Rogers, 2003, p. 259). As a technological innovation, software contains a low level of observability and therefore its ratio of adoption is relatively slow. Although hardware is the tool that signifies the technology in the form of a physical object or material, for Rogers (2003, p. 177), adoption means decisions for the complete use of an invention as the best course of action presented and refusal is a decision to not accept an invention or change.

Rogers (2003, p. 5) describes diffusion as the process by which an invention is connected by definite networks over time between the members of a social system, and highlights, communication channels, innovation, social system and time as the four important mechanisms of DOI. A technology is a strategy for influential action, which reduces the doubt in the cause-effect relationships involved in attaining a preferred consequence (Rogers, 2003, p. 13). Rogers connects two components with technology and one, the way information is substituted with the help of hardware, is

very hard to perceive (cited in Petherbridge, 2007). A hardware facet is the tool or material while a software facet is an information-based tool that is easy to imagine and makes it even possible to count the hardware facet of an invention (i.e., the number of computers in the office of faculty members).

According to Zaltman, Duncan and Holbeck (1984), when a large number of organisations or people frequently utilise an innovation, the DOI procedure is finished. The measurement of DOI success is when the process of diffusion is accomplished as well as when a social alteration has occurred (Zaltman et al., 1984). Miles (1964) specified that innovations or changes in a system can be extremely effective in serving an organisational influence, which would assist social change. Social change occurs from strategies of DOI that can affect the instructors, students, institution and the whole effectiveness and quality of the educational process.

2.2.5.1.2 History of DOI theory

According to Rogers (2003), DOI theory has been studied for over 30 years in a variety of disciplines that have utilised the model as a framework. Dooley (1999) and Stuart (2000) also listed numerous disciplines where it has been used, such as public health, economics, communications, history, political science, education and technology; it is clear that the theory developed by Rogers is an extensively utilised theoretical framework in the field of technology adoption.

Rogers (2003) notes that DOI theory was initiated by anthropologists and sociologists in the early twentieth century and that it can even be seen in the DOI research developed by Ryan and Goss' (1943) agricultural study in rural Iowa on the acceptance and spread of cross corn. Rogers (2003) also points out that in 1994 education was not a predominant field in DOI research, and only made up nine per cent of all DOI studies. Therefore, although educational technology is a quickly developing process, it is a relatively new topic in DOI research. Fundamentally, it can be argued that Rogers' DOI theory is related to any invention, which therefore includes the use of technology in higher education.

2.2.5.1.3 Four main elements in DOI

Rogers (2003) explained that 'innovation may be defined as an idea, project or practice which is supposed as innovative through an individual or some other unit

of adoption' (p. 12). An innovation or invention may have been developed a long time ago; however, if individuals recognise it as new it becomes an innovation for them at that point in time. In addition, Rogers (2003, p. 14) suggested that there is a lack of diffusion research on technology clusters, which consist of one or more unique features of technology that are supposed to be carefully interconnected. This is of relevance to this study, as it will examine various ICT-related hardware and software use in teaching and learning. Insecurity is a significant problem in the adoption of innovations – the consequences of an innovation may create hesitation: 'Consequences are the modifications that happen in a social system or an individual, as a result of adoption or refusal of an innovation' (Rogers, 2003, p. 436).

To decrease the doubt with regard to the acceptance of an innovation, individuals should be knowledgeable about all its merits and demerits to be aware of all its significances. Rogers (2003) proposed that significance can be categorised as desirable and contrasted with undesirable (dysfunctional or functional), direct can be contrasted with indirect (instant result or result of the instant result), and anticipated contrasted with unanticipated (familiar and intentional or not).

2.2.5.1.4 The innovation process

The decision by an individual about an innovation is a process that takes place across time and comprises a sequence of various actions. Rogers (2003) defines the innovation-decision-making process as a consecutive, psychological process with five different phases: 1) knowledge, 2) persuasion, 3) decision, 4) implementation and 5) confirmation. The first phase, knowledge, will take place when an individual is demonstrating the existence of innovation and an improved understanding of how it functions (Rogers, 2003, p. 171). Persuasion is the second stage, where the individual practices fortunate or unfortunate responses towards the innovation (Rogers, 2003, p. 174). In this stage, forward planning is included when the individual psychologically relates the innovative idea or inventions to his or her expected future situation before determining whether or not to try it. Decision is the third stage, whereby the individual is involved in actions or activities that lead to a choice to accept or discard it. Adoption is also a decision to make complete use of an innovation, as it is the best course of existing action. Refusal or rejection is, of course, a decision not to adopt an innovation (Rogers, 2003, p. 177). Implementation is the fourth stage, whereby the individual puts an innovation to use. In reality,

implementation contains noticeable and modified activities when the innovative idea is actually put into practice (Rogers, 2003, p. 179). Confirmation is the fifth and last stage in which the individual pursues a strengthening of the innovation-decision that has already been made, but he or she may reverse this decision if there are contradictory messages about the invention (Rogers, 2003. p. 189).

Some characteristics of innovations have an influence on technology-adoption decisions and can significantly motivate instructors to utilise or discard them. Theorists have established that explicit features of innovation affect the diffusion process (Hester, 2009). Rogers (2003, pp. 229–259) itemised the characteristics of an innovation as follows:

1. Relative advantage: The extent to which an innovation is supposed to be superior than the idea it replaces (e.g., status, low cost, profitability, time and effort saving, social prestige, decrease in discomfort, proximity of reward). Benefits of educational innovations contain effectiveness in student learning as well as in terms of the success of students.
2. Compatibility: The extent to which an innovation is supposed to be reliable with the past experiences, current values, and requirements of possible adopters.
3. Complexity: The extent to which an innovation is supposed to be comparatively hard to recognise and use.
4. Trial-ability: The extent to which an invention may be investigated with a partial base.
5. Observability: The extent to which the consequences of an invention are evident to others.

Rogers (2003) and some others (e.g., Hester, 2009) have also examined how these characteristics positively or negatively influence the degree of adoption – complexity is the only one that contains a negative influence.

2.2.5.1.5 Communication channels

Communication channels are the second component of the DOI process. According to Rogers (2003), in the process of communication all members create and share information with each other in order to influence ‘a common understanding’ (p. 5). These types of communication happen via channels among sources. Rogers (2003, p. 204) describes a source as an institution or individual that

creates a message – a channel is something through which a message flows from the source to the receiver. Rogers (2003) also describes diffusion as a particular type of communication that consists of communication elements, innovations to keep other units of adoption or two individuals, as well as a communication channel. Interpersonal communication and mass media are two communication channels. Although the latter comprises mass mediums such as radio, TV and newspapers, interpersonal channels consist of a two-way communication between two or more individuals. Thus, 'diffusion is a social procedure which contains interpersonal communication relationships' (Rogers, 2003, p. 19). Therefore, interpersonal channels are very powerful in terms of modifying or creating strong forms of behaviour possessed by an individual.

2.2.5.1.6 Time

Rogers (2003) pointed out that in most behavioural research the time aspect is ignored. One of the important strengths of DOI is, however, the time dimension that is included in the DOI process, rate of adoptions and adopters' categorisation (Rogers, 2003). In diffusion, time is involved in three dimensions:

1. Process of Innovation Decision: a process by which an individual passes from initial innovation knowledge via its adoption or rejection.
2. Innovativeness: the unit of adoption (i.e., the relative lateness/earliness with which adoption of innovation occurs) or an individual's innovativeness compared with that of others.
6. Rate of Adoption: normally determined by the number of individuals or members of the system who accept the innovation in an available or given time frame.

2.2.5.1.7 Social system

In a diffusion process, the social system is the final element. According to Rogers (2003, p. 23), the social system sets interconnected units linked in a mutual problem solving in order to attain a common goal. From its origins, DOI is affected by the social layout of the social system, which is a patterned arrangement of units in a social system (Rogers, 2003, p.24). Rogers (2003) further stated that individuals' innovativeness (which is the key criterion for categorising adopters) is influenced by the nature of the social system. DOI traditionally follows an S-like curve, of which

methods of DOI are used (Mahajan & Peterson, 1985; Rogers, 2003). The S-like curve as plotted in Figure 2.1 depicts the adoption rate: a few 'innovators' initially adopt the innovation, followed by a period of increasing adoption by 'early adopters' and then the 'early majority'. The process of innovation ends with a 'late majority' and 'laggards', where it reaches 'saturation' and the rate of adoption levels out (Mahajan & Peterson, 1985; Rogers, 2003). However, the literature lacks references to whether or not the traditional S-curve would follow the rate of adoption of technology by institutions of higher education:

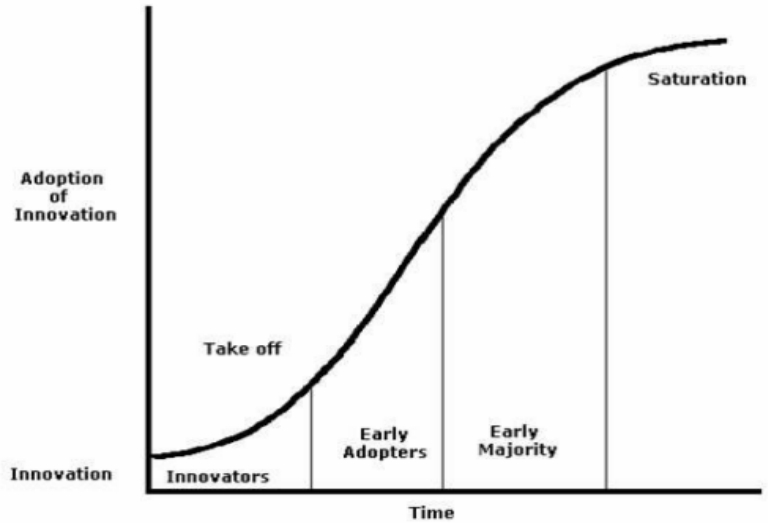

Figure 2.1: Stages of innovation adoption in the social system. Reprinted from *Diffusion of Innovations* (5th ed.) by E. M. Rogers, 2003, London: Free Press.

The relationship between the social system and the process of diffusion involves three elements:

1. Structure: the patterned activities of units in a social system, which provide regularity and stability to the behaviour of individuals in the system. The communication and social structure of a system impedes or facilitates the innovation diffusion in the system.
2. Norms: the well-known behaviour patterns for the social system's members, which serve as a standard or guide for their behaviour. The system's norms tell an individual what good behaviour is required. Norms can operate at the level of religious community, nation or local system (e.g., village, organisation).

7. Opinion Leaderships: the extent to which an individual is capable of informally attracting the attitudes of other individuals or converting their behaviour in a required way with relative frequency.

2.2.5.1.8 Basic and fundamental DOI processes

In the literature, DOI theories differ only minutely from each other, providing processes that are barely different from those of Rogers (e.g., Fullan, 2007; Havelock, 1995; Levine, 1980; Miles, 1964). The same is true of facts regarding processes that develop from DOI. The most fundamental and basic process of DOI were outlined by Eichholz and Rogers (1964, p. 303) as follows:

1. Awareness: An individual learns about the existence of an innovation.
2. Interest: The individual tries more information and studies the innovation's merits.
3. Evaluation: The individual creates a mental implementation of the innovation and applies weights to its advantages for his or her specific situation.
4. Trial: The individual implements the innovation on a small-scale basis.
8. Adoption: The individual adopts the innovation on a regular basis.

In the literature, an analysis of the key processes of DOI shows that there are four or five chronological stages as presented by Eichholz and Rogers (1964). According to Fullan (2007), three planned changed phases fit into this model, with the addition of routinisation. Most strategists of DOI add the final step of routinisation or institutionalisation. Routinisation may be defined as a confirmation of the permanent integration of innovation systems wide (Fullan, 2007). Berman and McLaughlin (1974, p. 10) defined institutionalisation as the stage when an applied innovative practice loses its status of special project and becomes a part of routine behaviour in the organisation. Rogers (2003) pinpointed how DOI theories and processes continue to evolve as innovations in technology fields and societies evolve. He stated that the internet is the technological innovation that has had the greatest impact on DOI processes and claimed that it could make innovation adoption and decision-making processes easier, quicker, and more cost effective (Rogers, 2003).

2.2.5.1.9 Major historical criticisms of DOI

Pro-innovation bias is a feeling in a researcher that innovation should be speedily diffused and adopted by all members of society. Individual blame bias is a tendency in a researcher to place responsibility on an individual instead of on the system. The problem of recall is a third issue, which is the self-reporting by participants of the time taken for innovation adoption. The fourth issue is equality – according to Rogers (2003, p. 135), socio-economic gaps among a social system's members are often broadened as a result of the penetration of new ideas. In view of these criticisms, Clarke (1999) argues that DOI best works as a means of description and lacks explanatory power in outcome prediction, but it may instruct decision makers on how to expedite rates of adoption, initially due to cultural and historical development paths. Rogers agrees to an extent, suggesting that criticisms of such pro-innovation bias may be the result of exploring the process of diffusion either prospectively or during its life cycle, and not retrospectively, as is traditionally common. Researchers are very interested in investigating unsuccessful innovation diffusion causes, a field that Rogers explains is deeply lacking in the diffusion literature.

2.2.5.2 Concerns based adoption model

Initially developed in the late 1960's through research conducted at a US teacher training college, the concerns based adoption model has continued to be the focus of research as well as evaluations of educational implementations (Roach, Kratochwill & Frank 2009). The model consists of three areas in which the engagement and evaluation of teachers takes place in view of changes that are being undertaken. These are stages of concern for the self, concerns about tasks and the extent to which the changes will be used and concerns about the impact of changes on teaching and on students (Conway and Clark 2009).

2.2.5.2.1 Stages of concern

Six stages of concern are identified by Roach et al (2009), which move from initial concerns that are centred on the self to concerns about impacts on relevance, coordination and cooperation and finally a focus on the wider benefits and on research and exploration.

In the self-focused stages, the individual teacher initially has few worries or, indeed, interest, in the proposed changes, but then develops and almost abstract involvement by considering aspects such as characteristics, the effect that the innovation may have and what will be required. This moves to a stage where the management of the change becomes of interest, with attention being paid to how information and resources can best be used – 'issues related to efficiency, organization, management, scheduling, and time demands are the utmost concern' (Roach et al 2009, p. 304). The final three stages in the first stage are described as being consequence, collaboration and refocusing. This includes being concerned with the impact of change on the relevance for students and on the localised spheres of interest, on coordinating with others and an exploration of the wider benefits, including how further changes could be made to enhance the innovation.

Interventions which may assist teachers in overcoming concerns can, according to Roach et al (2009), come within the stages where they are involved with impact, collaboration and refocusing. Examples of such interventions include the provision of efficient methods for tracking and assessing outcomes so that the individual can have a measure of impacts, connecting with other teachers and comparing results in order that coordinated decisions can be made about modifications and how and whether initiatives should be generalised. Further refocusing efforts can come with 'goal attainment scaling,' and 'curriculum-based measurement.' Research has found that the provision of performance feedback 'appears to improve and sustain teachers' implementation' (Roach et al 2009, p. 308).

2.2.5.2.2 Concerns about tasks and levels of use

Two main areas are identified in this aspect of concern and these are non-use and how the intervention is used. Within the first area, three sub-areas are identified, namely non-use/unawareness, orientation and preparation. In the first, the individual has little or no knowledge or understanding of the intervention, is in the process of acquiring information. As this stage moves on, a decision is reached as to whether more information should be gained and actions taken. The third sub-area is when the individual starts to prepare for the first use of the innovation.

The second area, how the intervention is used, is divided by Roach et al (2009) into five sub-stages. The lowest level – 'mechanical use' – is when the

individual puts most effort into practical and daily use of the innovation, with implementation based around individual preferences and needs rather than those of the student. As skills have not yet been developed adequately, practical application is often 'disjointed and superficial' (Roach et al 2009, p. 310). In the second sub-level, few further changes are made, but the use of the innovation is stabilised, with thought being given to how improvements can be made and what the consequences are. In the third sub-level, aspects of the innovation are refined and the effects on students are considered and enhanced, with variations being made based on 'knowledge of both short- and long-term consequences for these students' (Roach et al 2009, p. 310). In the fourth sub-level, the individual continues to vary and expand the uses of the innovation, while in the fifth collaboration with colleagues is undertaken, with efforts made at achieving improved impacts on students collectively across common boundaries. In the sixth sub-level, the individual becomes fully involved with the innovation, and evaluates it further, seeking and exploring new developments and further goals which can be set for it.

Interventions in these levels which may assist in shifting individuals to higher ones include coaching and mentoring, including assistance in planning and in interpreting the impacts of the innovation. Coaching and mentoring efforts have been found to be particularly beneficial when they include cooperation between peers, for example in solving problems and observation.

2.2.5.2.3 Impact of changes on teaching and on students

This stage is described by Roach et al (2009, p. 313) as being one of 'innovation configuration,' where there is an understanding that each change process is unique, and that the consequences of seeking to adapt the changes may be either 'optimal' or may become disjointed to the point of becoming ineffective. To these ends, an 'innovation configuration map' may be usefully set out with the mapping of several areas of innovation use. For example, objectives, objectives sequence, instructional resources used, assessment practices and grouping strategies.

The creation and analysis of these maps may enable the identification of areas where an innovation is being successfully utilised and areas where it is not. This analysis can be undertaken individually, and the results of efforts in both of these directions can become the basis for targeted professional development

programmes as well as for ‘pre-observation/post-observation conferencing’ (Roach et al 2009, p. 316).

2.2.5.3 Technological pedagogical content knowledge

Traditional and digital technologies are compared by Koehler and Mishra (2009) and a number of salient points are made. For example, while traditional technologies, such as rulers, pencils, microscopes and even chalkboards are specific and designed for single purposes, digital technology can usually be used in many different ways. Digital technology is also ‘opaque’ – how it works is not seen by the user. While traditional technology is stable over time, furthermore, digital technology is unstable because it changes, and often changes rapidly. For these reasons, rather than being seen as being an extension and part of traditional technology, digital technology presents a range of new challenges to teachers (Koehler and Mishra 2009, p. 61).

Digital technologies, furthermore, may deceive in their apparent abilities. Despite its obvious assets and perceived benefits, for example, email does not allow for synchronous communication and is not capable of conveying other that written meaning and nuances. The relatively recent development of digital technology, furthermore, means that many in the teaching professions were not themselves educated within technological environment, nor was it part of their ‘society’ or ‘culture’ at those times; thus it was not ingrained within their experiences, not part of their constructivist learning, and therefore has to be learned, arguably with similar difficulties and even disadvantages that a second language speaker has when they seek to study and learn outside of their native language.

The unique and extremely different features of digital technology mean that solutions to the challenges that they pose for educators should be sought outside of the normal ‘boxes’ and Koehler and Mishra (2009, p. 62) argue that an approach is needed which sees teaching as an interaction between what is known by them and the ‘unique circumstances or contexts within their classrooms.’ Fundamentally, there should be an acknowledgment that there is no one best way or method of integrating technology because such integration is contingent upon a number of contexts which *de facto* are specific to arena in which it is being introduced.

This leads to the identification of three core component areas that should be considered if technology is going to enable good teaching with technology, the three components being content, pedagogy and technology. Thus the TPACK (technology, pedagogy and content) framework, with the interactions between the three components being seen as critical if the adoption of TPACK is to be successful.

With regard to content, it is clear that teachers must have a good understanding of their subjects, which includes factual knowledge, concepts and theories, but they must also have a good understanding of how knowledge is gained within their subject areas, the 'nature of knowledge and enquiry' (Mishra and Koehler 2008, p. 4). For example, how and why evidence and justification will be different in the subjects of mathematics and history. This leads to disciplines and an understanding of the rules which guide the teaching and learning of each subject – 'through a process of developing knowledge, methods, purpose, and representation they allow us to "see"' (Mishra and Koehler 2008, p. 4).

Pedagogical knowledge is a deep understanding of the ways and methods used in learning and teaching and include a wide range of knowledge, for example management of the learning environment, the planning of lessons and their development and implementation. It also includes an understanding of students, what is most beneficial for them as learners and how and when their progress should be evaluated. A good and sufficient pedagogical knowledge requires that the teacher understands how their students construct knowledge, how they 'acquire skills, develop habits of mind and positive dispositions towards learning' as well as an understanding of theories of learning such as 'cognitive, social and developmental theories' (Mishra and Koehler 2008, p. 6).

This leads to pedagogical content knowledge (PCK), where consideration is given to differences between disciplines and therefore to different approaches. Citing a study conducted by Donald (2002), Mishra and Koehler (2008) describe six processes that universally apply, but the important point is the different extents to which they apply to different subject areas. The six processes are description of content, selection of relevant information, representation, inferences, synthesis and verification. The ways in which these two factors interface and the differences in how the processes work in each discipline effectively means that 'subject matter is transformed for the purpose of teaching' (Mishra and Koehler 2008, p. 7).

This leads to the third aspect, which is technological content knowledge, and this effectively involves an understanding of how technology may influence each discipline. Choosing the nature and type of technology that will be used may constrain or better enable the types of content that is delivered – it can extend representations, take them in positive directions, or it may deflate and even inhibit the learning process if its relevance and applicability to the subject matter and the pedagogical teaching paradigms are not carefully considered.

If the differences in disciplines that exist, for example, between science and mathematics on the one hand and history and philosophy on the other, it is clear that technology and its appropriate use will have a critical impact on judgments of its value, in the same way that content and pedagogy have such critical impacts. It is the interconnectedness of the three elements and an understanding how teaching should appropriately adopt and integrate all three which is most important. Seeing technology in this light, as an effective equal in terms of importance and complexity to content and pedagogy, means that it is the mix of three (TPACK) in definitively unique settings rather than two (PCK) that may be the key to true progress in teaching and learning.

2.2.5.4 Collis and Moonen's 4E model

The work of Collis and Moonen goes beyond their original 4E model, for example by developing frameworks and further descriptions of learning and technology such as the combination of acquisition models which may mean viewing technology as a 'set of tools, a locally tailorable workbench, which offers affordances to empower people to share, build, support, and manage their learning together, in their common context' (Collis and Moonen 2005, p. 6). However, it is considered to be of prime importance that the basis for the further development of such ideas is primarily considered.

The valid point is made by Collis and Moonen (2001) that even when it is presented with four main contexts – institution, implementation, pedagogy and technology – flexible learning is a complex issue. In similar vein to the TPACK model (see previous section), Collis and Moonen (2001) emphasise the interrelated nature of the contexts, and the also make the point that the starting point can begin

with institutions and end with technology (top down) or begin with technology (bottom up) or, indeed with another combination and starting point.

Although their work is essentially concerned with flexible learning and is set within a higher education context, Collis Moonen introduce their 4E model within discussions of technology within flexible learning. The four 'E's' represent ease (of use), the environment, the engagement of individuals and effectiveness. The importance of ease of use can be seen if it is not easy for teachers and/or students to use because the technology rather than its function as a learning tool is likely to be the focus of attention and it may become a barrier rather than an aid to gaining knowledge. Therefore, before adopting and using a new educational technology, the teacher should ask several questions of it and if these result in an answer that it is likely to be difficult to use, further perspectives need to be considered, for example should a separate session be designed specifically to explain the uses of the technology so that ease of use is obtained.

Environment can be seen as being a broad frame which includes the wider culture, the institutional culture, how teaching and learning is organised, even the institutional political environment – anything which may have an influence on pedagogical, content and technological issues. One example is the extent to which the socio-cultural environment is acceptive of innovation and change, whether students embrace change or prefer to avoid uncertainties. The teacher should be aware of and assess these environmental issues and seek to optimise the approach so that technology is best used.

It is clearly critical that the teacher is engaged with the technology being used and that he/she engages the students. If the technology is perceived as being effective by students as well as by teachers, there will be a greater likelihood that it will become more entrenched and more widely adopted and used. An understanding of effectiveness can come from several directions and be either subjective (intuitive) of objective. One example of this can be seen in the work of Wankel and Law (2011), who conducted an empirical study of technological effectiveness. The importance of the work is not so much that students expressed positive views concerning web lectures but that the facts that positive feedback had been obtained concerning both effectiveness and ease of use led the lecturers interviewed to state that they would either use the same lectures and lecture format or take these and seek to enhance and develop them further.

2.2.6 ICT in higher education

2.2.6.1 Overview

It is clear that a student-focused approach to higher education has become a recognised and positive pedagogical innovation and that it is very much aligned with the use of ICT (Toh, 2013). The question of how ICT can best be developed for such an alignment to be achieved continues to challenge higher education institutions across the world, as the 'unrelenting gap' between the promise of ICT and its fulfilment remains (Toh, 2013, p. 2). One approach to a better understanding of the challenges is to consider the underlying motivations and rationales for adopting ICT in higher education institutes. This may shed light on the sometimes skewed directions in which stakeholders seem to be taking ICT.

Samarawickrema (2005) highlights three general areas of incentives for higher education institutes to adopt and promote ICT. The first is to enhance the quality of learning, where there are opportunities to deepen constructivist approaches, and build student motivation, self-confidence and self-directed learning. This leads to a second motivation, which is to improve access and provide more flexibility to students and in so doing to reach out to 'earner-learners and professionals' (Samarawickrema, 2005, p. 26). Inevitably connected with this is the motivation to maintain a competitive advantage by achieving economies of scale, developing overseas as well as local markets and fundamentally trying to ensure that market share is gained at the expense of rather than lost to other institutions, both at home and abroad.

Other strong motivational forces that have been noted include the fear of not being left behind (Collis & Moonen, 2001) and survival in a modern post-industrial world (Wilson, Sherry, Dobrovolny, Batty & Ryder, 2000), effectively being left with no choice. The question that this raises is whether motivators that are more concerned with keeping up with rivals, demonstrating a commitment to the modern world and effectively second guess the mass assumptions of students who will seek to be within an ICT environment, are the most likely forces that will ensure enhanced and more student-focused learning environments. Perhaps the answer to this question is that the evolving process of ICT and its integration into higher education will, despite the rush for adoption at the potential expense of more expansive values, come to fruition, at least within some institutions, as the long-term realisation comes that universities and other higher educational institutions will be

judged by employers on the quality of their students, and future students in turn will judge the value of the institution on its perceived relative worth. In order to achieve this, institutions should focus on three 'prongs', which are at institutional, programme and individual levels (Henard & Roseveare, 2012, p. 7). This suggests that while institutions may have rushed to 'keep up' with technology, there will be a counterbalancing force that will mean a common interest among and within these three prongs for the institutions, their people, 'structures and processes' to 'adapt, evolve and grow in order to provide effective, engaging, student-centred web-based learning environments' (Samarawickrema, 2005, p. 8).

2.2.6.2 ICT adoption in teacher education programmes

As discussed previously, there may be a critical role for teacher training institutions in terms of appropriate and constructivist teaching and learning, an importance that is enhanced if findings such as those by Hismanoglu (2012) are accepted. This is because it implies that the slate in terms of previous ICT experience can, to an extent at least, be effectively wiped clean in terms of pre-teacher training use of ICT because its use in the teaching training process has a significant impact. Of course, this may have some contingency upon the use of everyday computer basics such as email and searching the internet, but it can also be argued that most trainee teachers in most nations, by the second decade of the twenty-first century, will have acquired at least these basic abilities and had at least this basic exposure to ICT. This was indeed the finding in a study of pre-service teachers undergoing training at a Turkish institution, where it was found that 81.6 per cent of the students within the department owned their own computer and more than 50 per cent had their own internet connection (Gulbahar, 2008). There was also a commonly stated belief by the majority of staff and students that they had positive attitudes towards ICT use in the classroom. For example, the majority of academic staff stated that they used ICT for communication (96%), producing their course material and exams (92%) and for presentations (90%). Almost all of these staff stated a willingness to participate in any form of professional development that would enhance their ICT abilities, nearly 50 per cent stated that they had participated in such courses and 85 per cent stated a belief that constructivist learning (learning by doing) were important methods employed in their courses (Gulbahar, 2008). Similarly, students were reported as being very enthusiastic about the use of ICT with, for example, 87

per cent saying that they would 'like to use electronic media for communicating with classmates and academic staff' (Gulbahar, 2008, p. 34). However, only a minority of the pre-service teachers believed that the media had been used 'efficiently' in their courses, with almost all ICT teaching being limited to board and overhead projectors as well as word-processed notes; a majority stated that computers should have been used (85%) as well as TV and video (70%) (Gulbahar, 2008).

Although differences by characteristics such as age, gender and length of service was found among those training to teach English as a foreign language (EFL) in Jordan, a study by Abu Samak (2006) found similar dichotomies between the aspirations of teachers and the type of training that they were given, although it also found a weak correlation between their attitudes towards ICT and their training, suggesting that enthusiasm for ICT was not dampened by learning experiences.

Gulbahar's (2008) study therefore seemed to suggest a shared commitment to ICT by both pre-service teachers and their instructors, a shared belief in the value of constructivist approaches to education and a generally shared enthusiasm for the uptake and extended use of ICT in the classroom. Yet what the instructors believed were progressive and constructivist uses of ICT was clearly not the same as at least the majority of students, which is suggestive of a misalignment of perceptions rather than either side of the instructor/pre-school teacher equation having any resistance to the use of technology. This apparent contradiction (between the mutually expressed support for ICT between pre-service teachers and instructors) and the generally reported dissatisfaction with the levels and types of ICT used by instructors as expressed by pre-service teachers is not uncommon, as it is a rational assumption that many teachers would only integrate the technologies that they themselves felt at ease with and the notion that instructors can be inhibiting factors as perceived by students appears regularly in studies conducted in this area (e.g., Johnson & Liu, 2000).

These points can be extended by considering the results of one study in particular. Coutinho (2006) speaks from personal experience as an instructor of pre-service teachers at a university in Portugal. She demonstrates the challenges of the role by noting that over the course of 15 years she and her colleagues 'constantly had to adapt our teaching practices to the technological changing world we live in in order to prepare teachers who use technologies in the classroom' (Coutinho, 2006, p. 3). In extending this challenge, consideration is given to introducing pre-school

teachers to the notion of using blogs as an educational resource on the grounds that they are an efficient means for information retrieval, providing a space for the provision of information online to students as well as for the exchange of ideas, role playing and integration. These points perhaps not only underscore some of the extended potential that ICT can provide for future teachers but also that if pre-school teachers in the course of their training are demonstrably shown that teachers should be innovative, they may be more willing themselves in their future careers also to adopt new, interactive and constructivist ideas. Bearing in mind the frustration of pre-service trainee teachers with the use of ICT content in their lessons despite the perception of instructors that they were embracing and using ICT, this may be seen as a good measure of the extended willingness of pre-service teachers to embrace and adopt innovative uses of ICT. Coutinho (2006) finds that levels of interaction between instructors and pre-school trainee teachers are considerably enhanced by the introduction of blogs, and that the 'weblog showed its efficiency in providing what is reported in the literature as educational scaffolding' (p. 7). The quality of the posts increased over time and, importantly, the learning developed in the classroom was considerably extended beyond it as students continued to post and respond beyond this parameter.

Further support for the notion of asymmetries between the approaches and beliefs of students on the one hand and university staff on the other comes from a study undertaken in Zimbabwe by Chitiyo (2006). This is of particular interest because all of the participants were lecturers (spread across three universities) teaching trainee secondary school teachers, and there were no student perceptions involved in the study. Therefore, it may have been anticipated that the lecturers did not self-perceive areas where they were lacking in terms of ICT and the learning expectations of their students, as was the implicit finding by Gulbahar (2008), for example. However, this was not the case, and the findings were, indeed, similar to others that have been reported. The responses from the lecturers suggested that they had a 'narrow systems view' of ICT, using the technology for the illustration of key points, word processing capabilities to prepare their lectures, and the internet at a basic level, and they had 'little confidence' in using ICT productively and integrating it within the learning processes (Chitiyo, 2006, p. 3). The reasons given by lecturers for their lack of innovative adoption of ICT are in common with many if not most of the other studies in this section, such as the lack of training and institutional support.

It can, however, be argued that while institutional and personal development failures as reasons for not being innovative and only using ICT at a functional level may have some validity as reasons for failings in providing pre-service teachers with appropriately constructive, dynamic and adaptive ICT methods, a further disjuncture can surely also be seen in terms of a general malaise among significant numbers of lecturers. Evidence for this was shown by Coutinho (2006). If these findings, which have emerged from a review of a range of studies, have at least some validity, then some of the responsibility, which is generously heaped on institutional and management factors, should, perhaps, be reassigned to lecturers, at least at some pre-service teacher training institutions in some countries.

It may be anticipated that over time, and particularly in developed nations, the cultural and societal adoption of ICT would lead to a scenario where there would be a gradual and societally constructed move towards the greater use of ICT so that earlier uses of it as a functional tool would incrementally give way to its utilisation at its full, or at least close to full, potential. In the case of higher education in Australia, despite considerable investments by the state and national governments, this was found not to be the case by Howell (2007). A further study, with regard to delivery in at least one Australian state (Western Australia), found little change over the last decade or so. Gray (2011) notes the key outcome of her follow-up study of one that was originally conducted in 2001 as follows:

> teacher proficiency and skills in utilising ICT in teaching have not significantly improved over time … despite successive Western Australian governments making substantial investment into new technologies, high-speed broadband and professional learning opportunities for teachers and schools. (p. 4)

2.2.7 Factors affecting ICT adoption in teaching and learning

The notion that learners as well as teachers can not only influence the teaching environment but also assist in aligning the institutional framework is rational and can be positioned within a constructivist paradigm. In such a scenario, the environment in the classroom will be strongly influenced by the ICT abilities of the learners as well as that of the teachers. This in turn may influence the strategic decision makers but one question that can be framed in this context is ‘what is the independent variable that may drive a positive impetus for change?’ A range of

reasons can be cited for differences in the successful implementation and integration of ICT into classrooms. These range from pragmatic factors such as a lack of equipment, lesson planning, the training of teachers and management support (Nussbaum, 2010) to more cognitive and metaphysical aspects such as a bias for or against ICT in teachers and a conscious decision to use or not use technology for teaching. Regardless of the work being undertaken, however, one factor that stands out as a common theme is a lack of competence and confidence in the use of ICT by the teaching staff. Using a multiple case study design within a mixed methods approach, Cooke (2012) found that there were strong correlations between the self-reported competence and self-confidence of both students and teachers and their use of ICT. However, there was one important condition with regard to the use of ICT by both students and by teachers in the classroom, which was the extent to which the teacher's 'average self-reported competence or average self-reported confidence was below competent or below confident' (Cooke, 2012, p. 2). This leads to a more detailed consideration of the motivations and limitations that affect the extent of adoption of ICT by lecturers at institutes of higher education.

2.2.7.1 Individual factors.

Factors that motivate the adoption and extended and innovative use of ICT by individual lecturers can be viewed in terms of those that are based on a vocational and satisfying need to develop the educational requirements of students and the desire for the enhancement of the self, whether in terms of self-actualisation (Maslow, 1970) or ambition and career development. A staff member may, for example, have concerns regarding the relative equity and fairness in systems of higher education and therefore be excited by the prospect that ICT use may break down financial barriers by enabling access to students from poorer backgrounds via distance and other forms of off-campus learning, or they may have an understanding that such learning paradigms will be better suited to many students in terms of convenience and enabling education while still maintaining necessary working lives (Ebersole & Vorndam, 2003; Jafri, McGee & Carmean, 2006).

Depending on their individual perceptions and aims, the motivating factors for some lecturers are likely also to be a wish to do what is expected by institutions, to be seen to do the right thing, which may be connected with fears of losing jobs if the potential income streams from ICT-based learning and e-learning fail to

materialise, or just a general sense of feeling comfortable with conformity (Ebersole & Vorndam, 2003). They may also have some affinity with ICT and deep-rooted convictions that it is an essential part of the constructivist learning paradigm and they may wish to effectively continue their own education, their own learning curves, through the innovative development of ICT application (Cowan, 2006). However, the same reason –professional development – may also be a strong inhibiting factor in a lecturer's motivation towards ICT adoption. In some nations, such as the UK, departments and universities are judged and awarded a grade based on the extent and value of the research undertaken and published by their staff. Parts of their government funding are based on this grade, such that the more publications by staff, the greater the public funding is (British Council, 1997). This means that staff are not only required to conduct research and publish papers and books, but it is a requirement, effectively a vital part of their job. Even if this were not the case, many PhD holders will see the necessity to continue their works in order to be seen as experts in their fields; they may be invited to address conferences and PhD workshops and all of these factors would be considered as being personally and institutionally beneficial. It would also, surely, be at odds with being able to devote significant amounts of time towards developing innovative uses of ICT in their lectures. This is problem often overlooked but, it, is an important potential inhibiting factor in the adoption of ICT in higher education.

Even if a lecturer sees value in building a career, they would only see the innovative adoption of ICT as a positive contribution towards this if it drew sufficient attention to them from management. If they perceived that attention would be better gained in other directions, for example, in encouraging students to participate in sports or being involved in other non-ICT factors, they would surely pursue these. Thus, ambition may be a motivating as well as a limiting factor for the individual lecturer. Some research (e.g., Carroll-Barefield, Smith, Prince & Campbell, 2005), has suggested that lecturers find the lack of technical ability and ICT training to be inhibiting factors, although there may be elements of blame deflection in this case.

It is implicit within at least some of the factors discussed that the personality and characteristics of academic staff is likely to be a very important influence on the motivation or limitations towards the innovative adoption of ICT. If an individual is, for example, confident, innovative and willing to take risks, they are surely more

likely to see ICT adoption positively; conversely, if the individual is conservative, lacks confidence and is generally resistant to change, they are much less likely to be willing to embrace the advantages that ICT adoption can bring (Birch, 2008).

2.2.7.2 Institutional factors

Although there may be elements of blame deflection by lecturers and teachers with regard to ICT adoption (see Section 2.2.7.1), a general theme that permeates the relevant literature is a lack of institutional support and understanding by management of the intrinsic needs of individual lecturers. Moreover, ICT in higher education is seen in similar ways as it is in business – the provision of hardware and software and a modicum of training and the system will function and provide benefits to the 'business'. However, such approaches overlook the essential understanding of ICT in education generally and in higher education specifically. This is encapsulated by the lack of a clear strategy, a vision that is either misaligned or fundamentally lacking (McLean, 2005), unaddressed educational goals and that the lack of the foresight in a transformational leadership paradigm (Wong & Li, 2008). This critical but often overlooked factor is a 'strong predictor' of the appropriate use of ICT by lecturers and teachers (Buabeng-Andoh, 2012), and to be effective the leadership must ensure that the vision is not only aligned with innovation and positive development but also that the academic staff themselves are committed to that vision. Farhat (2008, p. 29) sums up many of the points made in this section by referring to 'fragmented institutional planning' whereby institutions 'fail to match the technology investment with an investment in people' and further cites a lack of leadership within institutions and 'unrealistic expectations' that can produce 'immediate results' as summarising the heart of the institutional problems with regard to the successful adoption of ICT.

Although leadership, strategic planning and a shared vision are key institutional components, they must be interwoven with more tangible provisions. An obviously key area within this is professional development through appropriate training. As there are numerous reasons why lecturers and teachers may be resistant to change, such as time and a perception that ICT use will not be of benefit to the staff member and/or students. Therefore, it can again be argued that institutional support in the form of training must go beyond its mere provision and include a 'buy-in' by the academics themselves. In order to prevent professional training and

development from becoming a barrier in itself, careful and collaborative planning must be used. Significant influences within such a process will be the extent of existing knowledge of ICT (Hew & Brush, 2007) and the existing levels of confidence that teachers have in terms of personal use (Buabeng-Andoh, 2012). These points are emphasised and summarised by Sahin (2006), who suggests that for ICT to be properly integrated and successfully utilised, there should be 'recognition and process involvement, a vertical support structure to overcome technophobia, a well-defined purpose or reason, ease of use and low risk of failure and instructional/administrative advocacy and commitment' (p. 5). It is also proposed that considerable emphasis should be placed on the individual needs of academic staff (Drent & Meelissen, 2008). This needs awareness should include not only the obvious factors such as time constraints but also those that may be of particular importance at an individual level, such as commitment and responsibility for the production and publication of academic papers and books, personal and family commitments and the intrinsic beliefs and approaches to their subject areas by individual staff members.

A further point that can easily be overlooked and was briefly noted above is that of colleague support; indeed, this was found to be one of the most intrinsic factors that determined the approaches of teaching staff attitudes towards ICT and its adoption (Drent & Meelissen, 2008). In a wider sense, it can be noted that an understanding of interpersonal contact permeates the literature of fields such as marketing in terms of the importance of word-of-mouth recommendations (Brown, 2010), human behaviour in terms of group psychology (Hogg, 2001) and leadership (Derue, Nahrgang, Wellman & Humphrey, 2011). In sum, works and subject areas such as these emphasise the importance of human contact and how group mentalities can be formed and can develop a common view of an area of interest and of change to the extent that those with initial reservations can become positive proponents within a group.

A further point can be made from distributional change theory, where research has found that if leadership is shared within groups of professionals, where the individual with the greatest proficiency within a group takes temporary leadership when their skills and knowledge are the most appropriate, with leadership thus changing to suit the needs of the group, and very positive attitudes towards change and the implementation of new ideas can take place (Gronn, 2002). The

literature within the ICT and educational sphere suggests that such development and change initiatives have not been adopted, nor significantly discussed. This may therefore be seen as a point of interest and adopted within this study. A lack of initiatives that develop colleague collaboration and fail to address the forming of networks of professionals may be seen as a significant obstacle to the adoption of ICT in higher education generally and in teacher training programmes specifically.

One factor that permeates the literature and is commonly identified as a significant issue, particularly in developing and emerging nations, is the lack of ICT resources. At one level, the introduction and constant updating of ICT within higher education goes beyond the fact of the advantages of use because it has been found to be a significant factor in the engendering of a conducive environment, one where the benefits become assumed, and can become a part of the culture of education that persists and grows with ICT enablement (Richardson, 2000). This suggests, on the other hand, that a lack of sufficient ICT resources in institutes of higher education will have the opposite effect, where there is not a culture of change and development because the means and tools for change are non-existent or insufficient (Afshari et al., 2009). At its most basic and intuitive level, and notwithstanding all of the other considerable barriers that may exist and are discussed in this chapter, research has shown that the more computers and other facets of ICT are available in the classroom, the more they will be used by teachers and lecturers (Afshari et al., 2009).

However, despite the availability of ICT and the points made concerning the provision of leadership and vision by institutions, a further and clearly necessary factor is technical support, the lack of which is a major inhibiting factor in the use of ICT in the educational establishment, as found by numerous studies (e.g., Chizmar & Williams, 2001; Mumtaz, 2000). In the same way that many people find navigating their way around instruction manuals for ICT usage very challenging, so did a majority of students in one study find difficulties in actually knowing where and when relevant help and support was available on their campus (Chizmar & Williams, 2001). A further study from Turkey found similar issues: in the sense that the ease of use was a determining factor with regard to the use of ICT by staff members (Usluel, Askar & Bas, 2008). Again, perceptions become a key variable with regard to a positive association between technical support and the extended use of non-use of ICT and if it is perceived and believed that there are high levels of technical support, this is likely to improve confidence in use, provide encouragement for innovation

and become a part of professional development if it is not only readily available and efficient but is seen to be readily available and efficient (Khan, Hasan & Clement, 2012). Within such a scenario, it can also be suggested that the personal characteristics of teachers and lecturers should be taken into account (Farhat, 2008; Sahin, 2006). For example, one lecturer may be inhibited by the possibility that the ICT will not function properly and that they cannot therefore deliver their content to a class, or they may be worried that they will be seen as being technically disadvantaged in front of their students, while another lecturer may have the confidence not to worry in advance about such things. If proper technical support is not quickly available, that one fact may inhibit the first lecturer to the extent that he or she shies away from ICT. If assumptions based on the characteristics of the second lecturer are assumed for everybody, then it is these assumptions rather than a lack of investment or other factors that would be driving negativity.

2.2.7.3 Attitudes towards ICT

Some parts of this section have been touched upon within other parts of the review and this fact on the one hand emphasises a holistic and interconnected approach taken towards the review and on the other draws further attention to some very significant points. Fundamentally, it is beneficial to emphasise and add to some points that have already been made in two dedicated sections, this and the following one.

A number of studies have investigated attitudes by faculty members towards the use of ICT in the roles as teachers and facilitators. Within and across these studies, there are some common factors, while there are others that may be due to the specific institution or the academic environment and/or culture within which the individuals studied were located. The general but nonetheless relevant point is made by Yidana (2007) that the fact of being given positive communication concerning an innovative change will not of itself mean that it will be positively received and acted upon by the receiver; rather, a judgment will be made concerning the relative practical value that will be placed on it in terms of the working life of the receiving person. In other words, it must be seen as being able to positively influence the needs of the person being asked to implement it if it is to be enthusiastically embraced.

The extent of this receptiveness will surely be contingent upon a number of factors. Yidana's (2007) study used a mixed methods and multiple case study design

to consider and evaluate attitudes of faculty staff towards ICT use. Attitudes were expressed in terms of how classes were structured and how attitudes were reflected, and it was found that when students initiated interaction with and used ICT, they would usually be individually seated at their desktops. When it was initiated by the staff member, whiteboards were typically used and the students sat in groups. The importance of these points is in the extent to which the student-centred practices evident in non-ICT teaching environments were transferred when there were teacher-initiated ICT uses. The less confident and able the teacher felt in the use of ICT, the less student-focused and more instructional the delivery tended to be. However, Yidana (2007) also found that the determination of the environment was not fully led by the attitude and perceived self-confidence of the teacher – when they were in positions to direct their own learning, the students with higher levels of ICT capability and confidence tended to use ICT, while those who were less confident chose another learning method.

This dichotomy between teachers who have positive approaches to ICT and competence can be seen as a common theme in the literature and the important connections and implications for teaching and learning are often noted. For example, Moseley and Higgins (1999) suggest that the classroom characteristics of staff that had positive attitudes towards ICT included a positive belief in ICT, those who preferred individual as opposed to instructional teaching, being student focused and student-empowering and supporters of student choice in terms of their learning rather than directing and instructing them. Along with the findings by Yidana (2007), this suggests that ICT adoption can be seen as being related to attitudes towards teaching – staff who are oriented towards student-focused and constructivist methods would appear to have stronger associations with an ICT-inclusive approach. In a wider context, this in turn can be associated with work in the field of education and associations with research that has found connections between the self-efficacy of staff and student-learning outcomes (Klassen & Chiu, 2010).

While causal explanation and even the interrelatedness of factors can be discussed in isolation and inferences may be drawn on the relative importance of individual aspects, there will inevitably be a whole range of potential reasons why faculty staff may develop a reluctant attitude towards the adoption of ICT. Furthermore, while there is interconnectedness between factors, the bigger issue is how the challenges should be confronted and where resource priorities should be so

that attitudes may be effectively changed. Mumtaz (2000), for example, while concurring that there is a problem with attitudes when viewed from a wider pedagogical perspective, suggested that the issue may only be improved by the addressing of 'three interlocking frameworks for change': the individual, the institution and the policy makers.

Whether due to a lack of self-efficacy concerning ICT uptake or for other reasons, the issue of the extent to which computer technology is used in the classroom is taken up by a number of writers and researchers (e.g., Al-Senaidi, 2009; Goktas et al., 2009). In a qualitative study conducted across three universities in Zimbabwe, Chitiyo (2006) found that the attitude of most lecturers at these institutions towards ICT was to use it only at a most basic level, such as to illustrate key points that they wanted to make and in the preparation of their lecture notes. Such an endemic lack of ICT uptake despite its availability surely goes beyond self-efficacy and the further findings from the study agree with this. For example, a lack of institutional support was found, as well as limited access to technological tools, a failure to integrate ICT into policies and neither initial nor ongoing professional development.

Such reasons clearly have some validity and are cited across a range of studies, with different emphasis on specific areas; for example, a lack of pedagogical support (Ertmer & Otternbreit-Leftwich, 2010), insufficient time given faculty to adapt to ICT (Almekhlafi & Almeqdadi, 2010), a lack of understanding of how and when ICT can be most efficiently employed (Honan, 2008) and the retention of habits that are within a non-ICT concept of how students should learn (Goktas et al., 2009). However, many studies focus on faculty and sometimes students as participants and there may be a tendency to direct attention away from metaphysical areas (e.g. lack of confidence or other psychological barriers) and towards those that are more objective, measurable and not within the responsibility of the teaching staff participants (e.g., institutions, hardware, software and training deficiencies).

These more psychological factors can be seen in studies that focus on the differences between the teachers (the rationale being that if the reasons for non-adoption were predominantly objective, there would be relatively little difference in the uptake by faculty staff within the same institution). One example is Alajmi's (2010) empirical study of 10 public academic colleges in Kuwait, which found that there were statistically significant differences in attitudes towards ICT and that these

were based on age difference and the subject being taught (in both technical and non-technical areas). In a study with a similar aim at a Chinese college, which included distance learning, Li (2004) also found significant differences between the attitudes of faculty staff towards ICT. These differences were based on the subject, their education level, teaching experience, and length of involvement in distance learning. No significant differences were found based on gender, age or academic rank.

Ishtaiwa (2006) conducted a study at one large Jordanian university through a quantitative survey of faculty staff. Again, it was found that there were significant differences in attitude within both technical and non-technical disciplines. The important differences on this occasion were the extent of specialisation (which can be seen as effectively meaning the level of education attained), the levels of teaching experience and age. However, while specialisation and teaching experience appeared to have an influence on attitudes towards the uptake of ICT generally, they did not have a significant bearing on attitudes towards e-learning. Conversely, age was a factor within both areas. In his research within one large Omani university, Al-Senaidi (2009) found that there were differences in attitudes towards ICT adoption by faculty members based on early adoption and therefore greater skills and familiarity with ICT, perceptions of barriers, and demographic factors.

In summary, it is clear that there are some common attitudes across nations and cultures that have inhibited the introduction of ICT in higher education and, critically, in the training of future teachers. Studies that concentrated on the self-expressed attitudes of faculty staff found that a perceived lack of institutional support, training, time and professional development has led to poor implementation. Conversely, studies that focused on the underlying and more psychological attitudes have found differences based on age, subject and length of service. Limited results from a further and perhaps less researched area suggest possible connections between attitudes towards teaching generally and attitudes towards ICT uptake.

2.2.7.4 Professional development and ICT

This section, along with the previous one, emphasises and extends on some previous points. Indeed, while there are many references to the training provided for ICT and its adoption within this review, the work that has been cited has been somewhat general as well as being critical of it. This section attempts to fill this gap

by considering what professional development means and how it should be aligned with the role and vocational responsibilities of the teaching staff.

The role of the teaching staff is critical to the learning process and, as has been noted elsewhere, several studies have suggested a relationship between constructivist and student-focused learning use and relative willingness to adopt ICT within the classroom so that it will be used to its most important potential (Klassen & Chiu, 2010; Moseley & Higgins, 1999; Yidana 2007). A further connection can be argued in the sense that the propensity of staff members to adopt and use ICT to its full extent will also be contingent on a willingness to understand the intrinsic role and rationale of teaching, that is, in order to be of greatest value to their students, they should consider themselves within several interlocking areas. The first is the identification of themselves as a person formed, educated and developed within a given culture that will have influenced the beliefs, values and opinions that they hold. The second is the professional identity gained and developed through the pedagogical knowledge and the third is the individual who will have gained a knowledge and understanding from living and working within a wider community and society and a broader and more diverse teaching environment (Stepiola, 2013).

It is within this understanding by the individual that professional development should be seen and shaped – whether that training is formal or informal. It should itself be seen as an ongoing and dynamic process and this is confirmed by writers such as Olsen (2008), who argues that teaching is (not merely a cognitive or technical procedure but a complex, personal, social, often elusive, set of embedded processes and practices that concern the whole person' (p. 5). Thus, the deeper issues and problems with the adoption of ICT should be first considered at a level that evaluates how faculty staff perceive themselves and their role and vocation as a teacher, as either being within an evolving and questioning environment or as a static and instructional state. As Olsen (2008) further argues, teacher identity is an area that has been relatively neglected but is a 'useful research frame' because it focuses on teachers as 'whole persons in and across social contexts who continually reconstruct their views of themselves in relation to others' (p. 5).

Evidence that the looking at individuals and the environment and backgrounds that influence them, and that goes beyond the self-reporting of inhibiting factors such as a lack of time or formal training facilities, can be beneficial, is found in a number of studies. Drent and Meelissen (2008), for example,

conducted a study whose methods were path analysis of a number of case studies in Holland. The point is made that the Dutch government was at the forefront in the early identification of understanding that ongoing professional development and the integration of ICT within it should be targeted and it therefore 'provided teacher education institutes with special facilities to play a pioneering role in the integration of information and communication technology (ICT) in education' (Drent & Meelissen, 2008, p. 187).

This and earlier points made within this section are developed within a Dutch context by Drent and Meelissen (2008), who emphasise the importance of the role of the teacher as this is formed and enhanced through the teacher training process – 'a teacher educator, who uses ICT for the enhancement of the learning process of his students, also shows students at the same time how ICT can be used in primary education' (p. 188). The role of teacher education institutions, further argue the authors, should be placed very highly in terms of ICT because it should not be seen so much as a tool but, rather as something that can enhance or even replace other methods. It is an 'important instrument to support new ways of teaching and learning', which should be used to 'develop student's skills for cooperation, communication, problem solving and lifelong learning' (Drent & Meelissen, 2008, p. 188). In line with other studies, Drent and Meelissen (2008) note that teachers and student teachers self-report their relative enthusiasm and willingness to adopt and use ICT to a great extent, in this case two-thirds in a national survey in Holland reported being 'very enthusiastic'. However, it was found that only about half actually use ICT in the delivery of their courses and of these, the majority only used it as a teaching aid and in the preparation of their lessons – very few actually introduced and used the wide range of educational software that was available for primary and even secondary education.

Against this background, it is perhaps not surprising that the results of the study are that the provision of resources at an institutional level had relatively little impact on the extent to which ICT was used by teachers, with the more important factors being the extent to which the individual teacher involves him or herself in professional development and the extent to which he or she is involved within a dynamic and constructivist learning environment with like-minded colleagues.

These findings, as noted above, find support within the wider literature and cross-cultural research. Sang, Valcke, Braak and Tondeur (2010), for example,

conducted a quantitative survey across four Chinese universities, which involved 727 participants. While noting that cultural differences would be predicted as having an effect on the adoption methods and propensities of pre and post-service teachers, Sang et al. (2010) also make the point that Chinese teaching and learning methods have been significantly influenced by reforms that were introduced in recent years and that this New Curriculum Reform, placed a 'strong emphasis on the adoption of constructivist teaching and learning approaches in Chinese teacher education' (p. 104).

Interestingly, a model is proposed which bases the propensity of teachers to adopt ICT and to be involved in training and ongoing professional development in a Chinese context within three core areas. These are the constructivist beliefs, Teacher efficacy and gender. These bases in turn, argue Sang et al. (2010), will all influence two key areas of training and professional development, namely educational ICT attitudes and computer self-efficacy, which will be the drivers or non-drivers for the acquisition of the necessary skills and abilities to fully integrate ICT within individual teaching perspectives.

In their study, Sang et al. (2010) operationalised five variables using existing scales, the five being constructivist teaching beliefs, teacher self-efficacy, computer attitudes, computer self-efficacy and 'prospective computer use' (p. 107). It is of interest to note that although gender was predicted as being of relevance, it had no significant influence on the relevance of the findings, from which it may be inferred that some traditional and cultural barriers may have been or are in the process of being broken down. In the wider study context, it was found that the strongest predictor of the use of, and therefore willingness to train and be involved in professional development towards computers in education, was attitudes towards the use of ICT. Others were the holding of 'stronger constructivist beliefs', a 'strong teaching efficacy' and 'computer self-efficacy' (Sang et al. 2010, p 109).

A further study, again within a different cultural context, can be noted, from North Cyprus, which set out to identify the 'gaps' that existed between teachers with regard to 'age, Internet access, computer access and performance' (Uzonboylu & Tuncay, 2010, p. 186). Using a quantitative survey method (n = 394) that divided ICT adoption into three areas – technology-based e-learning, web-based e-learning and administrative e-learning applications, Uzonboylu and Tuncay (2010) found that there was 'a significant digital divergence observed among the teachers surveyed,

which would adversely affect their ability to prepare students for the knowledge society' (pp. 192–3). However, while these results confirm those of other studies reviewed in this and other sections of the literature review, the promised remedies and recommendations were disappointing, being limited to a proposal that an action plan should be developed for 'narrowing the Internet gap' (Uzonboylu & Tuncay, 2010, p. 193).

It is in this critical area, in the devising of training methods for trainee and pre-school teachers, that there is a lack of substantial work. The rational outcome in lieu of solutions will be the widening of the present educational divide, where what was a divide between instructional teachers and constructivist, student-focused teachers becomes a divide between instructional, non-computer-using teachers on one side and constructivist, student-focused, ICT-using teachers on the other.

There is a lack of practical substance within models and proposals for the development of teacher training and ongoing professional development. This can be seen in some of the studies that have attempted to address the issue. For example, Startic (2010) proposed that trainee teachers would gain most benefit from observing the benefits of ICT in the classroom and Toki and Pange (2010) suggested that working in small groups may be a way forward. Although vague in detail, perhaps the most intuitively rational approach comes from Zhiting and Hanbing (2001), who recommended a culture-specific and integrated framework for ICT training that includes it within the whole of the teaching and learning processes.

This and the previous section have shown that the likelihood and individual effectiveness of training will be very much influenced by factors intrinsic to individuals. These sections have shown that when the surface of self-reported problems by faculty staff are scratched, the factors that are commonly cited (e.g., poor institutional support, lack of hardware and software, lack of technical support) should be stood against the finding that it is the intrinsic characteristics and abilities of the individual that is a key which must be unlocked if the successful implanting of ICT within teacher training is to be achieved. However, in the interests of objectivity, it is relevant to summarise and discuss some of the commonly cited reasons for a lack of ICT adoption by faculty staff, particularly the demographic differences that may influence such adoption, as well as some of the strategies that may be adopted to overcome barriers to ICT adoption in education.

2.2.7.5 Demographic variables

A number of factors that may affect the adoption of ICT by faculty staff have been introduced and discussed previously, such as the acceptance of the status quo within a general human propensity to dislike changes in work routines, self-centred factors such as beliefs that positions may be undermined, the extent to which personal gains or losses are perceived as coming as a result of change, other motivational factors such as a vocational belief that the adoption of ICT can really help students, and can have a particularly significant impact on those from poorer backgrounds. More functional reasons have also been discussed such as a lack of technical support, a lack of technical ability and a main culprit, which is institutions and their failure to provide technical support, professional development and the time necessary to produce worthwhile and dynamic learning experiences from the use of ICT.

However, there is a quite strong body of research evidence that the extent to which these barriers exist is contingent upon some demographic variables. Many if not most of these contingencies may be aligned with wider theories or perceptions concerning characteristics aligned with demographics. For example, there is a commonly held belief that people who are older are more resistant to change and have a preference for the ways in which their views were constructed at earlier and formative periods of their lives (Islam, Ali & Wafi, 2010; Kunze, Boehm & Bruch, 2013). With regard to ICT adoption, these theories are confirmed by Afshari et al. (2009), who cite data from national statistics that academic staff and teachers with less experience were more likely to adopt ICT and constructively use them within their classrooms. In more specific findings, for example, 48 per cent of staff with less than three years' experience were likely to have adopted computers within their teaching, while only 33 per cent of those with 20 years' or more teaching experience were likely to have adopted ICT. Although theories regarding age and the application of stereotypes is an area of considerable debate (Butler, 2009), the underlying reason may not be age itself but the learning environment that existed when present teachers were training and developing (Afshari et al., 2009).

Thus, age, length of service and teaching experience may be negatively related with ICT adoption and, while not all findings agree (e.g., Venkatesh & Morris, 2000), the majority also find that there are more positive attitudes towards ICT among female faculty and teaching staff (Afshari et al., 2009). However, further

findings add complexity to the issue of demographic variables because while age and experience may be negatively related to ICT adoption by academic and teaching staff, further findings suggest that seniority within the hierarchy as well as the level of educational achievement obtained are positively related (Al-Musawi, 2007). The reasons for this may include the likelihood that there is greater necessity for those in more senior positions to adopt and use ICT in terms of institutional policies and those with higher levels of educational qualifications are more likely to have gained expertise during their post-graduate studies because of the need to research.

2.2.8 Strategies to overcome barriers to ICT use for teaching in tertiary institutions

As has been noted, the use of ICT in education has been generally accepted as being a positive development, particularly as it is aligned with a constructivist approach and involves learners to a far greater extent within the educational experience. However, while this may be held to be the case, there are no definitive answers with regard to the strategies that may be adopted which will overcome the barriers and thus enable the full benefits of ICT to be gained by students in higher education.

However, despite a lack of agreement, some factors can be proposed that are most likely to assist in promoting ICT adoption. For example, there is little doubt of the need for professional development programmes that are driven by the perceived needs of academic staff. While writers such as Borko (2004) emphasise professional development as a means of not only enabling the necessary skills but also as a focal point for required changes, others such as Bennett (2003) suggest that training and development programmes on their own are not sufficient – they should be a part of a wider approach that provides ongoing support and encouragement as well as a planning regime that includes the wider needs of staff than just ICT development.

Another approach is not to focus on formal training and development but, rather, to supply the means (and time) for staff to explore and develop ICT uses with each other (Haydn & Barton, 2008), to effectively create an environment where the advantages of ICT can be used in the form of self-learning for teachers to work with each other to develop and thrive. In this sense, the relative importance is placed on providing the means, culture and environment for positive levels of ICT adoption rather than on formal training. This belief, which assumes an inner desire among

staff to develop their skills of their own accord provided the means for them to do this is facilitated, is supported in a number of works (e.g., Bingimlas, 2009; Gulbahar, 2008). However, the key question is whether this is a sort of utopian ideal that is fundamentally not supported by reality and does not take into account factors such as human nature or the strong area of literature on the common resistance of humans to change (e.g., Agboola & Salawu, 2011; Cameron, 2004).

This leads to the question of whether a top-down institutional imposition of ICT adoption may, despite the likelihood of resistance from academic staff, be the only way that barriers can be overcome. However, there are a range of reasons why such an approach cannot work in isolation. One is that it is unlikely that the management which represents an 'institution' would have the necessary insight, understanding and skills to understand the ICT types and programmes which would be appropriate for all courses, which would effectively mean that more harm than good would come as de-motivated academic staff grappled with teaching approaches that are not aligned to the needs of their students. Another is that studies have consistently found a lack of institutional support as being a major barrier to ICT adoption and use (Oyaid, 2009; Shamaoil, 2005), but there are few, if any, which found that a lack of institutional imposition was a barrier.

There is, perhaps, a wider paradigm that could overcome a range of barriers, as proposed by Kennisnet (2011). In this model, it is suggested that the starting point for ICT adoption is vision and expertise, which takes account of what is needed in terms of hardware, software and infrastructure. This must be matched with the human factor; in other words, teaching staff must not only have the ability to use the equipment but also believe that it can be positively associated with their teaching and learning inputs and outcomes. This in turn requires the active and enthusiastic involvement of leaders, a sort of transformational leadership environment where the followers are inspired by the vision of the leadership. With these factors in place, formal training can be positively installed within teacher training, which in turn will link academic staff with their students. As is commonly held within such a dynamic change environment, revision, renewal and updating is necessary to maintain the impetus of ICT adoption.

While this may be seen as a more likely recipe for success than a predominant reliance on either teaching staff initiatives or the imposition of ICT adoption by institutions, it still relies on factors that are not constant or consistent

and is also, therefore, somewhat reductionist, even utopian. These ignored factors are contained within the human element, in the fact that there is not a sort of 'standardised' person that will respond according to some big idea, or some overarching theory. Therefore, it is argued, if the barriers confronting ICT adoption are to be overcome, particularly in the all-important area of teacher training programmes, such human factors must be accounted for, even at an individual level. These are factors such as students having higher levels of enthusiasm and ICT skills than their teachers, that while staff commonly report a belief in the use of ICT for constructivist learning, the reality is that most use it as a classroom aid (Gulbahar, 2008), that this is often encouraged by the type of ICT training that academic staff are given (Abu Samak , 2006) and that trainee teachers report that the most important inhibiting factor for ICT adoption is the academic staff themselves, their teachers (Johnson & Liu, 2000).

It is argued that it is only when the models and theories are aligned with the reality of the findings from a range of studies that the extent and realities of the barriers to adoption are revealed. This effectively means that academic staff have a 'narrow systems view' of ICT (Chitiyo, 2006) and commonly resist the transition to the stage where the important educational benefits of ICT can be gained. Therefore, a meaningful understanding of how barriers may be overcome can only stem from such a starting point, based on research among individual staff members at individual institutions.

The many areas of discussion in Section 2.2 lead to a consideration of the more specific area in which the study will be positioned, namely Saudi Arabia.

2.3 ICT in the Saudi Arabian Context

2.3.1 ICT adoption in Saudi Arabian institutes of higher education

The enthusiasm in Saudi Arabia for ICT and e-learning is discussed below, where it is established that the extent of this enthusiasm, among a population whose average age is less than 25, is likely to be an influence on the evolving policies at the highest level of the institutional and policy making hierarchies of the Kingdom (Kamal, 2013). However, while this enthusiasm can be contrasted with the perceived levels of competency and confidence in ICT among school teachers, this section of

the review will focus on higher education and e-learning and will consider the challenges and opportunities that exist.

The Government of the Kingdom of Saudi Arabia has long recognised the need to improve its education system if the country is to stand alongside those of advanced nations. Therefore, it has developed a strategy for investment and one cornerstone of the policies adopted is the Aafaq project, with one institution KFUPM (the King Fahd University of Petroleum and Minerals) being given the task of designing a 25-year plan for the education sector (Al-Sarrani, 2010). One key component of this plan is e-learning. The embedding of e-learning within the developing higher education system of the Kingdom was enhanced by a decree from the King in 2001 which established a national plan for the use of ICT in that sector. A comprehensive survey in 2007 established a number of problems and drawbacks with the aim of developing the strategies described above and these included a fragmented system, a lack of infrastructure, a lack of planning, the use of different systems, a lack of databases and a 'lack of research on e-learning' (Al-Sarrani, 2010, p. 6). One result of this was the establishment of the National Centre for E-Learning and Distance Learning (NCELDL).

The aims set out by the NCELDL, which are to develop an inclusive strategy for e-learning across all universities of Saudi Arabia, to develop a number of e-learning programmes and to 'provide complete e-learning solutions to at least three strategic partners by end of 2010' (Al-Sarrani, 2010, p. 7), can be seen as an attempt to embrace the concept of blended learning that includes e–learning (i.e., making e-learning an integrated part of the higher education framework). As with distance and e-learning, however, there is not one set definition for blended learning; therefore, perhaps the best approach is to describe its interpretation. While Beck (2009) simply suggested that it is a learning environment where a significant element of courses have been shifted to being online, Bailey, Ellis, Schneider and Ark (2013) described it in a more dynamic and progressive way as being a 'fundamental redesign of instructional models with the goal of accelerating learning' (p. 1).

While these varied explanations of blending learning have relevance, there is one crucial condition noted below, which is the point made by Liyanage (2004) that it must be perceived by learners (and teachers) as having value in terms of educational and career opportunities. Part of this perceived validity will come in dealing with challenges that are faced in the construction and implementation of

blended learning and e-learning in higher education in Saudi Arabia. One area in which significant challenges exist concerns technical constraints. This was highlighted by Altameem (2013), who found that 'only a few universities have the adequate ICT infrastructures to successfully develop and implement their own e-learning systems' (p. 67) and while users emphasised the need for access at any time they wished, the reality of poor Internet connectivity and bandwidths inhibits the learning process even when there is access. Finally, Altameem (2013) found that online IT support was a critical factor identified by student users and that more attention needed to be paid by universities in Saudi Arabia to this aspect of e-learning.

In a similar vein, Alkhalaf, Drew, Nguyen and Alhussein (2013) found that the ease of use for students and staff was a key factor perceived by students and staff at universities in Saudi Arabia but that when surveyed only a minority stated that they were satisfied with the ICT services received in the e-learning aspects of their courses. For example, only 37.5 per cent found that the e-learning system at their university was easy to use, 39.3 per cent that it was easy to learn to use, 32.8 per cent that it was easy to access and 44.9 per cent reported that there were appropriate levels of 'assistance and interpretation via the internet' (Alkhalaf et al., 2013, pp. 11–12). Interestingly, and in common with other findings reported from other Saudi Arabian studies discussed in this chapter (e.g., Kamal, 2013), the one area where the majority of respondents were in agreement was in their beliefs and attitudes towards e-learning, whereby 61.8 per cent 'agreed and strongly agreed' that e-learning 'provided a high degree of customization for different courses and increased their desire to join the relevant training courses in order to enhance their knowledge and skills' (Alkhalaf, 2013, p. 11).

In his study, Al-Sarrani (2010) was more concerned with university teaching staff in the discipline of science and their professional development. While this work does not paint such a stark comparison in higher education between the enthusiasm of students and a lack of ability and confidence among teachers in Saudi schools as, for example, Almalki and Williams (2012) do, a number of constraints are reported. Perhaps the most challenging one involves Saudi cultural values as well as technology and the fact that men and women are segregated effectively into two sections of the university. The fact that women cannot be taught face to face by male instructors and that there is a relative shortage of female teachers was identified as a

key problem and but one which could be overcome in an effective and efficient manner by the delivery of male classes taught by male instructors being simultaneously delivered to female classes via a television connection. This is one clear and innovative use of technology within a blended learning environment that can be seen as being distinctly advantageous compared to the use of traditional methods.

The notion that females generally and in the Saudi Arabian context in particular have a greater enthusiasm towards ICT and its adoption than their male counterparts has been seen to be a generally held view within the literature (e.g., Al-Sarrani, 2010; Abu Samak , 2006) and further confirmation is found in the work of Almuqayteeb (2009). This study, which focused specifically on a college for girls, found that while there were highly positive attitudes towards ICT among students, there was variance based on socio-demographic variables – the one that particularly stood out was a lack of self-confidence. These and other demographic variables are discussed at greater length in a later section of the review.

Although finding some optimistic avenues of ICT that were being explored and which could be easily used to overcome social and cultural barriers with regard to the segregation of men and women in institutes of higher education in Saudi Arabia, the study by Al-Sarrani (2010) found a number of areas which are not so easy to overcome in terms of introducing ICT and perhaps the most important of these is professional development. Indeed, this identified need was an almost consistent finding across both the qualitative and quantitative areas of the research, for example ‘the quantitative and qualitative data in this study demonstrated a great need for professional development in order for Science faculty to adopt BL’ (Al-Sarrani, 2010, p. 154). Within this generally perceived need was another that may also affect the morale and coping strategies of the instructors, namely that they were not given time within their normal duties for professional development. One further point which perhaps crystallises a range of potential constrictions that are felt by academic staff members in science departments came in answer to a question that asked for an opinion on the statement ‘I believe faculty members must have a stronger voice in the technology professional development program’ and 98 per cent either agreed or strongly agreed.

Thus, while the implementation of ICT and e-learning may be seen as being primarily determined by cost and affordability with regard to the provision of

hardware and software as well as interactive teaching by the institution and the extent to which instructors may have access to connectivity and time with regard to students, there are numerous other factors and sensitivities. One general area is socio-economic, which extends the extent of affordability into realms such as recognition, culture and the modes of delivery. An important finding within an e-learning context is the importance of acceptance by students of the value of the programme and their belief that it provides equality of opportunities in terms of their education (Liyanage, 2004).

2.3.2 Factors affecting ICT adoption in Teaching and learning in Saudi Arabia

There are a myriad of factors that will influence the propensity of a population, both teachers and students, to embrace and accept the potential benefits of utilising ICT to its full potential. For example, Saudi Arabia, which has been described as a high-income developing nation, has a world class, universal, free public healthcare system (Aleklett et al., 2010) but lacks a proper technological infrastructure in comparison to fully developed nations (Almalki & Williams, 2012). Further inhibiting factors identified by Almalki and Williams (2012) include a 'generational gap' with regard to teachers and a belief that levels of confidence and competence (two interrelated factors) within the profession are lacking. However, in terms of popular usage and age structure, there are some very positive signs that despite some barriers there will be a positive movement for change. This is exemplified by the fact that more than 50 per cent of the population is below the age of 25 and 'the demand for extra educational opportunities are high' (Kamal, 2013, p. 3). The extent to which the institutional hierarchy can be influenced by youth embracing ICT and learning in Saudi Arabia is shown by the fact that the government 'has recognised the necessity of adopting online teaching as part of its educational and development strategies' (Al-Khalifa, 2010, cited in Kamal, 2013).

The rather mixed scenario that has been thus far been identified and presented implies a nuanced view of ICT adoption in educational institutes in Saudi Arabia. While the enthusiasm and potential among young people within the Kingdom to adopt ICT can be seen as an extremely positive sign for the future, it is important to focus more closely on the barriers that continue to exist. Almuqayteeb (2009) pertinently reminds us that when the term 'barriers' is used, it is done so in a wide sense and includes anything, whether internal or external to an institution,

which may restrict instructors in the classroom in their adoption and use of technology. One fundamental barrier is a lack of understanding by academic staff of the extensive benefits of ICT adoption. One study found that there was a contrasting outlook at two Saudi universities between expatriate academic staff (more positive) and Saudi national lecturers (relatively negative), although the positiveness of the one group was a positive influence on the other (Alenezi, 2012). These findings are supported by Braak (2001), who found that two important influences on teachers and lecturers are the raising of their awareness of ICT and their exposure, particularly during teacher training, to good practices.

In an empirical study conducted across technical colleges in Saudi Arabia, Al-Asmari (2005) found three areas of statistical significance that had a predictive value of teachers' Internet use: expertise, place of access and experience. However, it was established that this explained only 39 per cent of the variance in use by the teachers in the study. This is perhaps supported by the results of a case study conducted at one technical college in Saudi Arabia, where Al-Ghonaim (2005) found that the three most significant barriers to ICT adoption, as perceived by teachers themselves, were the lack of equipment and infrastructure training for the utilisation of online instruction and technical support. The study also ascertained that the perceived factors that provided encouragement and incentives for teachers were the benefits that students could gain from online instruction, reduced number of assignments, increased learning flexibility for both them and their students and the prospects of extra pay from extra enrolments and assignments.

This study by Al-Ghonaim (2005) has implicit findings that go beyond those that were tangibly expressed because if they are related to findings from further afield, and as discussed in the first part of this dissertation, the individual needs of teachers and lecturers should be considered if there are to be meaningful understandings of the intrinsic barriers to ICT adoption. This important aspect is noted by Asiri, Mahmud, Bakar and Ayub (2012), who in building a theoretical framework for the study of ICT adoption in Saudi Arabia highlighted three important internal factors, 'affect, cognition and behaviour', and one relevant external factor, 'social barriers' (p. 132). In a quantitative study conducted at King Saud University by Alshangeeti, Alsaghier and Nguyen (2009), which used staff as participants, it was found that the strongest correlation between variables existed between compatibility and relative advantage, which is again suggestive that individuals will

consider the likely advantages or disadvantages for themselves before either resisting or accepting change.

The enthusiasm of Saudi Arabian students with regard to ICT use and e-learning has been noted in this section but, as with all aspects of human behaviour, this will be variant and contingent upon the environment within which the enthusiasm is exposed. For these and other reasons, establishing the perceived barriers by students is an important element in understanding this phenomenon. Al-Harbi (2010) conducted research among students at a Saudi Arabian university and found that the most significant barrier for the participants was their perceptions of constraints within the e-learning environment, followed by social pressures regarding the adoption of e-learning. Thus, we can see the potential of momentum and perceptions gained from other students and potentially negative beliefs about the efficacy of embarking on courses that would have a significant impact on their future careers. However, there would appear to be a lesser but nonetheless significant effect from a wider understanding of how effective ICT-based learning in higher education can be. This latter finding is supported by other studies, such as Alkhalaf et al. (2013), who found that there was a 'perceived positive impact of e-learning systems on higher education', whereby 'participants look to these systems for ease of use and expect them to be user friendly' (p. 2).

2.3.3 Demographic variables that may affect ICT use in Saudi higher education institutes

With regard to characteristics and ICT adoption, a study by Al-Sarrani (2010) found no statistically significant relationship between the age of academic staff or their rank, nationality, country of graduation and years of teaching with regard to adopting ICT and blended learning. Indeed, the only characteristic where there was a statistically significant difference was in gender and between departments within the wider science discipline. As Al-Sarrani's (2010) study was limited to science departments, it does not bear direct comparison with Al-Wehaibi, Al-Wabil, Alshawi and Alshankity's (2008) cross-sectional survey across four universities within the Kingdom and across a variety of departments and academic disciplines. Al-Wehaibi et al. (2008, p. 9) found no significant differences between 'perceived Internet problems' and gender, the academic discipline of the instructor, the respondents' amount of teaching experience and the age of the staff member. However, a

significant relationship was found between academic rank and internet problems. While these findings are somewhat at odds with the more specific study conducted by Al-Sarrani (2010) among the staff of science departments in terms of characteristics, the two studies have some alignment with each other, as they do with other work discussed in this section. These include technical and infrastructure problems, particularly the quality of internet connections, and a weakness in understanding the value of Internet usage by staff for themselves and their students.

However, the question of age is relevant and should be explored in greater detail. One reason for this is that if it is consistently shown to be a limiting factor in terms of ICT adoption and use among both faculty staff and students at Saudi Arabian institutions of higher education, it may enable the tailoring of attention, teacher training and professional development to having some contingency upon age. A further reason is that the findings of Al-Sarrani (2010) are at odds not only with those of other work undertaken in the Kingdom but also of numerous other studies. In his study of Buraidah College, for example, Al-Ghonaim (2005) found that there was a significant relationship between the age of faculty members and their attitudes to online teaching and learning. A similar finding was claimed by Al-Shehri (2005). Almuqayteeb (2009), in a study that was predominantly concerned with the attitudes of female faculty members, found that age was also a significant factor. In this and the other studies cited, it was found that the relationship between age and the uptake and use of ICT was negative. The weight of evidence from studies conducted in Saudi Arabia, therefore, as well as those from further afield, are against the findings of Al-Sarrani (2010) and for an intuitively likely proposition that those who are younger are more likely to have adaptable attitudes towards ICT use in the classroom.

As there is likely to be a connection for most faculty staff between age and teaching experience, it is likely that the negative relationship found between their age and use of ICT in the classroom would also be negative; this was indeed found in a number of studies, such as Ahadiat's (2008) on the actual use of technology and Al- Shehri's (2005) on the use of online learning. This was further endorsed by Alaugab's (2007) findings, though they were general and across one faculty and were questioned by Alzamil (2003), who considered individual subjects and found no significant difference in the uptake of ICT based on teaching experience in the subject of social studies. Despite the previous suggestion that the work of Al-Sarrani

(2010) was contradicted by a weight of other evidence, this opens the possibility that, when it is borne in mind that this was also within a subject-specific context, there may be a minority of subject areas where the generalisation does not hold true.

This area, the specific subjects and differences in ICT uptake by faculty members between them, has been considered by a number of writers. Al-Ghonaim (2005) found, for instance, that the uptake and use of ICT with specific regard to online courses was higher for those faculty members whose major subject was Arabic, Islamic and English than members who taught technical subjects. A further area of difference, which may seem at odds with the previous discussions of age and teaching experience, is with regard to seniority and educational attainment. Researchers (e.g., Almusalam, 2001; Al-Musawi, 2007) have found that those with higher academic ranks and levels of qualification (e.g., PhD holders) not only used ICT more frequently but were also more skilled in its use. Upon closer and more detailed scrutiny, however, the reasons for this become clearer and rational, as explained by the findings of Ahadiat (2008), as the extra use of technology is often for research and a PhD holder would almost inevitably have found it necessary to become adept at using ICT in the course of their research studies.

Two further variables found by numerous studies to have an influence on the extent to which faculty members (and students) are likely to use ICT is whether they have access to the Internet and a computer at home and their levels of English proficiency. The rational point can be made that being proficient with technology comes largely from regular use before and during the period when a person is at university and this will undoubtedly and significantly influence use in the classroom. This is endorsed by Alaugab (2007), who places a lack of home use and access among the 10 most important barriers to adoption, as well as by Al-Kahtani's (2006) study of female faculty members. Research on the importance of English proficiency found varying levels of significance, ranging from it being within the 10 most important reasons for lack of adoption (Al-Alwani, 2005) to a high level of proficiency effectively being a pre-condition for being able to use ICT beyond a basic level (Al-Kahtani, 2006).

The issue of gender has important connotations, as noted above, with regard to teaching and learning in Saudi Arabia and some significant and innovative methods have been utilised to ensure that there is equality across classrooms and lecture halls where students are separated and separately taught based on their sex.

However, even though the use of technology is clearly beneficial in enabling male staff to deliver their lectures to female classes, some drawbacks remain. Alkhalaf et al. (2013) noted that important non-verbal signals may be lost to the teacher when such methods are used and, of course, there are no opportunities to interact with classes. Conversely, while this may limit the potential for a constructivist and student-focused learning and teaching environment, it is precisely because the lessons are not interactive that there are greater opportunities for student reflection and replaying the content of lectures and classes.

In a quantitative case study across a number of female-only colleges in Saudi Arabia, with 196 survey participants and using multiple regression analysis, Almuqayteeb (2009) found that the respondents had highly positive attitudes towards ICT and commonly used computers for word processing, emails and Internet access. However, academic staff faced significant barriers, specifically in having sufficient levels of technical support, not receiving necessary training and further lack of support in three areas, namely equipment, infrastructure and administrative support. It was further found that, commensurate with the findings of other studies, there were important demographic variations in the areas of 'age, teaching experience, years of experience with computer technologies, subject taught, access to the Internet at home, computer skill levels, and English language proficiency' (Almuqayteeb, 2009, p. 2). Similar findings were reported by Alenezi (2012), with the further point made that female college students generally had more positive attitudes towards ICT adoption than their male counterparts.

2.3.4 Attitudes towards the adoption of ICT in Saudi Arabia

The issue of constructivist and learner-centred approaches being aligned with greater use of ICT and instructional techniques being associated with limited usage of technology is comprehensively discussed in the first part of this review and it was noted that while attitudes from the perspectives of faculty members and students has been the subject of many studies, there is a lack of it that specifically addresses this area. The same, it can be said, is true of Saudi Arabia and work that is specific to faculties and students within that nation. However, while there is a lack of research, its relative importance is acknowledged by several writers (e.g., Al-Asmari, 2005; Alenezi, 2012; Almuqayteeb, 2009). Almuqayteeb (2009, p. 26), suggests that advances in technology requires that faculty members 'move toward a more learner-

centred approach in which teaching focuses on the activities and outcomes of the learners', and that while the role of teachers 'must shift from being lecturers to becoming organizers and facilitators in constructivist learning environment', those who use an instructional approach are 'likely to resist' the adoption of technology unless they first change to more constructivist methods of teaching. In this sense, there may be a cause-effect dilemma in that while numerous reasons may be found within teaching staff attitudes towards ICT, the key independent variable may the teaching method as a fundamental barrier rather than the ICT.

These very important points aside, and in extension of points made above concerning motivation and demographic factors that inhibit the adoption of ICT in Saudi Arabia, some key areas from the perceptions of faculty staff have been found within some research studies. Alkhalaf et al. (2013) found, in contrast to earlier studies, that students were generally positive in their views of the extent to which ICT-based e-learning was functional, available and easy to use. The extent of use had, however, some contingency with website navigation, which, on the whole, the students were very positive about. Further positive responses from the quantitative survey included the speed and efficiency of the system and the fact that the systems development team were consistently available. With regard to qualitative interviews with staff, one primary finding was the stressed need for higher levels of collaboration between project participants.

Although not explicitly expressed, it is clear that the two universities (Qassim University and King Abdulaziz University) used in the study by Alkhalaf et al. (2013) had adopted an information systems (IS) impact model where the focus is on quality, capabilities and practices. The results reflected the success of this adopted model as perceived by the students who were using the system. The question from the point of view of this study is why this (as opposed to other) systems appeared to have a high level of perceived success while others did not. It can be argued that the reasons are fourfold. The first is that this is a recent study and reflects the ongoing improvements that are consistently being made and delivered in some institutions of higher education in the Kingdom. The second is that it was a case study of two universities that had adopted a high-impact model, which effectively forced the pace of change and had user satisfaction at its heart. This meant that it was not driven by the perceived needs of faculty staff, nor of the institutional bureaucracy but, rather, by the value of the system itself. The third point, one of potentially great importance,

is that it was an enforced and dynamic system that obligated faculty staff to adjust to it and its implied teaching methods and philosophy rather than being a system that is contingent upon the teaching and ICT beliefs of the staff. The fourth reason for perceived success is that the views of the users, the students, was the primary focus and this obscured the potential drawbacks that may have been expressed by academic staff. One possible indication of this is that 'ten staff members rejected the opportunity to take the interview' (Alkhalaf et al., 2013, p. 9), which meant that the qualitative part of the study was, of necessity, confined to three faculty members and one IT support staff member.

As noted above, there are some commonly reported barriers to ICT adoption by studies that had participants that were academic staff as well as students. Alenezi (2012), for example, found that two important barriers were the lack of appropriate tools and knowledge. Al-Asmari (2005) focused attention on the extent to which academic staff used the Internet and found that while they used it and had familiarity with it, this was predominantly for private use purposes and there was a relative lack of understanding of its use for academic research purposes or in how it could be a powerful tool if applied within their teaching environments. In a case study of one Saudi Arabian institute for higher education, using a total of 123 academic and administrative staff as participants, Al-Ghonaim (2005) found three key areas where barriers to ICT adoption were perceived: a lack of equipment and infrastructure, a lack of useful and effective training and a lack of technical support. Similar findings were reported by Al-Hawiti (2011), who studied the views of academic staff at two Saudi universities, with the additional barrier of a lack of planning. The findings follow similar patterns across the relative wealth of literature concerning ICT adoption in Saudi Arabia. A further example is Shaabi (2010), who found that the professional development of academic staff and funding were important barriers to ICT adoption in one institution for higher education in Saudi Arabia and that these should be placed alongside a lack of ICT tools, planning and technical support as significant reasons why adoption is inhibited.

2.4 Conceptual Framework

There are numerous definitions and approaches to theoretical and conceptual frameworks, for example they have been variously described as being a kind of

navigational “gyrocompass,” an analytical structure which can “reduce the loose and often misleading jargon and assertions which permeate the field” and a “collection of broad rules, guidelines, accepted truths, and other basic ideas about the field” (Solomon and Solomon 2004).

However, when closely scrutinised, a common thread can be identified, which is the encapsulating of the theories and concepts which underpin a study and the presentation of this as a summary justification for it. Taking this as a starting point, and with the subject area in mind, the conceptual framework for this study summarily considers the theories and concepts that have emerged from the literature review and articulates them in one statement of theory. It then shows how this summary theory was used to construct the instruments that were used.

With regard to the theories discussed and reviewed, it was found that one common thread within them is that there are challenges to change led by innovation generally and that these are particularly pronounced when the change involves modern digital technology in education. In a general sense, Rogers (2003) argues that innovation will incrementally be accepted and adopted within layers of social systems, will essentially filter through and will then be adopted and taken forward by individuals, or will be rejected by them as more of a hindrance than a help. The factors that determine this acceptance and adoption or rejection will include perceived advantages, compatability, complexity, trial-ability and observe-ability. The tendency to adopt may be enhanced through areas such as persuasion and communication.

While some authors consider the theory of Rogers as being very suitable and applicable to ICT adoption in education, others suggest that the field is far more complex and fundamental to teaching and learning and therefore seek more specific approaches and understandings of the subject area. For example, the concerns-based adoption model sees three stages of concern, which are concern for the self, concerns about tasks and the extent to which the changes will be used as well as concerns about the impact of changes on teaching and on students. Within these three broad stages are sub-stages that an individual teacher will go through, for example in the first stage a person moves from a lack of concern or interest to potentially seeking to collaborate with others. By identifying these stages and sub-stages, interventions can be appropriately designed and instigated which may positively move the individual

along and make progress rather than potentially have stagnation at various bottlenecks.

Another theory which is specific to the educational field and to ICT adoption is technological pedagogical content knowledge theory (TPACK), which suggests that certain aspects of digital technology should be recognised, both positively and in terms of its limitations, and that rather than being seen as a sort of classroom aid, should be positioned alongside the subject and pedagogy as a further teaching and learning paradigm. By seeing ICT in education in this light, and by promoting such an understanding of it, as a third and equal aspect with the other two (pedagogy and the subject), significant progress can be made in its adoption in teaching and learning.

A third specific theory is the 4E model proposed by Collis and Moonen. In this, emphasis is placed on the interrelated nature of the contexts in which ICT may be adopted, for example from an institutional level and then downwards or from a staff/student level and upwards, or from some other starting point. This theory also places importance on the environment in which adoption may take place, for example whether there is a socio-cultural tradition of accepting or being suspicious of innovation and change, and places particular emphasis on the motivational advantages of positive feedback from students, which is one of a number of recommended interventions that should be instigated alongside ICT adoption.

As well as these theories, the literature review has considered a number of concepts, or ideas and beliefs, that are likely to disrupt the adoption of ICT in education generally and in higher education and teacher training specifically. For example, that institutional support may be lacking or be misdirected, that assumptions concerning ICT adoption as it is adopted in business may be made and that the role of teaching staff may be not properly aligned at an appropriate level with ICT. It was further found that the constancy of innovations in ICT may be a barrier to adoption, that training and development programmes may either not substantially exist or may be mis-directed. The important issue of attitudes of staff and their individual fears would be likely to cause barriers to ICT adoption and use, as may demographic variables. Some areas were found in a focus on Saudi Arabia which suggested very strong beliefs in ICT support among students effectively being blunted in some cases by a ‘generational gap’ with some staff members and the

extent to which gender may, given the laws on the nation, be an issue that warranted particular attention.

From these theories and concepts emerge an overarching theoretical and conceptual position which can be articulated as a belief and understanding that there are significant reasons to believe that the adoption and diffusion of ICT is a challenge that has unique features and challenges in higher education generally and in teacher training specifically. It is also likely that these features and challenges have some aspects that are particular to Saudi Arabia and to teacher training at Colleges of Education within that nation.

This leads to a consideration of how this theoretical approach was used to construct the instruments. As is revealed in the following chapter, there are two instruments, one is a survey questionnaire with 21 items, of which 13 invite scaled responses. The second sets out a number of open questions that were put to participants in qualitative semi-structured interviews, with the potential for further appropriate and probing questions to be asked if felt relevant by the researcher.

The survey instrument (see Appendix A) is divided into seven sections and the first elicits demographic details. The asking of these questions was driven by the concept that there may be differences in levels of ICT adoption based in factors such as age, experience and gender. The second section is concerned with the then present levels of use of ICT by staff, for example asking questions such as how long computers are used at work, the length of time connected to the internet and what ICT is used for in teaching. It also asks the participants to rate their skill levels, how often hardware and software is used and the extent to which specific items of hardware and software are used. This section is clearly driven by the theories and concepts, for example in terms of where they may be in the concerns-based adoption model and what may be the causes of them being at a particular stage. The concept of institutional issues is also addressed in terms of ICT provision and enablement as well as how much effort has been put in and how much support and feedback is being provided.

The third section is concerned with the attitudes of staff towards their teaching and the students learning and 13 sub questions elicit features driven by the TPACK theory, 4E theory and even the more general innovation adoption theory of Rogers, for example by asking the participants how interested they are in ICT, whether they believe that it will positively contribute to the learning of their students,

the circumstances in which they would be likely to extend ICT use and whether they collaborate with other staff members. In terms of the concepts, questions are asked such as whether participants believe that ICT adoption would make their lives easier or harder and how comfortable they feel in using it in teaching.

The fourth section is concerned with training and development and this was driven by the concept of institutional support and with TPACK theory in terms of positive interventions. The fifth section asked about factors that the participants felt influenced their use of ICT in teaching and was driven by a range of concepts and theories, for example what the most important barriers to ICT adoption and diffusion are and the extent to which the barriers may be internal (TPACK) or external (4E model). The sixth section concerned policies and can be aligned with the concepts of training and development and from which directions initiatives were led (4E model). The seventh section asks about which strategies the participants felt would assist in ICT adoption and this was driven by a concept that there is a lack of support and collaboration from institutions and between staff members.

A total of fifteen questions were set out for the qualitative semi-structured interviews (see Appendix E), and while there are similarities with the survey instrument, these were designed to be exploratory and more probing. Thus, for example, questions were asked about self-perceived skill levels, the preferred forms of training, how the participants would rate the ICT facilities available and how appropriate these were for their particular needs. Further questions included the factors that had an impact on the effective use of ICT, what the most significant barriers are, how the institution could better promote the effective use of ICT and which changes would be necessary to better facilitate ICT adoption and diffusion. These are all driven by the theories and concepts, for example TPACK and the concerns based theories with regard to skill levels and how adoption could be improved and the general concept of barriers with regard to how the institution could improve levels of ICT adoption.

This section has summarised the theories and concepts presented and discussed in the literature review into one theoretical and conceptual position. It has then aligned this position and the theories and concepts from which it is derived with the instruments used in the study. This conceptual framework is summarised in Figure 2.2 below:

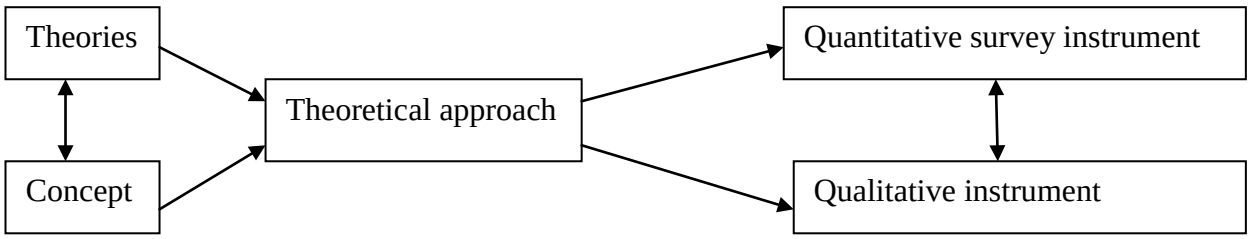

Figure 2.2: Conceptual framework

2.5 Chapter Summary

Section 2.2 has attempted to cover the subject area as comprehensively and broadly as possible. Numerous factors have been discussed and these have ranged from the fairly obvious and expected to the less overt and intangible human elements that may drive or inhibit positive change. Section 2.3 was more focused on the country, Saudi Arabia, where the study will take place and here again some of the problems and issues that are confronted elsewhere were discussed and analysed. However, some important differences were found from the generalities, such as the apparently less-willing staff with regard to ICT adoption on the one hand but the apparently more-willing students on the other. Important cultural asymmetries were also noted, particularly with regard to gender; it was noteworthy that the use of technology may be more enthusiastically embraced by females, one reason for which is that it can remove a substantial barrier to learning.

One possibility that emerged is that the extent to which some barriers exist and the importance of some demographic factors may be significantly contingent upon the specific institution, subject area and academic department being studied . This was particularly noted in the Saudi Arabian context, where the policy towards change and the determination to change and positively implement and integrate ICT within the teaching and learning culture means that there is also contingency upon how relatively recent the research results were found.

Another important point is that in both parts of the review striking similarities could be seen in the perception of faculty members with regard to the barriers to ICT that were being faced. Moreover, there were relatively few studies that attempted to draw connections between a failure to adopt ICT to its potential and the teaching methods employed by the teachers. Surely, if such a relationship exists, it should be further explored, even to a greater extent than the more commonly cited

barriers to the adoption of ICT by faculty members. A further point of interest for potential exploration is an emphasis on systems and their relative ability to provide user satisfaction because not only is user (*v.* faculty member) utility a more important measure of success but an inclusive system will effectively 'force' the adoption of ICT and constructive and learner-focused teaching methods and principles with it.

This chapter has provided strong justification for this study, which continues with a discussion of research methods and methodology in Chapter 3.

Chapter 3: Research Design and Methodology

3.1 Overview

This study has set out to make a contribution to existing knowledge concerning ICT adoption in higher education generally and in teacher training specifically. The justification and significance of such research has been noted elsewhere but in summary it may be emphasised that teacher training holds the key to a future where ICT use may be optimally adopted and used in education in Saudi Arabia, thus making a critical contribution to ensuring that plans and strategies adopted and invested in to ensure that the nation has a first rate system in the longer term are fulfilled. The alternative to widespread adoption in teacher training is a very significant barrier to such plans because if trainee teachers themselves are not guided and taught in appropriately dynamic and progressive ICT-enabled learning environments, future generations are less likely to be so enabled.

However, while the aims and objectives of the study can (and have been) discussed and the study further justified through the comprehensive literature review contained within another chapter of the study, it was of great importance that the methods and the methodology which underpins the actual research were the most rigorous and fruitful possible in terms of knowledge acquisition. It was also important that the enquiry held sufficient adaptability to enable unanticipated but important avenues to be explored once the research had been undertaken and once they had been revealed.

With these points in mind, and with an understanding that a single institution was the focus of an intensive study which set out to survey all of the available academic staff and to further conduct semi-structured interviews with selected key participants from this population, the design of the study is an exploratory mixed methods case study which used both quantitative and qualitative methods to achieve its stated aims. The nature of such a design and such a study meant that it was not appropriate to set hypotheses but, rather, research questions, on the grounds that the purpose was not to establish whether a phenomenon exists or does not significantly exist under given circumstances but, rather, to evaluate the extent to which it exists.

Thus, this chapter sets out the methods as well as the methodological underpinning of the study in greater detail and, in order to do this, it was first

necessary to consider the philosophical and theoretical approaches that support the epistemological and ontological values and beliefs held by the researcher.

3.2 Methodology

Perhaps the most important component of a research programme is the research methodology. It guides the research to find the answers to questions but in order to optimally do this, it is not only essential for a researcher to have sufficient knowledge of efficient and effective methods of research but also to align that knowledge with his or her own epistemological and ontological beliefs and truths concerning what is most likely to produce what may be regarded as justified knowledge (Saunders, Thornhill & Lewis, 2009). There are three general approaches to research, which are discussed in this section. They are supported by logical reasoning, which leads to the adoption of the specific method in accordance with the nature of the study (Gill & Johnson, 2002).

Developed through observations by the researcher and justified by a comprehensive literature review, the primary objective of this research is to understand the nature of ICT adoption by academic staff providing teacher training programmes at the COE at Al-Jouf University in Saudi Arabia. This section discusses the three methodologies that could be adopted in this study to achieve this objective.

3.2.1 Quantitative research

The purpose of quantitative research is to construct data in the form of numbers so that statistical analysis can be undertaken on it. Because data is quantified, inferences can be drawn based on comparisons of variables that are commonly derived from the responses to survey questions. Depending upon the sample size, the results may then be generalised to the wider population being studied. A quantitative methodology can also be used to complement more in-depth studies by, for example, providing additional and validated results that may (or may not) provide greater validity to the findings from other research methods (Elliott, Fischer & Rennie, 1999). One important reason for the decision to use a quantitative survey method in this study is that the researcher aimed to investigate the status of

ICT adoption and diffusion among academic staff providing teacher training courses, following a review of various relevant earlier work.

Quantitative studies can be set within a positivist or post-positivist framework. A positivist approach is interested in objective truths and objective reality and therefore can only consider that which can be seen, felt or touched. Conversely, post-positivism is interested in the metaphysical, with the human mind and behaviour (Trochim, 2006). Inductive reasoning, as opposed to deductive reasoning, is concerned with the extent to which something may be true, the likelihood of truth, rather than with absolute truths (Leedy & Ormrod, 2010). This study is concerned with human behaviour and with human values and cannot find absolute truths. Therefore, it can be described as being within a post-positivist paradigm and will use inductive reasoning.

One common method in quantitative research is the use of a survey questionnaire. Its more practical attributes can be discussed against the theoretical and philosophical background set out above. A questionnaire can be viewed as being a time- and cost-saving means of gathering relevant and accurate information, if appropriately designed (Cohen, Manion & Morrison, 2000). While it has limitations because the questions are closed and standardised across all participants, it can also be a strength because human values and beliefs as they exist across populations can be represented and subsequently analysed.

These instruments are also flexible and can be adapted to the limitations, constraints and needs of a research study because they can be used to conduct surveys through direct contact, sent by post or completed online (Cohen et al., 2000). The latter two uses may mean some disadvantages with regard to representing the varied characteristics of a population, but even these can be overcome, depending on the circumstances, by randomly filtering and discarding some of the questionnaires from over-represented sections while retaining the advantages of reaching a far wider group of spatially diverse populations. The fact that there is a considerable body of existing research in this area that has used surveys, furthermore, means that not only can some guidance be obtained from the instruments used, but also that results can be compared.

Nevertheless, it is important researchers must be aware of the potential limitations of questionnaires. Apart from those imposed by standardised questions and an inability to explore more fully the values and opinions of participants, and

despite efforts to mitigate for unrepresentativeness, validity issues will commonly remain. There are two methods that may, depending on the nature of the study, be used to overcome such disadvantages. One is to survey the whole population and the other is to conduct a qualitative study alongside the quantitative one so that the issue may be further explored (Lunenburg & Irby, 2008). Both of these methods were adopted in this study.

The wording of questions is of great importance for two main reasons. Firstly, they must be fully aligned with the research aims and questions in order to ensure internal validity; secondly, they must have sufficient clarity and simplicity to be easily understood by study participants (Leedy & Ormrod, 2010). In order to achieve these aspects, one useful method is to conduct a pilot study so that responses can be evaluated for such validity and clarity. Such a pilot can take a number of forms; for example, it can be formally conducted among a limited number of study participants and presented as a separate part of the results; it can be informal and conducted by the researcher among convenient individuals that can be easily accessed; or it can come from an associated qualitative study, where the responses to questions are evaluated for their relative alignment with the purposes of the work, in a mixed methods approach such as was adopted in this study.

3.2.2 Qualitative research

The fundamental difference between qualitative and quantitative research is that in the latter the data is in the form of narratives, or words, and therefore cannot be statistically analysed beyond, at most, the descriptive (e.g., graphs that identify numbers of participants who hold one view or another). There are also many forms of qualitative research, such as case studies and ethnographic, observational or phenomenological research (Lunenburg & Irby, 2008). A common method, particularly in the area that this study is concerned with, is semi-structured or in-depth interviews. The advantage with this methodology is that open and explorative questions can be asked and the depths of human values and behaviour can be explored. One disadvantage is that the number of respondents will always be limited in comparison with a quantitative survey (Lunenburg & Irby, 2008).

Interviews in qualitative research can be explorative and interactive, where the comfort of the environment is important and language is used by both the participant and the researcher that is natural for them. If appropriately conducted, the

result is that data emerges rather than being collected (Cohen et al., 2000) and knowledge based on the reality of human behaviour can be gained through the exploration of relevant key themes.

These points imply a key role for the researcher because in order that views, values and opinions can be freely expressed, the respondent must feel at ease, must feel a sense of empathy with the interviewer (Johnson & Christenson, 2000). The respondents must not be made to feel that specific or 'right' answers are being sought but, rather, that they should be imparted with the confidence and the understanding that their individual views and opinions are being sought. In sum, the aim of interviews is to express the life and/or working experiences of the respondents as they have interpreted these experiences.

While an unstructured interview may be useful when the aims and values of the work is being sought through them, the fact that they have no set parameters or theoretical frameworks means that they may be seen as lacking validity. Conversely, structured interviews may be useful when the research requirements are conformity and standardised responses (Patton, 2002). Between these two poles lie semi-structured interviews , where the starting point is a set of pre-determined questions that are aligned with the research aims, objectives and questions, as well as with those from the survey in the case of a mixed methods study. The clear advantage with this approach is that it can remain within the structure of the study and explore the pre-determined areas of research, while still enabling the researcher to explore further within these areas, to take the research in potentially valuable and unanticipated directions (Patton, 2002). This interview method was adopted in this study. While it is acknowledged that software packages for analysis of results from qualitative research (for example *Nudist, NVivo,* etc.) can be very beneficial, it was decided that the use of such software in this study would not result in any gains due to the relatively small numbers of interviews conducted and data collected.

Table 3.1 summarises the differences between qualitative and quantitative research (Johnson & Onwuegbuzie, 2004).

Table 3.1

Summary of the Differences between Quantitative and Qualitative Research

Qualitative Methods	**Quantitative Methods**
In-depth interviews, focus groups and reviews of documents for types of themes	Structured interviews & observations, surveys and reviews of records or documents for numeric information
More subjective: defines a problem or condition from the point of view of those experiencing it	More objective: provides observed effects (interpreted by researchers) of a program on a problem or condition
Use primarily an inductive process to formulate theory or hypotheses	Use primarily a deductive process to test constructs, pre-specified concepts, and hypotheses that make up a theory
Text-based	Number-based
More in-depth information on a few cases	Less in-depth but more breadth of information across a greater number of cases
No statistical tests	Statistical tests used for analysis
Semi-structured or unstructured response options	Fixed response options
Can be reliable and valid: largely depends on rigor and skill of the researcher	Can be reliable and valid: largely depends on the instrument or measurement device used
Time expenditure lighter on the planning end and heavier during the analysis phase	Time expenditure heavier in the planning phase
Less generalisable	More generalisable

It is important to note that while quantitative research can be positioned within either a positivist or post-positivist paradigm, a qualitative study by its very nature will always be post-positivist (Lunenburg & Irby, 2008). As shown in Table 3.1 and noted above, there are advantages and disadvantages with both quantitative and qualitative methodologies. This has increasingly led to the use of a mixed methods approach, although this will, as always, be contingent upon the needs of the research and the epistemological and ontological views of the researcher.

3.2.3 Mixed methods research

This current study adopted a mixed methods design, combining both quantitative and qualitative methods, as depicted in Figure 3.1. It was also based on a dominant-status sequential design and employs this design to collect, analyse, interpret and report data. This approach starts with quantitative data collection and analysis and is followed by qualitative data collection and analysis through the use of semi-instructed interviews. This assisted in explaining and interpreting the findings of a primarily quantitative study.

The interest of researchers in mixed methods research is increasing, as are the diverse ways in which qualitative and quantitative methodologies can be systematically combined (Leedy & Ormrod, 2010). The explanatory sequential design allows the researcher to collect, analyse, interpret and report data.

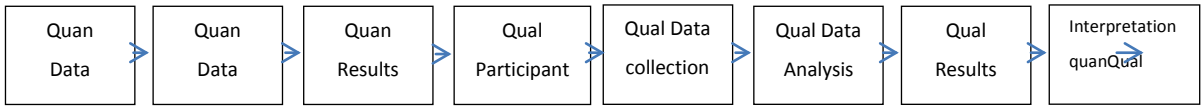

Figure 3.1: The explanatory design. Reprinted from *Designing and Conducting Mixed Methods Research*, by J. W. Creswell & V. L. P. Clark, 2007, Thousand Oaks, CA: Sage

It has been determined that a mixed research methods design is the most suitable design for the study, which includes the use of a survey for collecting information from a sample of the population, and for the collection of qualitative data for study using semi-instructed interviews. Fundamentally, the term mixed method research design is referred to as a process for the collection of both kinds of data, both quantitative and qualitative, in one study. Reporting and analysis of such data is based on a precedence and series of information (Creswell, 2003).

The use of mixed methods is advantageous in the sense that it can combine the benefits of using both kinds of information and has a good range of techniques to strengthen statements more vividly and get a synergistic vision of the findings (Huberman & Miles, 2002). It will produce quantitative data followed by a qualitative analysis after conducting interviews with a smaller number of respondents. It will be applied to explain their answers in accordance with the research questions and discover in-depth detail. Some researchers criticise quantitative techniques for being exceedingly simplistic, reductionist and de-contextualised and not enabling generalisations. However, while these weaknesses

may also exist in some qualitative studies, a mixed methods approach has the potential to overcome them.

3.2.4 Justification of mixed methods research.

The design of this study and its alignment with the benefits of a mixed methods approach means that:

1. The researcher gives priority to the collection and analysis of quantitative data. The motive behind introducing the quantitative data collection first is to represent the main characteristic of data collection. Then a relatively small amount of qualitative research is conducted in the second stage of the study.
2. The data is collected in two phases when using mixed method research design such as that of this study.
3. Qualitative data is often used by the mixed method researcher in order to refine the results obtained from the quantitative data. The refinement helps to explore typical cases, probing important results in detail or handling the outlier or extraordinary observations

Various researchers (Cohen et al., 2000; Creswell, 2003) have provided a variety of reasons or justifications for using mixed methods for collecting quantitative and qualitative data for a single study, including triangulation, initiation, complementarity (or discovering contradiction), expansion, development or addition of scope and breath to the research project. Mixed methods facilitate triangulation and elicit the findings more completely through the affluence and convolution of human activities by examining them from more than one viewpoint (Cohen et al., 2000). It is quite possible that a single-method approach might provide an imperfect view of the complications of human behaviour and conditions where the interaction of human beings is observed. Wholly depending on just one method can result in biased findings, but it is important to emphasise that the choice of research methodology should mainly be driven by the needs of research questions. A scrutiny of these suggests that while a quantitative survey is likely to elicit important general information, the value can be enhanced by gaining a deeper understanding of the values, beliefs and opinions of a smaller number of participants through qualitative interviews.

In using a sequential explanatory procedure, a study may start with the collection and analysis of quantitative data, and then proceed with the collection and

analysis of qualitative data. The two phases are incorporated through the data interpretation phase. Thus, the results obtained from qualitative data can be utilised to facilitate the depiction of the results of a mainly quantitative research. One of the major strengths of this approach is its openness. Furthermore, it can be implemented easily due to its clearly defined stages. Major disadvantages of using this technique are the extra time for data collection and the requirement for the researcher to become familiar with both kinds of research methods.

As has been noted, the choice of research methodology, and therefore the instruments used, should be mainly driven by the needs of the research questions. The link between the two is highlighted in Figure 3.2 below:

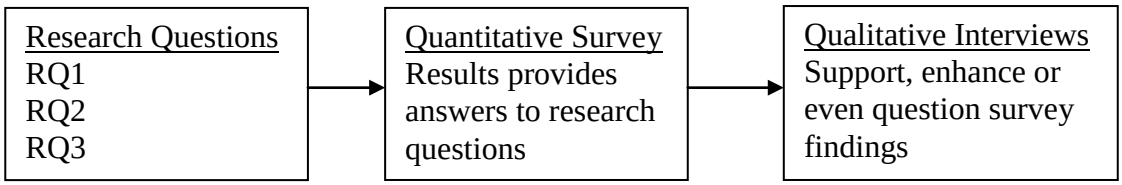

Figure 3.2: Research design linking research questions with the mixed methods approach

3.3 Research Design

As previously noted, the research consists of two phases. Phase one presents collection and analysis procedures for the quantitative data, while the second phase discusses the qualitative data collection and analysis and an outline of the approaches used to verify the accuracy of the qualitative data. Various strategies are available for the implementation of quantitative and qualitative techniques in a single design.

3.4 Phase 1

In this phase of research, the completion of a questionnaire by the teaching faculty members was required in order that the adoption and diffusion of ICT among academic staff at Al-Jouf University in Saudi Arabia could be explored. Findings and the statistical interpretation of data were used as a base for the development of the collection and analysis of data for the next phase. The questionnaires were distributed to all of the available population.

3.4.1 Relevant research questions.

Phase 1 of the research was guided by the addressing of a number of research questions, which are:

RQ1: *How do the COE academic staff describe the current ICT environment at Al-Jouf University?*

This has four subsidiary questions:

(a) *What ICT resources do the academic staff have access to?*

(b) *How do the academic staff use ICT?*

(c) *What level of ICT skills do the academic staff possess?*

(d) *What are the attitudes of the COE academic staff towards ICT adoption in teaching and learning?*

RQ2: *What are the factors that impact the use of ICT by academic staff in their teaching and learning?*

RQ3: *What strategies need to be implemented by the University to help academic staff adopt ICT in their teaching and learning in order to meet the needs of students in the digital age?*

RQ4: *How do the personal characteristics and demographic variables (e.g., gender, experience, age and discipline) of the academic staff at Al-Jouf University influence their ICT use and skills?*

3.4.2 Sample

Questionnaires were applied to collect data to find the answer to the research question. The study was initiated with a survey questionnaire (which was available online as well as being paper-based – the choice of which means was left to the participants) from teaching staff in order to discover the extent of ICT adoption and its use in teaching and learning processes. More specifically, the participants of this study consisted of all academic staff members in the COE at Al-Jouf University in Saudi Arabia. The COE, where the research took place, is one of eight main colleges at Al-Jouf University in Saudi Arabia. The university, which was established as recently as 2005, is the first and only government university in the Northern Region of Saudi Arabia. The COE is considered one of the major teacher training colleges in the Kingdom and it currently serves more than 8,530 students in the Bachelor program, and more than 300 students in the Diploma program. The number of COE academic staff is about 220 members who hold teaching positions in eleven

departments: Curriculum and Instruction, Arabic Education, Social Studies, Educational Foundation and Psychology, Islamic Education, Art Education, Physical Education, Science Education, Mathematic Education, Computer Education and Educational Technology.

3.4.3. Setting for the research

This research was undertaken at the COE of Al-Jouf University, which is located in Sakaka City, Saudi Arabia, and comes under the auspices of the Ministry of Higher Education. Although the University has only been established since 2005, the COE has a longer history as it was incorporated with the Teacher College, an entity that was established in 1984. In order to complete their four year course of study and move to the next stage of their careers, students must have completed a number of core courses relevant to their subject specialisation as well as a given number of electives (Almorshid, 2003).

3.4.4 Data collection instrument

The questionnaire was designed to collect a large data set of information relevant to the attitudes and factors that influence the academic staff adoption of ICT in teaching and learning. Guidance from the use of instruments from previous studies was gained (e.g., Farhat, 2008; Ishtaiwa, 2005; Pelliccione, 2001; Abu Samak , 2006; Yidana, 2007). The survey instrument consisted of 105 items, which solicited responses on a Likert multiple-choice scale. The survey development began by gaining demographic information before establishing the constructs that would be measured. Those constructs were as follows:

1. Technology access: The purpose of the construct was to identify the academic staff members' computer use, internet access and use.
2. ICT use in teaching and learning: The purpose of this construct was to identify the varieties and uses of ICTs in teaching and learning, levels of ICT use, Hardware, software, online services use and ICT attitudes.
3. Training: The purpose of this construct was to identify the academic staff ICT training and the awareness of Al-Jouf University professional development courses.

4. Factors affecting ICT use: The purpose of this construct was to identify the factors that influence the academic staff members' ICT use and obstacles facing academic staff members in adopting ICT's into teaching and learning.
5. Policy framework: The purpose of this construct was to identify the awareness of academic staff members' of school/department ICT plan.
6. Strategies to promote ICT adoption: The purpose of this construct was to identify the suggested university changes and strategies needed to help COE academic staff to adopt ICT.

In the first of the six parts of the questionnaire, background information was collected through questions Q1 to Q4 to determine characteristics of COE teaching staff and the nature of their work, such as gender, age, teaching experience, and department. In the second part, ICT use for teaching and learning in the questionnaire was collected by Q5 to Q12 inclusive, including computer use, internet access, ICT use purposes, self-reported ICT skills, self-reported ICT adoption levels for teaching and learning, and the availability of ICT resources. In the third part, information regarding attitudes towards ICT use in teaching and learning was collected through question Q13. In the fourth part, questions 14 to 15 were devoted to academic staff training. The next part was devoted to the collection of information about factors that influence ICT use in teaching and learning. Data were collected through questions Q16 to Q18. The final question (Q19) considered the suggested university changes and strategies needed to help COE teaching staff to adopt ICT in the educational process.

As the native language of the target population is Arabic, the questionnaire and interview questions were first translated into Arabic and then translated back into English for confirmation of the adequacy of the translation and the services of a bilingual expert translator were utilised for the purpose. Furthermore, its validation and translation was confirmed from two professors from JU and was amended as per their suggestions before carrying out a pilot study. The pilot study was conducted to verify the validity of the items in the questionnaire and to assess methods of data collection before starting the main study. It was also beneficial for identifying the timeframe for completion of the questionnaire and to develop the reliability and validity of the study instrument.

As noted above, a pilot study aids a researcher in improving the wording of questions and in better understanding the ambiguous points of the questionnaire to

make it easy for respondents. It also aids the clarity of data, layout, instructions and suitability of questions for respondents for closed questions (Cohen et al., 2000). A pilot test can be conducted on colleagues and friends. If there are minor changes, the research should be continued; otherwise, another pilot study should be arranged and evaluated (Leedy & Ormrod, 2010).

The pilot study was conducted with 20 participants, including female and male teachers, from the five different departments (i.e., Social Sciences and History, Art Education, Science Education, Islamic Education, and Educational Technology). Sixteen questionnaires (80%) were returned and adequately completed. The pilot study helped to evaluate the time duration for the completion of one questionnaire and this was about 15 to 20 minutes. This pilot study added value to the final draft of the questionnaire (appendix A) and helped to remove difficulties in response to the questionnaire for participants. It also confirmed the validity and reliability of the survey instrument because it tested the relevance and reliability of the questions, with the opportunity taken to revise, refine and re-test them.

The draft was submitted to the Dean of JU Academic affairs after the approval of the study by the Human Research Ethics Committee of Curtin University. It was also submitted to the Al-Jouf University Review Committee, including a letter of introduction explaining the purpose of the research. After obtaining formal approval, the researcher travelled to initiate the process of data collection. The researcher arranged a meeting with the Dean of the COE. After informing the Dean about the purpose of study, the researcher carried out the process of data collection. Email invitations were then sent to all 220 potential participants and the email invitation included a link for an online survey for them, where they were instructed to follow the link to the online survey. In addition, an Arabic version of the survey was distributed to all the participants for the said purpose. To ensure the distribution of the questionnaire to all participants, heads of departments in the COE were also included in the process. The participants were requested to fill the questionnaire, seal it in the given envelope and return it back within a week in a drop-off box provided in the office of the Secretary to the Head of Departments. It took two weeks to complete this process, which ended in April 2011. In the meantime, the researcher frequently visited the academic departments to resolve any relevant issues. The response rate was about 75 per cent, as the questionnaire was distributed among 220 participants and 180 were returned. Of these, 16

questionnaires were rejected due to incomplete information. Thus, the total completed questionnaires were 164 (including 89 male and 75 females).

3.4.5 Data analysis

SPSS version 18.0 was used to analyse the data. Random questionnaires were checked to ensure accuracy and were double entered to eliminate entering mistakes. Suitable statistical tools were used, including descriptives and cross tabulations in order to establish any relationships between the variables with respect to age, gender, department and teaching experience.

It was believed that the use of descriptive statistics was conducive to all of the questions and such a view is supported by writers such as Lunenburg & Irby (2008), who suggest that there is often a misplaced but perceived need to use inferential methods when descriptive statistics can be more advantageous. For questions based on the characteristics of participants (gender, age, experience, self-rated skills, department), it was felt that cross tabulations should be employed as this enables inferences to be drawn with regard to any associations between the relevant variables (Michael, 2001).

Before quantitative data analysis, the questionnaire was verified in terms of completeness inasmuch as there were answers to questions, questions were correctly answered, and they were correctly interpreted. However, answers that were not linked to a question were set aside.

Quantitative data produces useful results if the objective of the research is to illustrate a large population (Creswell, 2003). Following Johnson and Christensen (2000), an instrument can be a self-reporting data collection tool that each research participant completes as an element of a research project. Moreover, by using the instrument the researcher can obtain information on the respondents' beliefs, values, thoughts, feelings, attitudes, perceptions, personality and behavioural intentions.

Although the participants were also selected based on the extent of their perceived knowledge concerning ICT adoption and use at the COE, this selection process was further influenced by the results of the quantitative study. This provided an optimal opportunity for gaining real and meaningful truths and beliefs and therefore knowledge as epistemologically defined. In sum, based on the aims and objectives of the study and the explanatory research design, the researcher was

confident that the approaches outlined were the most thorough possible within the limitations and constraints of the study.

3.4.6 Reliability, validity and trustworthiness mechanisms

Validity in research covers a number of areas under one broad heading , which warrant separate discussions. However, in general terms, it can be described as a complex area of research that is challenging but of critical importance because it will fundamentally determine the perceived value of the work, perceptions that will be based on objectively based views, albeit with some elements of interpretive subjectivity. This is particularly so when the research is based, as this is, in inductive reasoning, and therefore in a search for relative as opposed to absolute truths. This point can be emphasised by noting that validity and its measurement is based within positivism and deductive reasoning (Golafshani, 2003).

One definition of validity is Golafshani's (2003) contention that it 'determines whether the research truly measures that which it was intended to measure or how truthful the research results are' (p. 599). This means that there is a need for the researcher to show through the methods employed, the design of the research and the approaches utilised, that the work is as valid as possible (on the understanding that absolute validity is unachievable, particularly when inductive reasoning underpins the work). It is of further importance to note that the means of establishing validity in quantitative research differs from that of qualitative research. Both of these areas are discussed, starting with validity in quantitative studies.

External validity can be seen within three contexts. One is people and the extent to which those chosen as participants represent the wider population; another is the location of the study, where consideration should be given to whether the research took place in experimental conditions, within created scenarios or are away from the participants' normal environment or within the reality of their lives (Altermatt, 2007); and a third is society and its construction and whether this has changed over time, such as between when data was gathered and when it is reported.

With regard to the first of these areas, it can be re-stated that this research does not seek generalisability because it is the view of the researcher that each institute of higher education will be unique, and with unique academic cultures, a unique environment, it will have academic staff that are individually unique, and a unique history of ICT adoption and use. Therefore, this aspect of external validity is

not applicable. With regard to the naturalness of the setting in which the research was carried out, this was done within the normal routines and within the normal environment of the working lives of the participants; therefore, while it is accepted that the fact of completing a questionnaire of itself represents something which is not typical, this was unavoidable and this point aside, external validity in this sense was optimised. With regard to the third point of external validity, there was a time delay between the collection of the data and the writing of the study and the possibility existed that some changes have been made. Therefore, the researcher has made informal enquires within the university and among study participants and has ascertained that no significant changes have been made in the interim. Thus, the potential for external validity within the limitations and parameters of the study have been achieved to the widest extent possible.

Internal validity considers the extent to which the research actually measures that which it set out to measure, which means that there should, ideally, be no confounding factors in cause-effect relationships, in other words that there are no unknown and unmeasured variables that are the cause of the effect other than the variables constructed through the data collected. As with external validity, the addressing of internal validity can be achieved by close attention to it through a rigorous approach, which ensures that, for example, the representative sample is large enough, and of sufficient diversity to minimise such confounding effects. In another sense, and although not directly relevant to this research, another means of ensuring greater internal validity, in treatment and control groups in experimental research designs, is to make sure that they are evenly matched. Despite best efforts in attempting to deal with internal validity, however, there is no guarantee that it can be totally eliminated.

Construct validity refers to the extent to which the means used in the research to gather the data actually extract the required information or whether they diverge into other, irrelevant, areas. One way of demonstrating construct validity is to refer to other works that have been generally held to be rigorous and to be guided by the tools used in them (Westen & Rosenthal, 2003). Drawbacks of such an approach, however, are that the research that is referred to may not be exactly aligned with the work being undertaken and the fact that authority is a subjective view that may be supported by biased opinion. Nonetheless, in this study the construct has been

guided by reference to numerous works without the direct use of one specific set of questions for the reasons given.

In a similar vein, content validity measures the extent to which the construct is adequately measured and for this there are several possibilities. One is similar to that suggested by Westen and Rosenthal (2003) and another, adopted by this study, entails submitting a draft of the questionnaire to an expert group in the specific field of study (see Appendix F). As this was considered by the researcher to be the most rigorous approach, the questionnaire was submitted to an expert panel in the field being studied, consisting of academics from Saudi Arabia. Subsequent revisions were based on recommendations made by this panel. Despite this precaution, it is noted that some ambiguities may have been a cause for reducing construct validity, for example in not sufficiently explaining terms such as 'teaching and learning' (see Appendix A). On the other hand, it is argued any anomalies in such an understanding would be likely to have emerged from the qualitative phase of the study.

Aligned with content validity is face validity, which is a more abstract but nonetheless important area. This considers the extent to which the research tools used 'appear' to measure that which they set out to measure, and whether they 'feel right'. It was felt by the researcher that the group that would be most likely to appropriately assess this aspect is students because they are the beneficiaries of the learning and teaching experience provided by the academic staff and would therefore be most likely to have a 'feel' for whether the right areas were being probed. Thus, five Arab graduate students were selected by the researcher and asked to give an opinion on the 'face' validity of the tools being used, and specifically on the questions being asked. Some relatively minor points were raised as a result and some small revisions were subsequently made.

Reliability is a consideration of the extent to which the results of a research study remain consistent over time and upon replication. Fundamentally, if the same methodology and instrument were to be used again and it reproduced consistently and appropriately similar results, it would be considered to be reliable. Golafshani (2003) highlights three types of reliability: 'the degree to which a measurement, given repeatedly, remains the same', the 'stability of a measurement over time' and 'the similarity of measurements within a given time period' (p. 598).

However, the test and then re-test method of ensuring reliability may not itself be reliable because participants may become 'sensitised' to the questions being

asked and, perhaps of even greater importance, even if a different group of participants with similar characteristics is used in a re-test, there may have been ‘a change in extraneous influences,’ which can cause a change in opinions, meaning that the differing results are caused by this change rather than the unreliability of the instrument (Golafshani 2003, p. 599).

Therefore, alternatives to the test, re-test approach must be sought. One basic means is to ensure not only that the same questions are put to all participants but also that the meaning of the questions is the same for all of them. One way of helping to ensure this is to utilise a pilot study, which was the case in this work, and it was found upon reflection with participants of that study that the same meanings were attached – no ambiguities were found.

In sum, the terms reliability and validity have significant importance in the research and both are indispensable to ensuring the integrity of a research study (Golafshani, 2003). Reliability refers to consistency, whereas the term validity is associated with accuracy (Cohen et al., 2000). Reliability and validity are important criteria for evaluating research quality. The quality of research depends on the validity of research instruments to ensure that they relate to data that will address the research questions. Validity of the quantitative data can be further improved by adopting cautious sampling techniques, correct tools and a good statistical evaluation of the data (Golafshani, 2003). This leads to Phase 2 of the study.

3.5 Phase 2

This section sets out the steps and requirements for the qualitative part of the research. It follows a similar path to the previous section.

3.5.1 Interviews and interview techniques

Prior to the qualitative interviews, selected participants were approached and invited to take part. Necessary informed consent was obtained and a schedule was drawn up following consultations with the participants with regard to the most convenient times for them (see Appendix E). This was considered to be important as the fact of participants being relaxed assists in them feeling that they can ‘open up’ without any time or other pressures. Although the researcher anticipated that the interviews would not last longer than about 50 minutes, he did not wish to feel any

need to meet a deadline so at least ninety minutes was allocated for each interview, something that would also accommodate the fact that participants may have required differing lengths of time to consider their responses.

Although the various choices regarding types of interview have been discussed, it can be reiterated that semi-structured interviews were chosen as they have the necessary structure required for this research design while retaining the flexibility to explore and to probe important areas of the study. In line with the quantitative study, specific items were set out which would be raised with all participants, with the opportunity to explore values and beliefs more deeply when considered to be of value to the study. The researcher felt that while there were set questions, they would not be asked in a prescribed order so that he could retain the flexibility to make judgments about the most useful points during the interview when they could be raised. With these points in mind, and after relevant details regarding basic characteristics had been obtained, the following items formed a part of all of the interviews:

- The availability and accessibility of ICT at Al-Jouf University
- The adoption of ICT into teaching and learning
- Self-reported levels of ICT skills
- Attitudes towards ICT use
- ICT training and personal development
- Factors affecting ICT use
- Barriers to ICT use
- ICT policies
- Strategies to promote ICT use in teaching and learning
- ICT use and age
- ICT use and experience
- ICT use and gender
- ICT use and academic department
- ICT use and levels of reported skills

The qualitative part of the study was an opportunity to explore in greater depth not only the problem but also how it may be addressed. Although the above concepts were not addressed in a specific order, the interview began, following informal interchanges to ensure that the participants were at ease, with a question

asking them to explain the benefits and challenges with ICT use as they perceived them. Although ninety minutes was allocated for the interviews, the longest lasted for 51 minutes and the shortest for 29. As is set out elsewhere, each interview was audio recorded and subsequently transcribed by the researcher before being stored as documents in a password-protected computer. It is relevant to emphasise that there was potential for some variance in perceptions and interpretations by the participants in both the survey and the interviews. The latter were therefore an important opportunity to explore these differences and thus to potentially reduce reliability and validity issues from the understandings gained.

3.5.2 Sample

The total number of participants in the qualitative study was 15, with 10 that were male and five female. All were considered to be experienced and knowledgeable key participants who were selected from across the departments of the university. Due to cultural rules and norms whereby men are not permitted to have face-to-face discourses with non-related females, the researcher's wife, following comprehensive guidance and informal training from the researcher, conducted the interviews with the five female participants. To reduce the effects of bias, which are prone to affect the results of some studies, it was ensured that no earlier relationship existed between the researcher and the respondents.

3.5.3 Data collection instrument

An interview is an interaction between one or more people (interviewees) and another person (the interviewer). It is essentially a conversation with an aim, which is to find out the values, beliefs and opinions of one person or a group of people on a particular topic or a set of topics (Denzin & Lincoln, 2003). In order to achieve these aims, it is important that the interviewee is able to express his or her opinions in their own ways, using language that is familiar to them. Through this channel, knowledge can be constructed rather than just gathered because it will develop and emerge from the conversation between the two parties (Patton, 2002). Although the values and opinions expressed and therefore the data that emerges will be subjective, it is within a metaphysical paradigm that by definition will be based on human behaviour and interpretations of the world that the interviewee lives and works in.

As the interviewer is able to probe and explore avenues of interest and relevance, the knowledge gained can go beyond that which may emerge from closed question surveys or even from other qualitative methods such as ethnographic and other observational approaches because an explanation of human behaviour comes directly from the individual who is being interviewed (Lunenburg & Irby, 2008). However, this places considerable responsibility on the interviewer because in order to gainfully conduct the interview, the interaction must be based on an acceptance of trust and respect by the interviewee of the interviewer (Burns, 2000), so that the thoughts and inner beliefs of the interviewee can emerge. One danger, for example, is that if the atmosphere is formalised, if the interviewee feels anything other than relaxed, confident and fully reassured, it is possible, even likely, that the knowledge that emerges is what the interviewee feels that he or she is expected to express rather than what is held within.

As well as providing a conducive atmosphere and ensuring that it is the opinions and beliefs of the respondent that should be expressed rather than, for example, a regurgitation of institutional policies, it is important that the researcher has a wide pool of knowledge in the subject area so that questions and points of clarification raised by the respondent can be appropriately addressed, a factor which will also provide encouragement for the expression of convictions and beliefs, even if they may be a distance from the establishment norms and expectations. It is also a point at which clarification may be made concerning the meanings of words and phrases, an opportunity not available for the qualitative survey, and so which allows for the probing of areas of understanding so that different perceptions made in the survey may be found nad explored in the interviews. Different kinds of objectives are attached to the interview, for example, it enables the researcher to extract the inspiration and clarification of participants' response, which is sometimes difficult to ascertain. Patton (2002) observed that the advantages of using interview techniques was to get inside information from people, which is otherwise not possible to observe. Other benefits of the interview method for data collection include getting high response rates, direct interaction of the interviewers with the interviewees, and probing by interviewers to get additional information from the interviewee. Furthermore, any query and ambiguity can be cleared during the interview process where interviewers can clarify any misinterpretation of the interviewee by using effective interpersonal skills.

Although the nature of qualitative interviews has been briefly discussed and the choice of a semi-structured approach in this study has been noted, it is relevant to add to the points made within this discussion. One potential approach is the use of unstructured interviews, where the researcher has the maximum potential to explore any relevant information with the participant (Patton, 2002). Its relative success will be strongly contingent not only on the skill of the researcher in effectively maintaining the focus on the relevant subject areas, but also in ensuring that the participant has the necessary freedom to express a wide range of values and opinions. This approach undoubtedly has value but it will be contingent upon the nature of the research and on the aims of the researcher. The analysis of the findings will also be challenging and, again, suited to potentially new areas of research, where theory is being explored rather than being tested, such as grounded theory, but this was not the aim of this study.

In contrast, a structured interview will be very much controlled by the researcher and the same questions will be posed to all participants, usually in a set order. Although it can be more closely aligned with an administered survey and therefore quantitative approach, there is some flexibility with regard to open-ended questions; however, such a data collection method may be more suited to research among a relatively large group of participants, or from multiple areas and using a number of researchers. It may also be suited to a series of studies that measure changes over time among one group, such as baseline and post-intervention studies or, indeed, for the collection of panel data over a period of time (Patton, 2002). As with unstructured interviews this approach has value within particular research designs, but it was not considered to be the most epistemologically aligned method for this work.

Semi-structured interviews can be positioned between the two extremes presented above because they are not only based on a set of pre-determined questions, but also allow considerable freedom for the interviewer to explore and probe beyond the immediacy of these questions. Thus, it can allow a researcher to align the interviews with a quantitative survey but also to explore each area in far greater depth, to add significance and meaning to the closed questions of the survey, to confirm or question the more direct responses and thereby to add a quality and depth of knowledge to the work that would otherwise be lacking. Therefore, it can be

a good match for an exploratory study such as this one and is the method that has been adopted.

Prior to starting the interviews, the respondents were informed about the objectives of the study in detail. The estimated time for a single interview, as noted above, was anticipated as being approximately 50 minutes; however, to avoid any foreseeable time pressures on either the researcher or the interviewee, a total of 90 minutes, as noted above, was allocated (the longest interview was 51 minutes and the shortest was 29 minutes). Respondents were assured that their identity would not be disclosed in the course of the study, the interview could be terminated at any time at their request, and they would be informed about the results of the research. After gaining informed consent from the respondents, an audio-recording instrument was used to record the interview. Informed consent forms were signed by the respondents, and a sample is provided in Appendix D.

Elements of structured and unstructured interviews are combined in a semi-structured interview (Patton, 2002). Some or part of the questions are structured and the remaining parts are left blank to get the views of participants, thus allowing flexibility to respondents. It enables data collection on systematic grounds, an advantage in acquiring some additional information from the respondents. Open-ended questions were used, although they were consistently asked to all respondents, which left an opportunity to explore further with probing questions where appropriate and relevant (Patton, 2002). The advantage with interviewing individuals is that they are free to expose their own views or opinions because each possesses unique kinds of information. Conversely, it is a relatively challenging task to manage the views and opinions of groups of people and it is quite possible that the views of all group members are not identical.

Following the interviews, the audio recordings were transcribed by the researcher and the resulting documents stored within a password-protected computer.

3.5.4 Data analysis

While there may be consideration of the data as it is being collected in qualitative research (Creswell, 2003), the first systematic step in the process following transcription is the organisation of the data into units conducive to analysis (Cohen et al., 2000). For example:

1. Preliminary coding and forming a central concept of the responses;

2. Re-examining the initial coding;
3. Formulating a preliminary list of classes or central theme;
4. Applying modification in the early list on the basis of additional readings;
5. Examining again the categories and also subcategories; and
6. Moving from categories towards concepts (themes).

Upon completion of this task, it is important that the researcher reviews the now categorised data and makes notes (or some other form of notation) in order that there is some interpretation attached to it. This is important because participants will have used differing types of words and even cultural language expression; therefore, the meanings within each codified set must be checked in order that the data is within the appropriate category. A final means of checking the categorisation of the data is by comparing the interpretation with similar published studies.

A further consideration that is relevant to this study is that of translation because the participants will have expressed values and interpretations within the cultural parameters of their language and much could be lost if the deeper implications and meanings do not suitably transmit from culturally influenced Arabic to standardised English (Scott & Fisher, 2004). Therefore, it is important that steps are taken to ensure that these important meanings are carried across the stages of interpretation and analysis. As has been noted, the researcher transcribed the audio recordings of the interviews from this study verbatim and then translated them into English. These translations were then checked by English-speaking academics at two separate university departments and were scrutinised by a native English speaker who is proficient in Arabic. In each case, random extracts from the audio recordings were also selected and checked by the academics to further ensure validity and reliability.

The use of a complementary approach in mixed methods research can assist in establishing the validity and reliability of research and, perhaps more importantly, ensure that there is a ‘greater understanding of cultural artefacts and behaviours’ and the ‘underlying cultural values and assumptions’ (Yauch & Steudal, 2003, p. 465). By following this understanding in the study, the researcher was able to gain a holistic understanding of the phenomenon being studied and to synthesise the results from both sources to obtain a true picture of ICT use and adoption at Al-Jouf University. Thus, multiple steps were taken to ensure validity and reliability through both the quantitative and qualitative parts of the research, separately as well as

within the fact that they were complementary and joined, effectively meaning that each provided validity and reliability to the other.

3.5.5 Reliability, validity and trustworthiness mechanisms

There are tensions within qualitative research because, according to Whittemore, Chase and Mandle (2001) it is 'challenging because of the necessity to incorporate rigor and subjectivity as well as creativity into the scientific process' (p. 522). However, one reason for these perceived tensions may be the fact that it is taken from a positivist view, which effectively came first, rather than from an understanding that a completely different paradigm altogether is required. This point surely gains support when the epistemological dilemmas with regard to truth and knowledge within the post-positivist, metaphysical world are taken into account.

Taken from this standpoint, and based on an assumption that knowledge is sought, the rational result must be that 'qualitative inquiry is equally as concerned about unsound or unjustified findings as quantitative inquiry' (Whittemore et al., 2001, p. 527). If the example of semi-structured interviews is used, any researcher would be expected to show a justification for the choices of participants in terms of their being likely to represent the views of a wider population (external validity) and to ensure that confounding factors were minimised. He or she would also be at pains to ensure that the questions were aligned with the aims and objectives of the study (construct validity) and to test the questions prior to their use (Lunenburg & Irby, 2008).

Validity and reliability can also be achieved, as it was achieved in this study, through the collection and synthesising of data through more than one source, by checking with participants that the transcriptions were accurate recordings of what they had said, by double checking and then re-checking the translations and the coding of the qualitative data and by referring to experts in the field to consider whether the questions were appropriate to the aims of the study and to the research questions. Further mechanisms for trustworthiness as well as for validity and reliability included regular consultations with peers, fellow academics and PhD students, to take an impassioned and unbiased view of the work and to offer alternative suggestions in order that a wider perspective could be gained of the work when it was in its developmental stages.

However, despite taking all of the steps described, these do not ensure validity or reliability. In the same way that a lack of success in re-tests with regard to quantitative studies may not be assumed to be due to a lack of reliability, so the repetition of the same interviews may not only produce different responses but, even if the responses are appropriately similar, they may be differently (but still meaningfully) interpreted by a different researcher. This makes openness and the leaving of a clear trail by the researcher so that the rationale behind decisions and interpretations made can be seen and understood of great importance. Fundamentally, in order for the study to be credible, it must show that it has trustworthiness as well as validity and reliability.

3.6 Conjoint Data Analysis

As has been previously noted, a mixed methods approach has the potential for the primary method (in this study the quantitative part) to be strengthened (or weakened) by the results of the qualitative part. This is a strongly positive opportunity to gain further validity and a greater potential for the value of the study to be enhanced by a wider academic and even general audience.

However, this is contingent upon the extent to which the data can be seen as addressing the same or similar issues, in the case of this study the challenges and issues involved in the use of ICT by teaching staff members at a teacher training institute within the Saudi higher education system. In order to ensure this, it was necessary to form the data into similarly operational units so that direct comparisons could be made. The quantitative data is formed into variables that are determined by the closed questions used in the instrument. Therefore, it was important to ensure that the qualitative data could also be formed into similar units of analysis. For example, if the findings from a scaled response of the quantitative survey found that the participants strongly disagreed that they used ICT in innovative and exploratory ways, it was also necessary to ensure that there was a line of questioning and probing within the qualitative part that explored this area. The results could thus be conjoined.

3.7 Ethical Considerations

The ethical issues involved in the study include consideration of the rights of participants and sensitivity concerning the information regarding professional and personal values, attitudes, and experiences. Before conducting the study, approval was acquired from the Human Research Ethics Committee of Curtin University and Ministry of Higher Education in Riyadh, Saudi Arabia. The participants were provided with an information sheet (see Appendix C) consisting of a description and outline of the research objectives as well as their rights as participants and a permission form for participating in the study. Furthermore, participants were told about all devices and activities used for data collection. Identity, position, and colleges of the participants were kept anonymous by the use of pseudonyms.

Ethical postures are very important while conducting any kind of research, especially in fields such as educational research, as the respondents are human beings who may become embarrassed, frightened or emotionally hurt as a consequence of the study. In this study, numbers of ethical issues are taken into account and the following paragraphs cast some light on these. Participants of this study were selected by using the following process:

It is the responsibility of every researcher to safeguard the participants of the research project. Authors described that the ethical considerations for carrying out a study are the foundation of a research project. As Johnson and Christensen (2000) state, it is essential to gain consent from the participants, along with a set of clear and easy versions of the subsequent information:

- Explain the objectives of the research project and state the potential benefits
- It is the right of the participants that information obtained from them may be kept confidential and that their right of privacy for data may be preserved.
- Identity of the participants may not be disclosed.

Participants were asked to avoid marking any sort of additional identification on the questionnaires in order to maintain their confidentiality. No one other than the researcher was given access to the completed questionnaires. Further, an agreement form was signed to assure the participants that the data obtained from them will not be used for any other purpose than the current study and publication of its results. Real names of the participants were not used; rather a code number was assigned to each questionnaire while the names of participants did not appear on the

questionnaires. Every possible effort was made to protect the identity of the participants so that adverse impacts on them could be avoided. Data were stored in a secure place and it was decided to destroy the data after five years of the completion date of the project.

All the data was collected through prior permission of respondents and the data collected from respondents will be kept confidential and used only for research purpose.

3.8 Chapter Summary

This chapter described the methodology and design used in the study. The first part deals with methodologies in research and explains and justifies why a mixed methods approach was used in this study. Following this, there is a description of sequential explanatory strategy for data collection and analysis and the plan for the study was drawn up. Two phases of the research were explored – the first which focuses on quantitative data collection and analysis procedures with a description of the setting, participants, and validity and reliability. The second part discussed the method of qualitative data collection and its analysis and the strategies for analysing the qualitative findings. Validity and reliability have been extensively discussed, along with trustworthiness as these factors are held to be key components of research. This led to a discussion of conjoint analysis and ethical considerations. The following chapter examines the collected data.

Chapter 4: Results

Previous chapters of this study have described and justified the problem which it addresses, reviewed the existing literature in a wider as well as in a Saudi Arabian context and have discussed and presented the methods that have been used as well as the methodological paradigm which supports them. This chapter continues from this work with the presentation of the results that have been obtained from the primary data collected. It begins with a reminder of the aims of the study and the research questions that were set.

The overall aim of the study is to investigate the adoption and use of ICT by teaching staff members within a Saudi higher education context. Specifically, participants were drawn from academic staff at the COE at Al-Jouf University in Saudi Arabia. Within one main and overarching main research question, four further questions were set to fulfil the aim of this research. The main and overarching question is: 'Do the COE academic staff at Al-Jouf University have the skills and knowledge required to educate and prepare pre-service teachers to function effectively in the digital age?'

In order to address this, data collected from a six-part questionnaire were used to answer the following research questions and subsidiaries:

RQ1. *How do academic staff within the COE describe the current ICT environment at Al-Jouf University?*

(a) *What ICT resources do the academic staff have access to?*

(b) *How do the academic staff use ICT?*

(c) *What level of ICT skills do the academic staff possess?*

(d) *What are the attitudes of the COE academic staff towards ICT adoption in teaching and learning?*

RQ2. *What are the factors that have an impact on the use of ICT by academic staff in their teaching and learning?*

RQ3. *What strategies need to be implemented by the University in order to assist their academic staff to adopt ICT in their teaching and learning in order to meet the needs of students in the digital age?*

RQ4. *How do the personal characteristics and demographic variables (e.g., gender, experience, age and discipline) of the academic staff at Al-Jouf University influence their ICT use and skills?*

Although predominantly quantitative, this is a mixed methods study and the results from the qualitative element are, it is held, an important element in supporting (or questioning) the quantitative data and the results obtained from it. In order to do justice to both research approaches, this chapter is divided into two sections, the first presenting the quantitative results and the second those from the qualitative study.

Part 1: Quantitative Study Results

Data was collected from the seven-part questionnaire (Appendix A). Before presenting the results from the administering of it, a brief overview and description of it is considered as being useful to the reader.

4.1 Questionnaire Description

In the first of the seven parts of the questionnaire, background information was collected by questions Q1 to Q4, which were aimed at determining the characteristics of COE academic staff and the nature of their work, such as gender, age, teaching experience, and the departments in which they work. In the second part, information concerning ICT use for teaching and learning was collected with questions Q5 to Q12 , including computer use, internet access, ICT use purposes, self-reported ICT skills, self-reported ICT adoption levels for teaching and learning, and the availability of ICT resources. In the third part, attitudes towards ICT use in teaching and learning were collected through question Q13. In the fourth part, questions 14 to 15 were devoted to academic staff training. The following section is devoted to the collection of information about factors that influence ICT use in teaching and learning and these data were collected through questions Q16 to Q18. The final part (Q19) considered the suggested university changes and strategies needed to help COE academic staff to adopt ICT in the educational process. Thus, the first part of the questionnaire is concerned with the characteristics of the respondents and these results are presented first.

4.2 Demographics of Participants

Demographic characteristics were collected from Part I of the questionnaire (see Appendix A). The information includes gender, age, years of teaching experience, and the department that a respondent worked within.

- **Department:** The first question focused on the departments of COE academic staff. Almost two-thirds of the questionnaire participants were in non-science departments, and therefore approximately one-third were involved in the teaching of Science Education, Mathematics Education and Computer Education.
- **Teaching Experience:** The second question focused on the teaching experience of COE academic staff. The most common levels of such experience was between 0 to 5 years (56, 34.1%), with the smallest category of 12 (7.3%) having more than 20 years' experience. The second and third most-common teaching experience groups had between 11 to 15 years, and 6 to 10 years, respectively. Thus over two-third of the participants had teaching experience of less than 15 years.
- **Gender:** The Third question focused on the gender of the questionnaire participants. There were more male than female participants, although it is held that there were sufficient numbers in each group to enable gender differences to be evaluated and included (approximately 45% females and 55% males).
- **Age**: The fourth question focused on the age of the COE academic staff. The largest age group across all participants was between 41 and 50 years (n = 55, 33.5%), with the smallest category of n = 9 (5.5%) respondents being aged over 60 years. The second and third most-common age groups were between 31 and 40 years, and 21 to 30 years, respectively. Thus over two-thirds of the questionnaire participants were under the age of 41.
- **Response rates:** As previously noted, out of a total number of questionnaires distributed, 180 were returned, which represents an approximate response rate of 75%. Of these, 16 were rejected, which meant the total number of participants was 164 (89 males, 79 females).

Table 4.1 summarises the demographic characteristics of the study participants.

Table 4.1

Demographic Characteristics of the Study Participants (n = 164)

Demographic Information			
Variables	Category	Frequency (n)	Percentage (%)
Gender	Female	75	45.7
	Male	89	54.3
Age	21–30 years	35	21.3
	31–40 years	36	22.0
	41–50 years	55	33.5
	51–60 years	29	17.7
	Over 61 years	9	5.5
Department	Curriculum and Instruction	23	14.0
	Arabic Education	20	12.2
	Social Studies	12	7.3
	Educational Foundation and Psychology	12	7.3
	Islamic Education	18	11.0
	Art Education	8	4.9
	Physical Education	4	2.4
	Science Education	18	11.0
	Mathematic Education	16	9.8
	Computer Education	21	12.8
	Educational Technology	12	7.3
Teaching Experience	0–5 years	56	34.1
	6–10 years	33	20.1
	11–15 years	39	23.8
	16–20 years	24	14.6
	Over 20 years	12	7.3

4.3 Availability and Accessibility of ICT

Having set out the demographic characteristics, this section proceeds with a presentation of the results based on the research questions posed rather than in the

order in which they appear in the questionnaire. Thus, Research Question 1a) asks; 'What ICT resources do the academic staff at Jouf University have access to?' Data regarding types of ICT resources that COE academic staff members at Jouf University have access to have been collected by Q10(A) to Q12 (see Appendix A). In general, the participants were asked to indicate the availability and accessibility of ICT resources. In Q10(A), they were specifically asked to identify the types of hardware available to teaching staff at COE. Table 4.2 shows this availability as indicated by the participants, including a desktop computer, printer, overhead projector, scanner, and TV monitor/VCR/DVD player. Other available hardware for teaching and learning purposes as reported by participants are: laptop computers for academic staff use and a data show projector (98.2%), an interactive whiteboard (92.7%), a document camera (68.9%), and devices for digital image or video processing (1.8%). A graphic tablet, Mp3/iPod, iPad or tablet computer, and mobile phones are not available for academic staff at the COE. There is a possibility that a limited number of staff have privately owned iPad, mobile phones etc., but it is clear that they either do not use them at all in their work, or consider such use as being so minor that it is not considered as being 'access to.'

Table 4.2

Types of Hardware Available at COE (n = 164)

Types of Hardware	Yes		No	
	n	%	n	%
10.A.1 Laptop computer for lecturer use	161	98.2	3	1.8
10.A.2 Desktop computer for lecturer use	164	100.0	0	0.0
10.A.3 Interactive whiteboard (e.g., Smart Board)	152	92.7	12	7.3
10.A.4 Printer	164	100.0	0	0.0
10.A.5 Data show projector	161	98.2	3	1.8
10.A.6 Digital image/video processing devices	3	1.8	161	98.2
10.A.7 Overhead projector	164	100.0	0	0.0
10.A.8 Graphic tablet	0	0.0	164	100.0
10.A.9 Document camera	113	68.9	51	31.1
10.A.10 Scanner	164	100.0	0	0.0
10.A.11 Mp3/iPod	0	0.0	164	100.0
10.A.12 TV monitor/VCR/DVD player	164	100.0	0	0.0

10.A.13 iPad/tablet computer	0	0.0	164	100.0
10.A14 Mobile phones	0	0.0	164	100.0

In Q11(A), the participants were asked to identify the types of software available to academic staff at the COE. Table 4.3, which shows the availability of this software, shows that word processing and desktop publishing is available for academic staff members. Other available software for teaching and learning purposes as reported by participants are as follows: email software (98.2%), Internet browser (97.6%), presentation software (91.5%), spreadsheet (78.0%), statistical, mathematical programs (42.1%), computer-aided design (CAD)/ computer-aided manufacturing (CAM) (39.6%), database (39.0%), educational software on CD-ROM (37.2%), graphics (26.8%), educational games (16.5%), recreational games (15.2%), simulations (13.4%), author-ware/audio/video clips (12.8%), programming language (12.8%), drill and practice programs (9.8%), and tutorial programs (0%). These findings suggest that software use in teaching and learning is predominantly limited to MS Office as reported by the majority of participants. The use of simulating and interactive software was not widespread as it was reported by a minority of the participants. This may imply that only a minority of participants are able to see the potential that exists for being innovative and interactive in the use of the more widely available software such as MS *Word* and MS *Excel*, which in turn may reflect factors such as training, confidence and attitude.

Table 4.3

Types of Software Available at COE (n = 164)

Types of software	Yes		No	
	n	%	n	%
1. Word processing, desktop publishing	164	100.0	0	0.0
2. Spreadsheet (e.g., Excel)	128	78.0	36	22.0
3. Database (e.g., Access)	64	39.0	100	61.0
4.Graphics	44	26.8	120	73.2
5. CAD/CAM	65	39.6	99	60.4
6. Statistical, mathematical programs	69	42.1	95	57.9
7. Programming languages	21	12.8	143	87.2
8. Drill and practice programs	16	9.8	148	90.2
9. Tutorial programs (for self-learning)	0	0.0	164	100.0
10. Simulations (e.g., real-world simulations)	22	13.4	142	86.6
11. Educational games	27	16.5	137	83.5
12. Recreational games/other games	25	15.2	139	84.8
13. Internet browser	160	97.6	4	2.4
14. Email software	161	98.2	3	1.8
15. Educational software on CD-ROM	61	37.2	103	62.8
16. Author-ware and/or audio and/or video clips	21	12.8	143	87.2
17. Presentation software (e.g., PowerPoint)	150	91.5	14	8.5

Question 12, where the participants were asked to identify the types of online resources available to teaching staff at COE, is connected with Research Question 1 (b). The results from Question 12 are therefore included in Table 4.10.

4.4 Adoption of ICT into Teaching and Learning

RQ1(b) asks ‘how do academic staff from COE at Al-Jouf University use ICT?’ These data were collected from responses to questions Q5 to Q 7 and Q9 and Q12 of the questionnaire (see Appendix A). Participants were asked to indicate the level of ICT used in teaching and learning. Q5 and Q6 of the questionnaire dealt with

the issue of computer use and Internet access. Tables 4.4 and 4.5 identify the existing patterns of computer use and Internet access as stated by the participants. These show that almost half of the teaching staff used a computer daily for teaching related purposes and almost 80 per cent used the Internet for less than an hour on each visit.

Table 4.4

Frequencies and Percentages of Computer Use (n = 164)

Computer use	Frequency	%
Daily	80	48.8
1–3 times/week	32	19.5
4–6 times/week	49	29.9
A few times a month	3	1.8
Total	164	100.0

Table 4.5

Frequencies and Percentages of Internet Access (n = 164)

Internet access	Frequency	%
Never use the Internet	4	2.4
15–less than 30 minutes/visit	77	47
30–60 minutes/visit	59	36
2–3 hours/visit	21	12.8
4–5 hours/visit	1	0.6
More than 5 hours/visit	2	1.2
Total	164	100

In Question 7, the participants were asked to identify the purposes of the types of ICT use. Table 4.6 shows that 28 per cent of teaching staff used ICT daily for teaching and half of the teaching staff (53%) reported that ICT use for finding digital learning resources was limited to 2–4 times a month. This percentage dropped to one-third of the participants for ICT use concerned with communication, personal education, organisation of work, keeping records, and preparation of lectures.

Table 4.6

Types and Purposes of ICT Use (n = 164)

Types and Purposes of ICT Use	Never		Several times a year		2–4 times a month		2–3 times a week		Daily	
	n	%	n	%	n	%	n	%	n	%
1. Communication	2	1.2	40	24.4	61	37.2	55	33.5	6	3.7
2. Personal education	2	1.2	50	30.5	55	33.5	53	32.3	4	2.4
3. Organisation of work and keeping records	2	1.2	22	13.4	78	47.6	59	36.0	3	1.8
4. Preparation of lectures	2	1.2	31	18.9	52	31.7	62	37.8	17	10.4
5. Posting assignments, project information or other lecture requirements	23	14.0	65	39.6	73	44.5	3	1.8	0	0.0
6. Finding digital learning resources	6	3.7	42	25.6	87	53.0	27	16.5	2	1.2
7. Teaching	2	1.2	13	7.9	68	41.5	35	21.3	46	28.0

Question 9 linked directly to Rogers' (2003) theoretical framework with regard to DOI. It provides a snapshot of the teaching staff's level of ICT adoption for teaching and learning, asking the participants to rate the degree of ICT use for teaching and learning based on Rogers' (2003) adoption of innovations categories. Table 4.7 shows that 20.1 per cent of the participants considered themselves to have adopted ICT into their teaching and learning to a 'very high' degree compared to their colleagues in COE departments. The majority (44.5%) placed themselves within the middle range.

Table 4.7

Individual Self-rated ICT Adoption (n = 164)

	Category	Frequency	%
Self-rated ICT adoption	Very Low (1–10%)	35	21.3
	Low (11–25%)	42	25.6
	Medium (26–50%)	31	18.9
	High (51–75%)	23	14.0
	Very High (top 25%)	33	20.1

	Total	164	100.0

In Question10 (b) the participants were asked to identify the levels of hardware devices used for teaching by teaching staff at COE. The frequencies and percentages for these uses are provided in Table 4.8. To determine the use of hardware devices for teaching purposes, participants were asked to rate their use on a four point Likert scale, with the options being: Never, Rarely, Sometimes, and Regularly. The most frequently used hardware device for teaching noted by COE academic staff members was ‘Desktop computer for lecture use’ in which 74.4 per cent of the participants used this device regularly or sometimes. The second most commonly used hardware device was ‘data show projector’, where 64.6 per cent of the participants used this device regularly or sometimes. The third was ‘printer’ (54.9%) and the fourth ‘laptop computer for lecture use’ (51.9%) The fifth was ‘interactive whiteboard’ in which 45.1 per cent of the participants used this device regularly or sometimes and the most least frequently used hardware devices in teaching mentioned by the participants were graphic tablet, Mp3/iPod, iPad or tablet computer, and mobile phones, in which all of the participants stated that they did not use these devices in teaching.

These findings do not preclude the possibility that some students (whose enthusiasm for ICT, especially in Saudi Arabia, is well documented – see Chapter 2 above) use their own devices despite the fact that they are not used by teaching staff. Indeed, it is possible that a ‘technology gap’ exists between some teachers and learners, where the former may sometimes tend to hold on to outdated technology (overhead projectors, document cameras etc.), while the latter seek to stay abreast of more recent innovations.

Table 4.8

Frequencies and Percentages of Hardware Devices Used for Teaching (n = 164)

Hardware	Never		Rarely		Sometimes		Regularly	
	n	%	n	%	n	%	n	%
1. Laptop computer for lecturer use	3	1.8	76	46.3	26	15.9	59	36.0
2. Desktop computer for lecturer use	0	0.0	42	25.6	61	37.2	61	37.2
3. Interactive whiteboard (e.g., Smart Board)	51	31.1	39	23.8	19	11.6	55	33.5
4. Printer	8	4.9	66	40.2	48	29.3	42	25.6
5. Data show projector	0	0.0	58	35.4	44	26.8	62	37.8
6. Digital image/video processing device	159	97.0	0	0.0	3	1.8	2	1.2
7. Overhead projector	16	9.8	40	24.4	83	50.6	25	15.2
8. Graphic tablet	164	100.0	0	0.0	0	0.0	0	0.0
9. Document camera	71	43.3	53	32.3	17	10.4	23	14.0
10. Scanner	13	7.9	111	67.7	32	19.5	8	4.9
11. Mp3/iPod	164	100.0	0	0.0	0	0.0	0	0.0
12. TV monitor/VCR/DVD player	27	16.5	94	57.3	26	15.9	17	10.4
13. iPad/ tablet computer	164	100.0	0	0.0	0	0.0	0	0.0
14.Mobile phones	164	100.0	0	0.0	0	0.0	0	0.0

In Question 11(b), the participants were asked to identify the levels of software applications used for teaching at COE. The frequencies and percentages for these are provided in Table 4.9. To determine their use for teaching purposes, participants were asked to rate their use on a four point Likert scale selected from the choices of: Never, Rarely, Sometimes, and regularly. The most frequently used software application for teaching as suggested by COE teaching staff members was ‘Internet browser’ (93.3%), followed by ‘email software’ (85.4%), ‘word processing’ (74.4%) and ‘presentation software’ (59.2%). The least frequently used software application in teaching mentioned by the participants was ‘tutorial programs’, in which all of the participants indicated that they never use these applications in teaching. The second least frequently used were ‘simulations programs’ and

'recreational games' (95.7% never used them). The third and fourth least frequently used were 'graphics software' (93.3% never used) and 'educational games' (90.9%).

Table 4.9

Frequencies and Percentages of Software Applications Used for Teaching (n = 164)

Software programs	Never		Rarely		Sometimes		Regularly	
	n	%	n	%	n	%	n	%
1. Word processing, desktop publishing	0	0.0	42	25.6	65	39.6	57	34.8
2. Spreadsheet (e.g., Excel)	52	31.7	70	42.7	38	23.2	4	2.4
3. Database (e.g., Access)	109	66.0	28	17.3	13	8.0	14	8.6
4. Graphics	154	93.9	8	4.9	0	0.0	2	1.2
5. CAD/CAM	145	88.4	0	0.0	17	10.4	2	1.2
6. Statistical, mathematical programs	126	76.8	23	14.0	13	7.9	2	1.2
7. Programming languages	143	87.2	0	0.0	13	7.9	8	4.9
8. Drill and practice programs	152	92.7	2	1.2	10	6.1	0	0.0
9. Tutorial programs (for self-learning)	164	100	0	0.0	0	0.0	0	0.0
10. Simulations (e.g., real-world simulations)	157	95.7	7	4.3	0	0.0	0	0.0
11. Educational games	149	90.9	8	4.9	5	3.0	2	1.2
12. Recreational games/other games	157	95.7	0	0.0	5	3.0	2	1.2
13. Internet browser	1	0.6	10	6.1	80	48.8	73	44.5
14. Email software	3	1.8	21	12.8	69	42.1	71	43.3
15. Educational software on CD-ROM	129	78.7	9	5.5	24	14.6	2	1.2
16. Author-ware and/or audio and/or video clips	143	87.2	6	3.7	12	7.3	3	1.8
17. Presentation software (e.g., PowerPoint)	16	9.8	51	31.1	28	17.1	69	42.1

Question 12 asked the participants to identify the levels of online services used for teaching by staff at COE. The frequencies and percentages for levels of these services are provided in Table 4.10.

Table 4.10

Frequencies and Percentages of Online Services Used for Teaching (n = 164)

	Never		Several times a year		2–4 times a month		2–3 times a week		Daily	
	n	%	n	%	n	%	n	%	n	%
Q12.1. Social networking websites (e.g., MySpace, Flickr, Twitter, Facebook)	61	37.2	48	29.3	35	21.3	17	10.4	3	1.8
Q12.2. Instant messaging (e.g., MSN)	88	53.7	46	28.0	25	15.2	4	2.4	1	0.6
Q12.3. Watch videos or live TV on websites (e.g., Youtube)	40	24.4	52	31.7	29	17.7	43	26.2	0	0.0
Q12.4. Upload video or photo content onto the Internet	110	67.1	27	16.5	23	14.0	4	2.4	0	0.0
Q12.5. Participate in online discussion groups or chatrooms	31	18.9	52	31.7	43	26.2	36	22.0	2	1.2
Q12.6. Wikis/blogs/ online networks	33	20.1	48	29.3	38	23.2	39	23.8	6	3.7
Q12.7. Have personal blog/website	139	84.8	5	3.0	4	2.4	10	6.1	6	3.7
Q12.8. Access university portal via own PC/laptop	2	1.2	2	1.2	49	29.9	59	36.0	52	31.7
Q12.9. Access Internet from own mobile/PDA	20	12.3	37	22.7	24	14.7	55	33.7	27	16.6
Q12.10. Learning management system (e.g., Blackboard)	0	0.0	14	8.5	59	36.0	38	23.2	53	32.3
Q12.11. Email	0	0.0	0	0.0	43	26.2	53	32.3	68	41.5

To determine the use of online services for teaching purposes, participants were asked to rate their use on a five-point scale selected from the choices of: never, several times a year, 2-4 times a month, 2-3 times a week and daily. The most frequently used online services for teaching mentioned by COE academic staff members was 'email' (73.8%), followed by 'access university portal via own PC/laptop' (61.7% daily or 2-3 times a week), 'access learning management system (e.g., Blackboard)' (55.5% daily or 2-3 times a week) and 'access the internet from mobile/PDA)' (50.3% daily or 2-3 times a week). The least frequently used online services in teaching as stated by the participants was 'personal blog or website' (84.4 never used for teaching), followed by 'upload video or photo content onto the internet' (67.1% never used for teaching) and 'Use instant messaging e.g., MSN' (53.7% never used for teaching).

4.5 ICT Skill Level

Research Question 1(c) asked 'what level of ICT skills do the academic staff at Al-Jouf University possess?' Respondents were asked to rate their ability to use ICT tools in their teaching and the results are shown in Table 4.11. These indicate that the largest segment of the respondents identified themselves as Beginner (39.6%), followed by Advanced (25.6%) and Expert (12.2%) in the use of ICT in their teaching. These percentages further support earlier findings that this sample consists of both experienced and young teachers. Furthermore, 19.5 per cent of respondents rated themselves as intermediate users of ICT tools, while a minority of participants (3.0%) rated themselves as being non-users.

Table 4.11

Individual Self-rated ICT Skills (n = 164)

	Category	Frequency	%
Self-rated ICT skills	Non-user	5	3.0
	Beginner	65	39.6
	Intermediate	32	19.5
	Advanced	42	25.6
	Expert	20	12.2
	Total	164	100.0

4.6 Attitudes Towards ICT Use

In the third part of the questionnaire, there were 13 items that addressed academic staff members' attitudes towards the adoption of ICT into teaching at COE in Al-Jouf University. Participants were asked to respond to each item by determining their degree of agreement on a 5-point Likert scale: 5, Strongly Agree; 4, Agree; 3, Neutral; 2, Disagree; and 1, Strongly Disagree. If a participant selected a 5 or 4 for positive statements, it indicated that the participant had a positive attitude towards ICT use in teaching and learning. If a participant selected 2 or 1 to a positive statement, it indicated that the participant had a negative attitude towards ICT use in teaching and learning. While there are generally high levels of neutral responses, it is noted that participant responses to ICT adoption in teaching were generally positive. The results are provided in Table 4.12.

Table 4.12

Attitudes Towards ICT Use in Teaching (n = 164)

Attitudes	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
	n	%	n	%	n	%	n	%	n	%
1. I am interested in learning how to use ICT in my teaching.	3	1.8	5	3.0	18	11.0	63	38.4	75	45.7
2. I am interested in learning how to change my pedagogy to be able to teach using ICT.	9	5.5	15	9.1	56	34.1	27	16.5	57	34.8
3. I believe that ICT use in teaching would be beneficial to my students' interaction and engagement.	3	1.8	7	4.3	14	8.5	58	35.4	82	50.0
4. I feel ICT can have a positive impact on the way we teach.	2	1.2	4	2.4	27	16.5	26	15.9	105	64.0
5. I am interested in attending workshops on how to teach using ICT.	12	7.3	17	10.4	12	7.3	43	26.2	72	43.9
6. Adopting ICT in teaching requires necessary curriculum reforms.	17	10.4	38	23.2	55	33.5	25	15.2	29	17.7
7. I feel comfortable using ICT in my teaching	23	14.1	16	9.8	32	19.5	40	24.4	53	32.3
8. I think ICT is a valuable resource in my teaching	4	2.4	14	8.5	27	16.5	37	22.6	82	50.0
9. The use of ICT in my teaching will make my job easier.	21	12.8	26	15.9	28	17.1	45	28.6	44	27.4
10. I feel that ICT will be useful for my teaching.	4	2.4	9	5.5	21	12.8	50	30.5	80	48.8
11. I would use ICT in my teaching if I was given some incentive to do so.	2	1.2	6	3.6	18	11.0	39	25.0	99	60.4
12. I would use ICT in my teaching if I saw a proven need for technology in my teaching area.	0	0.0	0	0.0	54	32.9	108	65.9	2	1.2
13. I am willing to collaborate with colleagues in my area to share my experience of using ICT in teaching.	0	0.0	9	5.5	44	26.8	80	48.8	31	18.9

4.7 ICT Training

Academic staff training data were collected from Part 4 of the questionnaire (Q14, Q15). In Question 14, the participants were asked about any training they had received in ICT use for teaching purposes. From Table 4.13, it can be seen that that majority of teaching staff (92%) had attended training in the use of ICT for teaching purposes.

Table 4.13

Frequencies and Percentages of Training in Using ICT for Teaching (n = 164)

	Category	Frequency	%
Training	Yes	152	92.7
	No	12	7.3
	Total	164	100.0

In Question 15, the participants were asked to identify ICT training preferences in using ICT for teaching purposes. From Table 4.14, it can be seen that that majority of teaching staff (98.2%) prefer to have workshops for training in this area, 79.3 per cent prefer to have general courses and 75.0 per cent specific software courses. These may include online exercises that follow up on the work undertaken in workshops.

Table 4.14

Frequencies and Percentages of Training Preferences (n = 164)

Training Preference	Frequency	%
1. Workshops	161	98.2%
2. Lectures	4	2.4%
3. Intensive short-term training	88	53.7
4. Face-to-face tutorial	25	15.2
5. Online	15	9.1
6. All day sessions	112	68.3
7. General courses	130	79.3
8. Specific software courses	123	75.0

4.8 Factors Affecting ICT Use

Research Question 2 asked ‘What are the factors that impact the use of ICT by academic staff in their teaching and learning?’ Data regarding types of ICT resources that COE academic staff members at Jouf University have access to were collected through questions Q16 to Q18 of the questionnaire (see Appendix A). Participants were asked to indicate the factors that have an impact on ICT use for teaching and learning. In Q16 the participants were asked to identify the incentive factors that support ICT use for teaching by academic staff at COE. The frequencies and percentages of these factors are provided in Table 4.15. As can be seen within a generally positively expressed scenario, the most firmly positive views with regard to incentives for using ICT came with regard to Q 16.17, which invited responses concerning evidence that ICT improved student learning (92.8% agreed or strongly agreed). The relative significance of ‘agree’ as opposed to ‘strongly agree’ will be discussed in Chapter 5, but taking ‘strongly agree’ as the most forceful expression and therefore as a measure of relative strength of feeling, the second most positive expressions came with regard to the availability of equipment and resources (75.6%), followed by the availability of training and support programs (69.5%), then the availability of classroom technology infrastructure (67.7%), rewards and recognition for teaching innovations (65.9%), personal computer skills (62.8%), support and encouragement from faculty (60.4%) and time available to use and learn ICT within the teaching area of the participant (55.5%).

The area where there was by far the highest level of neutrally expressed views was with regard to the requirements of departments or of the university (77.4%), followed by the extent to which respondents felt comfortable in using technology (42.1%) and then the extent to which ICT could be used as an aid towards tenure or promotion (38.9 %). It can be suggested that for a minority of questions, a neutral view may have been considered as being a ‘safe’ option by participants but the fact that there were relatively decisive views expressed means that one potential drawback with the use of a five-point scale, namely the over-use of the neutral mid-point, did not materialise. These points are discussed at greater length in the following chapter but this section concludes by noting that the highest levels of disagreement in terms of being considered incentives were the computer

skills of colleagues (39.1% disagreed or strongly disagreed), followed by departmental or university requirements (15. 8% disagreed or strongly disagreed).

Table 4.15

Frequencies and Percentages of Incentive Factors (n = 164)

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	n	%	n	%	n	%	n	%	n	%
Q16.1. Requirement by department or university	11	6.7	15	9.1	127	77.4	9	5.5	2	1.2
Q16.2. Support and encouragement from the faculty	6	3.6	8	4.9	9	5.5	48	30.4	99	60.4
Q16.3. Support and encouragement from peers	3	1.8	5	3.0	42	26.8	62	37.8	52	31.7
Q16.4. Access to Internet/ online services in classroom	3	1.8	7	4.4	40	25.6	60	36.6	54	32.9
Q16.5. Reduced teaching load	8	4.7	12	7.3	20	12.0	39	25.0	85	51.8
Q16.6. Rewards/ recognition for innovation in teaching	3	1.8	5	3.0	22	13.2	26	15.9	108	65.9
Q16.7. Credit towards promotion and tenure	4	2.4	7	4.4	64	38.9	42	26.2	27	16.3
Q16.8.Available classroom technology infrastructure (e.g., connections, computers, projectors)	3	1.8	4	2.4	28	17.1	18	10.9	111	67.7
Q16.9. Available equipment/resources	3	1.8	5	3.0	15	9.1	17	10.1	124	75.6
Q16.10. Available training programs and support	8	5.0	7	4.4	16	9.5	19	11.3	114	69.5
Q16.11. Time available to learn ICT use in teaching	6	3.6	10	6.1	19	11.3	38	23.8	91	55.5
Q16.12. Comfort with technology	8	5.0	13	7.9	69	42.1	36	23.2	38	24.4
Q16.13.Evidence of proven need for technology in teaching area	1	0.6	3	1.8	28	17.1	54	32.9	78	47.6
Q16.14. Colleagues' computer skills	26	15.9	37	23.2	44	27.4	27	17.1	30	18.9
Q16.15. Own computer skills	6	3.6	8	4.8	24	14.7	23	20.8	103	62.8
Q16.16. Resources on how to apply technology in teaching	2	1.2	2	1.2	19	11.5	69	42.1	72	43.9
Q16.17.Evidence of students' improved learning	0	0.0	0	0.0	12	7.1	23	14.1	129	78.7
Q16.18. Easy to use and integrate into teaching	5	3.0	7	4.2	20	12.1	58	35.4	74	45.1
Q16.19. Availability of a well-defined ICT policy	0	0.0	1	0.6	10	6.1	73	44.5	80	48.8
Q16.20. Advantage over traditional teaching	4	2.4	8	4.4	25	15.3	107	65.2	20	12.2

In Question 17, the participants were asked to identify the factors that hinder ICT use for teaching by academic staff at COE. These frequencies and percentages are provided in Table 4.16.

Table 4.16

Frequencies and Percentages of Barrier Factors (n = 164)

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	n	%	n	%	n	%	n	%	n	%
1. Increased workload for academic staff	6	3.6	8	4.8	12	7.2	28	17.0	110	67.1
2. Lack of equipment and infrastructure	5	3.0	10	6.1	15	9.0	34	20.7	100	61.0
3. Lack of software	19	11.6	22	13.4	27	16.4	63	38.4	33	20.1
4. Lack of time to learn about computer technologies	4	2.4	8	4.8	14	8.5	21	12.8	117	71.3
5. Lack of training options	9	5.4	9	5.4	16	9.7	24	14.6	106	64.6
6. Lack of technical support	5	3.0	8	4.8	11	6.7	36	22.0	104	63.4
7. Lack of administrative support	7	4.2	9	5.4	14	8.5	39	23.8	95	57.9
8. Lack of colleague support and interaction	15	9.0	17	10.2	85	51.8	27	16.5	20	12.2
9. Lack of self-confidence	23	14.0	28	17.1	37	22.6	45	27.4	31	18.8
10. Lack of personal interest	0	0.0	3	1.8	13	7.9	85	51.9	63	38.4
11. Lack of ICT skills	18	10.8	19	11.4	12	7.3	34	20.7	81	49.4
12. Lack of contribution towards promotion and tenure	36	21.9	37	22.5	42	25.6	24	14.7	25	15.3
13. Lack of available well-defined ICT policy	4	2.4	9	5.4	26	15.9	52	31.7	73	44.5
14. Lack of collaboration with colleagues who teach in same area	25	15.3	23	14.1	54	32.9	28	17.1	34	20.7
15. Lack of incentives for using ICT in teaching and learning	6	3.6	15	9.1	26	15.9	39	23.7	78	50.6

Based on the parameter of 'strongly agree,' the most frequent barriers affecting ICT use for teaching as reported by COE academic staff members are a lack of time (71.3%), followed by increased workload (67.1%), a lack of training options (64.6%), a lack of technical support (63.4%), a lack of equipment and infrastructure (61%), a lack of administrative support (57.9%) and a lack of incentives for using ICT. By far the highest point of neutrality was a lack of colleague support and interaction (51.8%), with the second highest being a lack of collaboration with colleagues (32.9%). The most strongly disagreed with factors are a lack of ICT contribution towards promotions and tenure (21.9%), a lack of contribution with colleagues in the same subject areas (15.3%), a lack of self-confidence (14%) and a lack of software (11.6%).

4.9 ICT Policy

In Question 18 the participants were asked to identify their awareness of ICT policy at a university/college/department level. Table 4.17 shows the frequency of different responses of participants. They were asked whether their university/college/department has a policy for the use of ICT; 79.3 per cent indicated that their university/college/department do not have any policy for the use of ICT and only 9.1 per cent of them identified that an ICT policy exists. The remaining 11.6 per cent were unaware of any policy on ICT use that their university/college/department has.

Table 4.17

Frequencies and Percentages of Awareness of ICT Use Policy (n = 164)

	Category	Frequency	%
ICT policy awareness	No	130	79.3
	In progress	15	9.1
	Do not know	19	11.6
	Total	164	100.0

4.10 Strategies to Promote ICT Use in Teaching and Learning

Research Question 3 asked **'**What strategies need to be implemented by the University in order to assist academic staff to adopt ICT in their teaching and

learning in order to meet the needs of students in the digital age?' In Question 19 of the questionnaire, the participants were asked to identify the strategies need to be implemented by the University in order to assist academic staff in adopting ICT in their teaching and learning. Table 4.18 shows the frequency of the different responses of questionnaire participants. This shows that the most frequently cited strategy is Training (98.7%), followed by technical support (98.1%), the availability of ICT resources (97.5%), rewards or incentives for using ICT in teaching (94.5%), providing time (87.1%) and a well-defined university ICT goal (86.5%). The least frequent strategy cited is meetings and conferences to promote interdisciplinary collaborations (51.2%) and the second least frequent barrier is increased funding (68.2%). With regard to meetings and conferences, it is acknowledged with hindsight that this may have benefitted from being separated into types of meetings and conferences, for example between inter-departmental meetings and those that have a broader spectrum, for example between institutions.

Table 4.18

Frequencies and Percentages of Useful Strategies to Promote ICT Use (n = 164)

Useful Strategies	Frequency	%
Training	162	98.7
Technical Support	161	98.1
Availability of ICT resources	160	97.5
Rewards or incentives for using ICT in teaching	155	94.5
Provide Time	143	87.1
Well-defined university ICT goal	142	86.5
Increased funding	112	68.2
Meetings and conferences to promote interdisciplinary collaborations	84	51.2

4.11 Personal Characteristics and Demographic Variables

Research Question 4 asked 'How do the personal characteristics and demographic variables (e.g., gender, experience, age and discipline) of the academic staff at Al-Jouf University influence their ICT use and skills?' Cross-tabulation was

used to determine whether there were significant differences in academic staffs' self-rated ICT skills and adoption for teaching based on demographic characteristics such as gender, age, years of teaching experience, and department. Each characteristic area is presented within its own sub-section below.

4.11.1 Relationship between ICT skills and gender.

Cross-tabulation was used to determine the gender differences in academic staff self-rating ability to use ICT and its adoption into their teaching. The results indicate that there were no significant gender differences in academic staff self-reported ability to use ICT in their teaching. Table 4.19 shows the respondents' self-rated ICT use ability split across gender (54.3% male and 45.7% female). With regard to non-users (n=5), 60 per cent were female and 40 per cent were male participants. For beginners (n=65), 52.3 per cent were male and 47.7 per cent were female participants. For intermediate users (n=32), 56.2 per cent were male and 43.8 per cent were female. For advanced users (n=42), 57.1 per cent were male and 42.9 per cent were female and of those who self-reported being expert (n=20), 55 per cent were male and 45 per cent were female. As can be seen, the trends across all of the relationships based on gender were broadly in line with the overall gender split, with the exception of non-users, where there were more females in percentage terms than males; however, the numbers involved do not allow for any significance to be attached to this finding.

Table 4.19

Cross Tabulation of Participants' Self-rated ICT Skills and Gender (n = 164)

Self-rated ICT skills			Gender		Total
			Female	Male	
Q8.	Non-user	n	3	2	5
		%	60.0	40.0	100.0
	Beginner	n	31	34	65
		%	47.7	52.3	100.0
	Intermediate	n	14	18	32
		%	43.8	56.2	100.0
	Advanced	n	18	24	42

		%	42.9	57.1	100.0
	Expert	n	9	11	20
		%	45.0	55.0	100.0
Total		n	75	89	164
		%	45.7	54.3	100.0

4.11.2 Relationship between ICT skills and age.

Table 4.20 shows participants' self-rated ICT use ability split across age. For non-users (n=5), 40 per cent were 41-50 years age and 60 per cent were 51-60 years age. For beginners (n=65), 41.5 per cent were 41-50 years of age and 32.3 per cent were 51-60 years age. For intermediate (n=32), 46.9 per cent were 31-40 years age and 34.4 per cent were 41-50 years age. For advanced (n=42), 47.6 per cent were 21-30 years age and 23.8 per cent were 41-50 years age. For expert (n=20), 60 per cent were 21-30 years age and 30 per cent were 31-40 years age. As the trends in Table 4.20 show, there is a clearly recognisable inverse relationship between age and the self-rated ICT skills of the participants.

Table 4.20

Cross Tabulation of Participants' Self-rated ICT Skills and Age (n = 164)

Self-rated ICT skills			Age (years)					Total
			21–30	31–40	41–50	51–60	Over 61	
Q8.	Non-user	n	0	0	2	3	0	5
		%	0.0	0.0	40.0	60.0	0.0	100.0
	Beginner	n	2	7	27	21	8	65
		%	3.1	10.8	41.5	32.3	12.3	100.0
	Intermediate	n	1	15	11	4	1	32
		%	3.1	46.9	34.4	12.5	3.1	100.0
	Advanced	n	20	8	10	4	0	42
		%	47.6	19.0	23.8	9.5	0.0	100.0
	Expert	n	12	6	2	0	0	20
		%	60.0	30.0	10.0	0.0	0.0	100.0
Total		n	35	36	55	29	9	164
		%	21.3	22.0	33.5	17.7	5.5	100.0

4.11.3 Relationship between ICT skills and teaching experience.

Table 4.21 shows participants' self-rated ICT use ability split across teaching experience. Non-users (n=5), all had more than 20 years of experience and of beginners (n=65), 29.2 per cent had 6–10 years of experience and 26.2 per cent had 16–20 years of experience. For intermediates (n=32), 53.1 per cent had 11–15 years of experience and for advanced (n=42), 54.8 per cent had 0–5 years of experience, while self-reported experts (n=20), 80 per cent had 0–5 years of experience. In similar vein with regard to the findings concerning self-rated ICT skills and age, there is again a clearly recognisable inverse relationship between ICT skills and experience.

Table 4.21

Cross Tabulation of Participants' Self-rated ICT Skills and Teaching Experience (n = 164)

Self-rated ICT skills			Teaching Experience (years)					Total
			0–5	6–10	11–15	16– 20	Over 20	
Q 8	Non-user	n	0	0	0	0	5	5
		%	0.0	0.0	0.0	0.0	100.0	100.0
	Beginner	n	6	19	13	17	10	65
		%	9.2	29.2	20.0	26.2	15.4	100.0
	Intermediate	n	6	6	17	3	0	32
		%	18.8	18.8	53.1	9.4	0.0	100.0
	Advanced	n	23	6	7	4	2	42
		%	54.8	14.3	16.7	9.5	4.8	100.0
	Expert	n	16	2	2	0	0	20
		%	80.0	10.0	10.0	0.0	0.0	100.0
Total		n	56	33	39	24	12	164
		%	34.1	20.1	23.8	14.6	7.3	100.0

4.11.4 Relationship between ICT skills and teaching department.

In terms of departments and self-reported ICT skill levels, of non-users (n=5), 60 per cent were from the Arabic Education Department and 40 per cent were from the Islamic Education Department. For beginners (n=65), 29 per cent were from the Arabic Education Department, 18.5 per cent were from the Islamic Education Department and 16.9 per cent were from the Science Education Department. For intermediate users (n=32), 25 per cent were from the Computer Education Department and 21.9 per cent were from the Curriculum and Instruction Department. For advanced users (n=42), 23.8 per cent were from the Mathematic Education Department and 16.7 per cent were from the Computer Education Department and the Science Education Department respectively. For self-reported expert users (n=20), 30 per cent were from the Mathematic Education Department and Computer Education Department respectively, as shown in Table 4.22. This strongly suggests that self-reported skill levels are have some relationship with departments and academic disciplines, with those from non-English usage departments showing considerable lower levels of self-reported skills.

Table 4.22

Cross Tabulation of Participants' Self-rated ICT skills and Departments (n = 164)

ICT self-rated skills		Department											Total
		Curric. & Instru.	Arab Ed.	Social Stud.	Ed. Found	Islam Ed.	Art Ed.	Phys. Ed.	Science Ed.	Math Ed.	Comp. Ed.	Ed. Tech.	
Non-user	n	0	3	0	0	2	0	0	0	0	0	0	5
	%	0.0	60.0	0	0	40.0	0	0	0	0	0	0	100
Beginner	n	9	13	6	4	12	2	2	11	6	0	0	65
	%	13.8	20.0	9.2	6.2	18.5	3.1	3.1	16.9	9.2	0	0	100
Intermediate	n	7	2	2	6	2	0	1	0	0	8	4	32
	%	21.9	6.2	6.2	18.8	6.2	0	3.1	0	0	25.0	12.5	100
Advanced	n	5	0	4	0	0	6	1	7	10	7	2	42
	%	11.9	0	9.5	0	0	14.3	2.4	16.7	23.8	16.7	4.8	100

Expert	n	2	2	0	2	2	0	0	0	0	6	6	20
	%	10.0	10.0	0	10.0	10.0	0	0	0	0	30.0	30.0	100
Total	n	23	20	12	12	18	8	4	18	16	21	12	164
	%	14.0	12.2	7.3	7.3	11.0	4.9	2.4	11.0	9.8	12.8	7.3	100

4.11.5 Relationship between level of ICT use and gender.

Table 4.23 shows participants' self-rated ICT adoption levels split across gender. For very low adoption levels (n=35), 51.4 per cent were male and 48.6 per cent were female. For low adoption levels (n=42), 52.4 per cent were male and 47.6 per cent were female participants. For medium adoption levels (n=31), 58.1 per cent were male and 41.9 per cent were female. For high adoption levels (n=23), 56.5 per cent were male and 43.5 per cent were female. For very high adoption levels (n=33), 54.5 per cent were male and 45.5 per cent were female participants. As with the findings for self-reported skill levels, usage is broadly in line across the range of use levels with the overall gender split of the participants.

Table 4.23

Cross Tabulation of Participants' Self-rated ICT Use and Gender (n = 164)

Self-rated ICT use			Gender		Total
			Female	Male	
Q9.	Very Low (1–10%)	n	17	18	35
		%	48.6	51.4	100.0
	Low (11–25%)	n	20	22	42
		%	47.6	52.4	100.0
	Medium (26–50%)	n	13	18	31
		%	41.9	58.1	100.0
	High (51–75%)	n	10	13	23
		%	43.5	56.5	100.0
	Very High (top 25%)	n	15	18	33
		%	45.5	54.5	100.0
Total		n	75	89	164
		%	45.7	54.3	100.0

4.11.6 Relationship between level of ICT use and age.

Table 4.24 shows participants' self-rated ICT adoption levels divided by age. For very low adoption levels (n=35), 51.4 per cent of participants were 41-50 years age and 28.6 per cent were 51-60 years of age. For low adoption levels (n=42), 47.6 per cent of participants were 41-50 years of age and 14.3 per cent were 31-40 years age. For medium adoption levels (n=31), 45.2 per cent of participants were 31-40 years of age and 25.8 per cent were 41-50 years of age. For high adoption levels (n=23), 47.8 per cent of participants were 21-30 years of age and 30.4 per cent were 31-40 years age. For very high adoption levels (n=33), 63.6 per cent of participants were 21-30 years of age and 18.2 per cent were 31-40 years old. As with experience and age in terms of self-reported skill levels, use and age appear to have an inverse relationship.

Table 4.24

Cross Tabulation of Participants' Self-rated ICT Use and Age (n = 164)

Self-rated ICT use			Age (years)					Total
			21–30	31–40	41–50	51–60	Over 61	
Q9.	Very Low (1–10%)	n	0	3	18	10	4	35
		%	0.0	8.6	51.4	28.6	11.4	100.0
	Low (11–25%)	n	2	6	20	11	3	42
		%	4.8	14.3	47.6	26.2	7.1	100.0
	Medium (26–50%)	n	1	14	8	6	2	31
		%	3.2	45.2	25.8	19.4	6.5	100.0
	High (51–75%)	n	11	7	5	0	0	23
		%	47.8	30.4	21.7	0.0	0.0	100.0
	Very High (top 25%)	n	21	6	4	2	0	33
		%	63.6	18.2	12.1	6.1	0.0	100.0
Total		n	35	36	55	29	9	164
		%	21.3	22.0	33.5	17.7	5.5	100.0

4.11.7 Relationship between level of ICT use and teaching experience.

Table 4.25 shows participants' self-rated ICT adoption levels split across teaching experience. For very low adoption levels (n=35), 34.3 per cent of

respondents had 6-10 years of experience and 25.7 per cent had 0-5 years of experience. For low adoption levels (n=42), 35.7 per cent had 11-15 years of experience and 21.4 per cent had 6-10 years of experience. For medium adoption levels (n=31), 45.2 per cent had 11-15 years of experience and 22.6 per cent had 0-5 years. For high adoption levels (n=23), 56.5 per cent had 0-5 years of experience and 21.7 per cent had 6-10 years. For very high adoption levels (n=33), 75.8 per cent had 0-5 years of experience. Consistent with previous findings, there is a clearly recognisable inverse relationship between self-reported use and age.

Table 4.25

Cross Tabulation of Participants' Self-rated ICT Use and Teaching Experience (n = 164)

Self-rated ICT use			Teaching experience (years)					Total
			0–5	6–10	11–15	16–20	Over 20	
Q9.	Very Low (1–10%)	n	9	12	2	6	6	35
		%	25.7	34.3	5.7	17.1	17.1	100.0
	Low (11–25%)	n	2	9	15	12	4	42
		%	4.8	21.4	35.7	28.6	9.5	100.0
	Medium (26–50%)	n	7	5	14	3	2	31
		%	22.6	16.1	45.2	9.7	6.5	100.0
	High (51–75%)	n	13	5	4	1	0	23
		%	56.5	21.7	17.4	4.3	0.0	100.0
	Very High (top 25%)	n	25	2	4	2	0	33
		%	75.8	6.1	12.1	6.1	0.0	100.0
Total		n	56	33	39	24	12	164
		%	34.1	20.1	23.8	14.6	7.3	100.0

4.11.8 Relationship between level of ICT use and department.

Table 4.26 shows participants' self-rated ICT adoption levels divided by department. For very low adoption levels (n=35), 40 per cent were from the Arabic Education Department and 37.1 per cent were from the Islamic Education Department. For low adoption levels (n=42), 26.2 per cent were from Science Education and 14.3 per cent were from Social Studies and the Mathematic Education

. For medium adoption levels (n=31), 32.2 per cent were from Computer Education, 25.8 per cent were from Curriculum and Instruction and 19.4 per cent were from Educational Foundation and Psychology. For high adoption levels (n=23), 21.7 per cent were from the Curriculum and Instruction and Computer Education departments and 17.4 per cent were from Science Education. For very high adoption levels (n=33), 24.2 per cent were from the Mathematic Education Department and 18.2 per cent were from Computer Education and the Educational Technology. Similar to the findings with regard to skill levels, there are clear differences between departments, with those that do not use English as the language of instruction being the least likely to use ICT in teaching and learning. There is also a trend towards higher usage in technology-oriented departments such as Mathematics, Computer Education and Educational Technology.

Table 4.26

Cross Tabulation of Participants' Self-rated ICT Use and Department (n = 164)

Self-rated ICT use		Department											TotalTotal
		Curric. & Instru.	Arab Ed.	Social Stud.	Ed. Found	Islam Ed.	Art Ed.	Phys. Ed.	Science Ed.	Math Ed.	Comp. Ed.	Ed. Tech.	
Very Low (1-10%)	n	4	14	2	0	13	0	2	0	0	0	0	35
	%	11.4	40.0	5.7	0	37.1	0	5.7	0	0	0	0	100
Low (11-25%)	n	4	4	6	4	3	4	0	11	6	0	0	42
	%	9.5	9.5	14.3	9.5	7.1	9.5	0	26.2	14.3	0	0	100
Medium (26-50%)	n	8	0	0	6	0	2	1	0	0	10	4	31
	%	25.8	0	0	19.4	0	6.5	3.2	0	0	32.3	12.9	100
High (51-75%)	n	5	0	2	0	0	2	1	4	2	5	2	23
	%	21.7	0	8.7	0	0	8.7	4.3	17.4	8.7	21.7	48.7	100
Very High (top 25%)	n	2	2	2	2	2	0	0	3	8	6	6	33
	%	6.1	6.1	6.1	6.1	6.1	0	0	9.1	24.2	18.2	18.2	100
Total	n	23	20	12	12	18	8	4	18	16	21	12	164
	%	14.0	12.2	7.3	7.3	11.0	4.9	2.4	11.0	9.8	12.8	7.3	100

Part 2: Qualitative Study Results

This second part of the chapter is concerned with the results of the qualitative study undertaken. The results should be viewed as being potentially supportive of those obtained from the quantitative study, bringing a necessary and valuable depth in terms of the values, beliefs and opinions of the participants through narrative

accounts and responses to open questions, which a quantitative survey will always lack. A number of areas have been addressed that are within the same or similar parameters to those covered within the quantitative study. Where appropriate, tables are used to summarise the views expressed and, where it is also deemed as being of value and appropriate, English translations of parts of the transcripts, particularly those that summarise the views of a number or a majority of the participants, are cited. These translations have been made with the priority of expressing as accurately as possible the meanings intended within their original Arabic narrative.

The key participants for this survey were selected based on their representativeness of university staff, based in turn on the identified characteristics from the quantitative work, although this was not based entirely on their survey responses (see above). The demographic profile of the 15 participants (10 male and 5 female) is presented in Table 4.27.

Table 4.27

Demographic Profile of Participants in the Qualitative Study

Name	Gender	Department	Teaching experience (years)	ICT skill level	Self-rated ICT adoption in teaching
P1	M	Computer Ed.	0–5	Advanced	Very High
P2	M	Math Ed.	0–5	Advanced	High
P3	M	Ed. Techn.	6–10	Advanced	High
P4	M	Social Studies	6–10	Intermediate	Medium
P5	M	Curric. & Instr.	11–15	Intermediate	Medium
P6	M	Science Ed.	16–20	Intermediate	Medium
P7	M	Ed. Found. & Psych.	16–20	Beginner	Low
P8	M	Art Ed.	11–15	Beginner	Low
P9	M	Phys. Ed.	16–20	Beginner	Very Low
P10	M	Islamic Ed.	Over 20	Non-user	Very Low
P11	F	Computer Ed.	0–5	Advanced	Very High
P12	F	Science Ed.	0–5	Advanced	High
P13	F	Math Ed.	6–10	Intermediate	Medium

P14	F	Curric. & Instr.	11–15	Beginner	Low
P15	F	Arabic Ed.	16–20	Non-user	Very Low

4.12 Availability and Accessibility of ICT

As can be seen from Table 4.27, the levels of skills, experience and self-rated adoption are broadly similar in structure to those of the quantitative study (more precise matching was not possible due to the different numbers of participants used). It became clear to the researcher in exploring this and the following question (regarding ICT adoption) with the key participants that it was necessary to ensure that the discussions and the consequent transcriptions were separated between the areas of self-rated levels of ICT adoption, the use of ICT in teaching and self-rated ICT skills. The reason for this separation, as well as further separations within the qualitative study, was to explore some of the limitations and even overlaps that may exist within the quantitative (survey) study and thereby to not only enhance the overall value of the work but also to reduce potential problems in validity and reliability.

The narratives summarise a range of views with regard to the availability and accessibility of ICT at the University. For example, Participant 3 (P3), a staff member from Educational Technology, said that:

> *The basics are always easily available, we have them to hand, but some of the other items, which I often use because of the nature of the courses that I run, have to be asked for and returned to IT. So I have the same level of access as someone who is teaching English or something like that. No disrespect to my colleagues from other departments, but a more flexible system would help where what we have and what we can use is more aligned with our daily needs. So available? Yes; accessible? Yes, but easily accessible? No, not for the important equipment that I need for developing innovative, ICT-based lessons.*

However, attitudes and experiences varied, exemplified by the words of P1, the person who self-rated most highly with regard to ICT adoption and use:

> *Most equipment is as available as a staff member wants it to be – I have a good informal relationship with IT and so long as I keep in touch with them about the security of the more expensive and sophisticated items, I feel that*

availability and accessibility are good – look, I want and have been pushing for all students to have tablets, which would be useful for my classes, but I understand two things, one is that this would require a huge investment in one item when there are other needs, and secondly that this innovation will come in good time. So I don't go on about it and moan like some of my colleagues, I get by with what I have got, which in my estimation is pretty good compared with other institutions that I have friends and colleagues working at.

This can be contrasted with the views of P9, a staff member who teaches physical education:

I know that there is some good equipment that can be used for measuring performance and the relative state of bodies during and after physical exercise but I just don't see the benefits, I don't want to push the university to get this equipment. Some of my colleagues do, but I don't – in fact I don't even know for sure how I can get hold of, let alone use, such equipment. I have seen some colleagues using it but not me.

And P8, with regard to Art Education:

I do use computer-based art images and graphic design with my students and the basic equipment is available and quite accessible, but I am not confident with it, I feel that the students know more about it than me. What should I do? Let them take over and reverse roles with them?

4.13 Adoption of ICT in Teaching and Learning

The qualitative results from this section were quite extensive, which warrants the division of them into relevant sub-sections.

4.13.1 Self-rated ICT adoption and use in teaching.

The overlapping nature of a qualitative study means that in order to maximise the value gained, participants often stray into areas of another open question when answering, as can be noted from the comments regarding availability and accessibility in Section 4.12. The limitations, furthermore, that lie in the self-evaluation of skills can also be seen with regard to some responses, contingent as it is on factors such as self-esteem and self-confidence. Thus, while P13 self-evaluated

her level of skills as intermediate and her levels of adoption as medium, she articulated an adoption willingness and use that may considerably exceed these evaluations:

> *I find that the use of ICT is a very exciting way of teaching mathematics education. I strongly believe in constructed learning and that it is the only real way to teach mathematics. We are teaching teachers and the ways in which we teach them to teach will be a strong determinant of how the next generation comes through. There are so many ways of using ICT in maths, from a learning experience and real-life examples from everyday life to how to really understand equations and what they really mean. How could I compete with such a teaching and learning paradigm? I am the facilitator, the guide, but the students and, in time, their students, will be the self-teachers/learners.*

This can be contrasted with the views of a science department staff member, P6, who self-rated himself at the same level as P13:

> *My students have to know the basics of science and science teaching so that they can become good teachers themselves. They have to learn how to stand in front of a class and how to make sure that all theories and models are learned and that they are understood. Only I can do this and so I see ICT as a teaching aid and use it to help me in my presentations of what I teach. It is I that will interact with the class and it is I that will answer their questions – a machine cannot do this.*

4.13.2 Types of ICT use and purposes

The previous comment from P6 in a sense introduces this sub-section as it attempts to elicit how ICT is used and the underlying purposes for which it is used. How ICT is used is a central theme that permeates the literature, which crosses into other areas of discussion such as attitudes. P10, a self-reported non-user with very low adoption in teaching Islamic Education, was quite unequivocal:

> *I will never understand why anybody would think that ICT can be useful for teaching all subjects. It has become a minimum norm to use PowerPoint to present lecture material and so as not to seem like I am an odd one out, I also use this sometimes, but just for appearances. My subject is about showing the way, leading and guiding within a framework of rules and*

norms. This is done by the interaction of the teacher with the learners so that they may teach in the same ways when they graduate and have teaching jobs.

This can be contrasted with the views of P3, a staff member in Educational Technology:

The question for me is not whether ICT can be used but in how it can best be used within the classroom. I almost feel that I have a mission to ensure that these future teachers who are my students must be ingrained in technology use, it must become a second nature to them. Because they are future teachers who must be innovative if they are to get the best out of their students, I consider it as being vital that they come up with their own ideas. I think that students enjoy my classes because they are interesting and challenging. So the answer is that I use ICT for many purposes and use as many types as is possible within the thinking constraints of my students.

4.13.3 ICT skill levels

As noted above, the actual levels of skill held by academic members may be relatively different to those that have been self-stated. Some staff members may understate their real abilities and motivation to use ICT (e.g., P13 above). Conversely, others may give overly high self-ratings. When asked about her skill levels, P12 (who self-rated as being advanced and with a high levels of adoption in teaching) stated that she believed that her skill levels were high – the same or higher than those of colleagues within the Science Education Department. However, the researcher felt that this should be explored and so asked P12 to expand on this observation by explaining what she could do and how she used ICT:

Well, I use ICT often in the classroom and present many of my lectures using PowerPoint. I also point to some headings and ask students to explain and discuss what is there, so I get them to interact with the ICT. I also set them work to do outside of the classroom and they have assignments to do and I always put a note on the assignments and other work when I hand them out that all students are welcome to email me if they have any questions or are unsure about the instructions. When I am preparing my lessons, I sometimes use Google to get some ideas. I feel that this puts me quite high in terms of ICT use as I have heard that some staff members in other departments don't even like to use PowerPoint, let alone email or Google.

[Confirmatory prompt from researcher: 'so are there any other uses of ICT that you employ and which you are skilled at?']

No.

A quite wide and varied agenda was covered within the qualitative sections thus far discussed. Some of the quotations used have not been typical because it was felt useful to demonstrate some positive and negative responses as well as those that were at the margins. In order to ensure consistency, a summary of the views of all participants concerning these areas is presented in Table 4.28. Although the statements are not direct quotations, they have been sincerely constructed as representative summaries of the words of the participants.

Table 4.28

Summary of Views on ICT Availability, Accessibility and Adoption

Respondent	**Availability**	**Accessibility**	**Adoption**	**Views towards ICT**
P1	There is good availability of ICT equipment	Because I have a good relationship with IT, I find all equipment that is available	ICT has been strongly adopted and is used to an advanced level	Very positive
P2	Most of the equipment that I need is available	Getting access to some of the equipment is a bureaucratic challenge	ICT has been adopted and is used beyond just a teaching support level	Positive
P3	The mainstream and basic ICT equipment is available	I have easy access to the basics but find it awkward when trying to access some equipment that I often need	ICT has been strongly and innovatively adopted	Very positive
P4	There is enough equipment available for most of my needs	I can access the equipment that I use quite easily	The level of adoption is moderate, which is in line with self-perceptions of where it can be useful in teaching and learning	Quite positive
P5	There is a shortage of	At certain times, when everybody	ICT adopted to a medium level but	Positive

	some equipment	is doing the same thing, like assignment preparation, there is a lack of accessibility to some of the ICT equipment	keen to adopt it to a greater extent	
P6	For my current needs, there is sufficient availability	I can usually access the ICT equipment that I need	All ICT that is useful as a classroom aid has been adopted	Moderately positive
P7	I don't use much ICT equipment, but for my needs there is always sufficient availability	For me accessibility is okay, but I have heard colleagues and students complaining about this	Relatively low levels of adoption	Neutral
P8	Most equipment is available	Most equipment is accessible	Aware of ICT potential but a reluctant adopter	Neutral
P9	I think that most ICT equipment is available	I think that most ICT equipment is accessible	Resistant to adoption	Quite negative
P10	There is more than enough ICT available for my purposes	The ICT that I need and use is easily accessible	Has adopted the minimum amount of ICT that he feels is required to teach his subject	Negative
P11	I get frustrated sometimes because I feel that the university is a bit slow in getting the latest hardware and software	What is available is sometimes accessible to me	Adoption is considerably beyond basic levels and striving to be innovative with ICT	Very positive
P12	I find that availability is good	I am occasionally surprised to find something not immediately accessible, but overall I would say that I have good accessibility to	Basic levels of ICT as a teaching aid have been adopted	Moderately positive

		ICT		
P13	Good availability	Good accessibility	I adopt and use all of the ICT that I can	Positive
P14	For my needs, availability is good	All ICT that I need is accessible	Limited adoption	Neutral
P15	If I need it, ICT is available	If I want to access ICT, it is accessible	Some resistance to adoption	Mildly negative

4.14 Factors Affecting ICT Use

Again, a range of narrative data was collected under this broad heading, which this warranted its division into sub-sections.

4.14.1 Incentive factors

As noted from the results of the quantitative survey, an extensive range of factors can be viewed as incentives and some notable comments from individual participants regarding these can be cited. For example, with regard to support and encouragement from the department or wider university arena, P1, who has been identified as a strongly positive supporter of ICT use, was quite scathing:

> *Sometimes I feel that I am almost standing alone with a minority of colleagues in terms of pushing the ICT agenda forward. There is a fundamental lack of encouragement – there are words and there are policies but when it comes down to it, I get the impression that anything new and innovative, that is outside of the 'box' created by the institution, is not really wanted or welcomed.*

P3, again a key participant who has been identified as being a very positive supporter and innovative user of ICT, was more diplomatic and almost reticent about support. Nonetheless, the meaning shone through:

> *I am not a person who would wish to criticise an institution that employs me and who has helped me to develop academically, so I will just say that from my perspective there is a surprising lack of support or encouragement.*

It might be expected that against such strongly expressed views regarding support and encouragement, that similar ones would be expressed about the requirements that are set out by the institution at both general and departmental level. However, here criticism was muted and despite prompting from the researcher, a

neutral ‘wall’ was generally found to exist. One exception was, perhaps surprisingly, P10 (given his stated and generally negative attitude towards ICT):

> *Perhaps because of my many years at this institution, I feel freer to speak out about my employer. I have seen young staff full of enthusiasm and fully supportive of ICT adoption and use change and almost wilt as they have tried to meet the requirements set them. Me? I just ignore most of the requirements, but then I suppose I am a bit ‘untouchable’ because nobody ever seeks to rebuke me.*

It would be impossible to note all of the areas that were discussed or to cite specific responses. However, one citation really encapsulates the issues and challenges being faced. Within a long and fruitful discussion, P11, a very strong supporter of ICT use and innovation, made the following observation:

> *Sometimes I feel that I am living in two worlds. One is where I have lived and breathed ICT, where I have such a strong belief in it for my future and, more importantly, that of the next generation of my country. I have pushed to learn, have attended many training courses and I have striven to innovate and develop my classes. Yet I sometimes walk into a classroom with great enthusiasm for a constructed learning session that I have created but there is no connectivity – the basic tool for learning by experience is missing. So I either have to completely change my plans or waste half of my lesson finding someone from IT to find out what the problem is. This saddens me.*

4.14.2 Barriers

It would be anticipated that where there is a lack of incentives, barriers will arise. Therefore, it is important to identify barriers that exist besides a lack of incentives. As with the quantitative survey, several key barriers shone through and were encapsulated in the narrative of P7:

> *What I want to achieve in my academic career is just not compatible with a wholesale and full-blown commitment to ICT. When I was at university, I envied the senior lecturers in their abstract dedication to study and to research. I always sought out their work when it was published and I associated myself with such a life – educating, enlightening my students on the one hand while having enough time to be immersed in new areas, in new research. Now what do I find? I am not properly trained in ICT, so every*

aspect for me is a slow and painful process. When I really need technical support, it seems not to be there, and when I think about what it really involves – the workload – I shudder. Please help me someone – I want to be an academic, but ICT won't let me!

4.14.3 Attitudes towards ICT use in teaching

In a sense, this continues from the previous two sub-sections because it is the barriers and the incentives (or lack of them) that will be strong influences on attitudes. This point aside, attitudes pervade this discussion, and have pervaded the previous sections. Therefore, it is most relevant to identify the most important factors that influence attitudes as enunciated through the values, opinions and beliefs of the key participants that were interviewed. These were captured in summary form through the words of P5:

Never mind the question of my attitude towards ICT and its adoption, and never mind that I have always supported its use – let's look at the factors that will support and drive that attitude, or which may drain it and make it negative. Fundamentally, I would say to this institution that it should give me the time and the right courses so that I can become an ICT expert. Then give me the best possible technical support, then encourage me by rewarding the results that I achieve with these potentially marvellous tools and set achievable targets for these results. Then I will have the best possible attitude. The less of these that you give me, the less positive my attitude will inevitably be.

4.14.4 Training and awareness of ICT use policy

Levels of training and attitudes towards them have been touched upon in previous sections. One area that stood out from the quantitative survey (without wishing to pre-empt the following chapter), is the almost contradictory fact that while respondents cited issues with regard to institutional and ICT demands, relatively few admitted to actually knowing or being aware of what these policies were. This was generally supported by the qualitative findings but, as may be expected, the relativity of awareness could be refined. One good example of the narrative responses were again articulated by P5:

I think that everybody is aware that ICT is high on the 'political' agenda of the university management and leadership, but there seems to be a gap in transforming this into a workable strategic plan – the problem is that they want ICT at the forefront but they don't know how to position it against their other wants. In other words, they want it all without the necessary investment in human capital.

4.15 Strategies to Promote ICT Use in Teaching and Learning

In this area the qualitative results again brought greater clarity to an issue that is beyond 'black and white', and which can usefully go beyond relative frequencies, as exemplified by several quotations from the narratives. For example, P7 stated that:

I can say what I need and I can suggest strategies, but these will be different to those that my colleagues will say and even if they are similar, it will mean a different emphasis by each of us. Look, my ICT skills are quite poor, so I need training and I don't just need technical support, I need to know what technical support is talking about. I also need to think about the needs of my subject, which will be different from those of another subject, even if everybody does keep talking about strategies such as constructed learning as if it is the same for all areas. It isn't, so what I really need is a strategy that attends to my needs and to the needs of my department.

These sentiments were similarly reiterated by P14:

I want to be positive about ICT and I want to talk about positive strategies, but I know less about ICT than most of my students. So my suggestion is that somebody looks at my individual needs, somebody develops a strategic plan for me, something that will enable me within my subject area.

The last two sections of this chapter have, it is held, provided some informative narrative data. In the interests of objectivity, the values and opinions as interpreted by the researcher for all of the key respondents are summarised in Table 4.29.

Table 4.29

Summary of Views on Factors Affecting ICT Use, Training and Policy Awareness and Promotion Strategies in Teaching and Learning

Respondent	**Factors affecting ICT use**	**Training and policy awareness**	**Strategies for promoting ICT use in teaching and learning**	**Views towards ICT in these areas**
P1	Lack of institutional encouragement	Policies are difficult to understand	Greater use of workshops and shared learning with colleagues	Positive
P2	No meaningful support	Policies are not coherent	Set clear goals and ICT targets at subject level	Quite positive
P3	Lack of institutional support and encouragement	Greater clarity is needed	More staff workshops where skills and innovations can be shared	Positive
P4	Lack of technical support and encouragement from IT professionals	Well informed but cynical of the value of training and policies	It should be broken down to department and subject levels	Quite positive
P5	Lack of factors that would support positive attitudes	Lack of training, support and supportive policies	More involvement by management and department heads	Moderately positive
P6	Lack of professionalism	Limited awareness of policies and a neutral attitude towards training	More interactivity between staff from different departments	Neutral
P7	Lack of support for individual needs, too much emphasis on ICT	Relative unawareness of policies; training should be subject-specific	Attention on individuals and their specific subjects	Neutral/ mildly negative
P8	Complete lack of meaningful support	Not aware of policies and only interested in training that can be shown to be useful for	Workshops and more encouragement from management	Mildly negative

		the individual		
P9	Do what I say, not do what I do attitude from department heads	Not interested in training and not very aware of policies	Leave the staff alone – it's up to them	Negative
P10	Too much bureaucracy and management	Doesn't want training and is not interested in ICT policies	More encouragement for new and less experienced staff	Negative
P11	Lack of technical and ICT consistency	Aware of policies and believes in more training to higher levels	Provide time for staff to help each other	Positive
P12	Attitudes of some staff members	Aware of policies and a strong supporter of training	Raise standards by installing greater direction and policy guidelines	Very positive
P13	Technical support	Enthusiastic about training but not sure about policies	Provide the time and means for staff interact and learn from each other	Very positive
P14	Lack of suitable guidance	Confused about policies but keen to be involved in more training	Pay attention to the individual needs of staff members	Quite positive
P15	Lack of technical support	Not interested in policies or training	Pay attention to the needs of each staff member and to the needs of their subjects	Mildly negative

This chapter has presented and analysed the data of this study. This leads to a discussion of this data in Chapter 5.

Chapter 5: Discussion

This chapter analyses and discusses the results from both the quantitative and qualitative sections of Chapter 4. The approach taken is to consider each research question, the extent to which the findings are aligned with those from other studies discussed in Chapter 2, and how the present findings may be positioned within the context of one institution and within the wider higher education and teacher training context in Saudi Arabia.

5.1 Research Question 1

The first research question is interested in the current ICT environment at the University and the ICT profile of the academic staff within the COE. The results from the survey questionnaire have been divided into four areas, which are discussed separately below.

5.1.1 Availability and accessibility

The subsidiary question for this sub-section is 'What ICT resources do the academic staff at COE have access to?' The importance of this question emerged from the literature review as it is within the question of whether ICT is being seen and used by universities as a central part of an educational constructivist approach or as a teaching aid (e.g., Howell, 2007). Furthermore, whether there was sufficient institutional support to indicate the extent to which innovation and the embedding of ICT across departments signalled such adaptive approaches or whether it was effectively left to individual staff members to be innovative and dynamic or resistant and who used (even this sometimes reluctantly) ICT as a classroom aid. Such questions were found to be crystallised to a greater extent within a Saudi higher education context, where a 'generational gap' was inferred between many staff members and a student population that was far more willing to embrace and learn through ICT (e.g., Almalki & Williams, 2012; Kamal, 2013).

Against this background, it can be seen that the findings from this study support such tensions that appear to exist at Al-Jouf University with regard to access and availability. The results from the quantitative survey summarised in Tables 4.2 and 4.3 indicate that participants reported undeniable and universal access to basic teaching aid technology. For example, all participants stated that they had access to a

desktop computer for lectures (and 98.2% to laptops), and to a printer, scanner, overhead projector, TV monitor and DVD/video player. With regard to software, they all had access to word processing and desktop publishing. Returning to hardware, most (92.7%) had access to an interactive whiteboard and to a data show projector (98.2%) and a majority (69.2%) had access to a document camera. However, if these devices are at a margin where aids become innovative uses of ICT, as this parameter (innovative and constructivist learning usefulness) deepens, so too do the levels of access, which declines to 1.8 per cent for digital imaging or video processing and to 0 for hardware tools such as graphic tablets, iPads, MP3s and mobile phones.

Consistent with the findings from a number of studies concerning factors such as perceived value of ICT (Liyanage, 2004), ease of use (Alkhalaf et al., 2013) and academic rank (Al-Wehaibi, 2008) both within and outside Saudi Arabia, there appears to be a dichotomy between the use of ICT as a classroom aid as opposed to it being an integrated part of higher education. The reasons for this could include staff being effectively set in their ways and unwilling to change unless 'pushed' into doing so by the management of the institution, a fundamental fear or reluctance to adopt ICT and difficulties in aligning present teaching methods with ICT adoption. Two areas that are not significantly supported by other studies are technical constraints and the strong differences that exist between departments. For example, Altameem (2013) found such constraints but placed responsibility for a lack of adoption with institutions rather than with academic staff. If there is responsibility on institutional management, the findings of this study suggest that it comes from a lack of impetus or insistence for ICT adoption rather than its lack of availability. This could be because there is a misalignment between management and staff, where the former may assume that it is the responsibility of staff to adapt and adopt, while the majority of staff will not go beyond the use of ICT as a classroom aid unless some management and leadership effect inspires or requires them to do so. Departmental differences, which emerge as a consistent theme throughout the findings, may have numerous causes, such as the existence of very different sub-cultures within each department, or even a fundamental lack of proficiency that tends to permeate some departments, while others may have developed a system of mutual professional development that effectively compels ICT adoption and use, effectively substituting for leadership and management.

In terms of theories, the findings find alignment with the TPACK model, where it is proposed that solutions with regard to staff willingness to adopt should be sought outside of the normal 'boxes,' where there should be acknowledgment that while the staff may have a good understanding of their subject knowledge and of pedagogy, this should not presume that they will therefore have a good understanding of technology. The theory also propounds that assumptions should not be made about what is a suitable adoption, it should be specific to the subject area and to the environment of the classroom that exists. Fundamentally, that technology should be seen as a part of a whole, treated on the same level as the subject and the pedagogical arena, integrated within these factors.

With regard to software, the only programmes that were stated as being accessible by a majority of participants are word processing, mail software, internet browsers, presentation software and spreadsheets, with only 42.1 per cent stating availability of statistical mathematical programmes, 39.6 per cent for CAD software and 12.8 per cent for language programs. Several inferences can be drawn from this. First, the lack of availability of the most useful interactive, innovative and constructed learning software suggests a lack of institutional awareness of what is required with regard to enabling academic staff members to be innovative and to be at the primary margins of educational technology developments, a point which gains further impetus when it is recalled that there were no substantial learning management systems in use at the time the research was undertaken. Perhaps of equal importance to this is the fact that a minority of participants believed that hardware and software that could develop ICT-enabled learning was not at all available. As with hardware, there are a number of reasons, all of which may be viewed negatively. The lack of a widespread adoption of software beyond basic and classroom aid levels may be because no attempts have been made by some staff members to access the available technology (and hence statements that it was not available). Conversely, it is possible that institutional limits have been placed on access based on perceived departmental or subject needs; however, there would be little rationality for institutions to invest in software and then not make it widely available. More likely is that there are no set standards or requirements at departmental or subject levels to ensure that the right equipment is used by academic staff members, or at least that they are aware of its availability, which fundamentally

means a lack of institutional support, consistent with the findings of other studies (e.g., Oyaid, 2009).

The possibility also exists that it is a combination of these factors that drives the stated levels of relative availability. For clues as to the relative importance of these areas, attention can turn to the results of the qualitative study, whose size in terms of number of participants and the exploration of values and opinions enables further inferences to be made. For example, there were two participants from Computer Education and both were self-reported as having advanced and very high levels of computer skills and adoption (P1 and P11). Both of these participants reported that they found ICT availability levels good, although one (P11) suggested a lack of institutional attention to speedily obtaining the latest technology. Similar comments and stated availability can be seen from Mathematics Education (2 participants) and Educational Technology (1 participant), all of whom stated that availability is good, with one similar qualification in the narrative (from P3) that the University was a bit lacking in obtaining the latest ICT. For the rest, the stated levels of availability seemed to be relative to their needs, with some (e.g., P4, P6, P10, P14 and P15) saying that there was enough for their needs.

The enumerated and more extensive data from the quantitative survey, combined with the deeper understanding that emerged from the qualitative narratives, lead to strong inferences. These may be that there are no departmental or subject-level requirements placed on staff members with regard to using ICT, that the possibility exists that the University as an institution provides a reasonable level of ICT but that this provision is lacking in some key and potentially innovative areas of technology. Furthermore, it may be the case that the institution and/or IT department imposes limitations on availability or that academic staff members self-impose limitations based on their own perceptions of their subject needs. It can be further postulated that the length of time spent on the internet, coupled with associations between constructivist learning and ICT adoption (as opposed to instructional teaching and a lack of adoption) support the possibility that it is the entrenchment of the perceptions of academic staff members that is inhibiting ICT adoption. This, in turn, is reinforced by a lack of institutional leadership and direction. One clear example of the differences that exist is the continued use by some staff members of overhead projectors, even when data projectors are clearly available.

Turning to theoretical approaches and applying them to the analysis, it can be posited that there is no prescription of where initiatives should come from, as suggested by Collis and Moonen's 4E model, but it would appear in the case of the CoE that it is neither top-down or bottom-up. This may suggest that the environment in which ICT is being placed is not conducive, that it is in danger of becoming a barrier to learning rather than as an aid. In this study, distinct environments, even sub-cultures, have been found to exist at departmental levels and this may be the determinant of whether initiative is shown in ICT adoption or not. Similarly aligned with the work of Collis and Moonen (2001) and, as noted above, with Wankel and Law (2011), is a lack of opportunity for finding out the effectiveness of technology from a student perspective, which could provide significant motivation for staff to further develop their ICT adoptions. This also finds alignment with a concerns-based adoption model, where some staff members may have reached a sort of impasse in terms of their concerns about ICT adoption, and where some forms of peer involvement in coaching and mentoring may, according to Roach et al (2009), allow for progress to be made.

These points on ICT availability at Al-Jouf University can be summarised as follows:

- There is a lack of provision of ICT hardware and software that would encourage the most innovative, interactive and constructivist learning approaches among academic staff members;
- There is no system to ensure that academic staff members are aware of the ICT that is available;
- There are no departmental or subject-level standards with regard to ICT use;
- There is no accountability placed on academic staff members for the ICT that they access or which is deemed as being most suitable for optimising the learning opportunities for students;
- There is a lack of any evidence of management or strategic direction;
- There seems to be a lack of understanding that a highly innovative pedagogy that is linked to ICT use in basic teaching aids could be more effective with regard to producing effective teaching outcomes than a technically advanced level of adoption that is disadvantaged by a poor pedagogy or poor learning designs and

- There would appear to be a lack of attention or even understanding of applicable theories which may assist staff in applying the appropriate technology for their subject and their classrooms as well as a lack of appropriate assistance in encouraging progress in ICT adoption.

5.1.2 Adoption of ICT in teaching and learning

The second sub-question in this area asked 'how do the academic staff of COE use ICT?' This can be seen as an extension and more detailed scrutiny of the results on availability and accessibility in Section 5.1.1, which ended with a proposition that there is a distinct lack of management and strategic direction in the pursuit of ICT. This may also be found through the lens of adoption rates as enumerated from the quantitative survey and the narrative accounts. Chapter 2 identified a number of barriers to adoption – for example, while there were shared commitments concerning adoption generally between trainee teachers and their instructors, the reality is that academic staff would only use those with which they themselves were comfortable and familiar with and, in this sense, the most significant potential barrier to ICT adoption were the instructors themselves (Johnson & Liu, 2000), who are effectively confronting issues described in the concerns based adoption model and TPACK. On the hand a significant number of the academic staff are within the first stage of concern, where they are either indifferent to the initiative or are grappling with how ICT can best be used or, on the other, are within an environment which does not acknowledge the extent of the challenges being faced in ICT adoption. With regard to studies specific to Saudi Arabia (e.g., Almuqayteeb, 2009), more emphasis is found with regard to a potential lack of understanding of the potential benefits of ICT adoption rather than absolute resistance, which further supports the contention that key elements of studied theories are being overlooked.

Some sense of the lack of resistance but with perceived levels of competence driving the extent of adoption by academic staff members at Al-Jouf University can be seen as the results of the questions from this area of the quantitative study are unravelled. For example, almost half of the participants (48.8%) stated that they used their computers on a daily basis, and with only 1.8 per cent reporting that they only used it a few times a month (see Table 4.4). However, when the results from Table 4.5 are overlaid on these, the nature of such apparently extended use becomes

clearer, where only 2.4 per cent stated that they never used the Internet. The vast majority (83%) stated that their Internet visits were less than 60 minutes, and 47 per cent of all participants stated that their visits were less than 30 minutes. These levels of use may be due to more superficial information and course content gathering or extensive research that would represent optimal Internet appreciation with regard to student needs. It also begs the question of whether such short visits would also be reflected in those by students when they are studying and learning through experiencing and doing. Fundamentally, it opens the possibility that there is a culture that exists in some departments where the Internet, as an extremely important tool for learning, is not being sufficiently used either by staff or students and this, in turn, discourages further ICT adoption and use. Based on the wider results, it may be the case that academic staff at Al-Jouf are remaining within their comfort zones in terms of ICT use, which for the significant majority, is a basic level of use and application, consistent with findings of other sections of this study and with other studies undertaken at Saudi Arabian institutions. A further, and perhaps more worrying, possibility is that this is a teacher training establishment but most of the academic staff themselves, unlike their students, only see value in basic use. They remain within the practices and uses that they were themselves educated within, so this study therefore supports a notion of there being a 'generational gap' as highlighted in the work of several writers (e.g., Almuqayteeb, 2009). From a theoretical perspective, it can again be argued that there is no impetus either from the top down or bottom up (Collis and Moonen 2001) in some departments, while in other it is coming from the bottom up if there is sufficient desire for adoption within these departments.

Some clues that may assist in answering these and similar questions may be revealed from a scrutiny of Table 4.6, which provides a broader range of Internet use by participants and the extent to which these uses occurred. This shows that for the purpose of communication (which may be considered as being a computer aid), a majority used ICT at least two to four times a month and a significant number (33.5%) used it two to three times a week. Similar levels of weekly use were also found in areas that are also likely to be aimed at using ICT as a classroom aid rather than as a cornerstone of the learning process: personal education, organisation of work, record keeping and lecture preparation. When it came to more adaptive and dynamic areas that would be likely to extend ICT use beyond basic levels, levels of

use are significantly lower. For example, only 1.8 per cent of participants reported that they posted assignments, project information or other lecture requirements on a weekly basis, 16.5 per cent that they sought digital learning resources and 21.3 per cent that they used ICT for teaching on a weekly basis.

Similarly, supportive findings can be seen from Table 4.8 with regard to the frequencies with which various hardware is used by academic staff for teaching. In this area, perhaps even more starkly, the extent to which ICT is used for classroom assistance rather than being integrated as a key part of the learning process is highlighted. For example, significant percentages (ranging from 25.6 to 37.8) of respondents reported using printers, laptop and desktop computers, whiteboards and projectors regularly in their teaching, but when it came to eight other areas, the range of responses with regard to regular use decreased to 0–14 per cent, with four areas (graphic tablets, MP3 players, iPads and mobile phones) indicating no regular use whatsoever. One noteworthy statistic, which may be indicative of some level of resistance even to the most basic of ICT uses, is that only 15.2 per cent of academic staff reported that they regularly used an overhead projector (although it is acknowledged that data projectors have largely superseded overhead projectors), and just 10.4 per cent that they used a TV monitor and DVD/videos on a regular basis.

A very similar picture emerges with regard to the use of software, with four types being used at significant levels of regularity (word processing and desktop publishing, internet browsers, email software and presentation software [PowerPoint] from 34.8 to 44.5%), while others were hardly used at all. The highest level of use among 12 categories other than the four noted were 8.6 per cent for databases and with three (drill and practice programmes, tutorial (self-learning programmes) and simulations).

The final part of this series of questions and the responses to them is with regard to the use of online services for teaching, which, if the examples and findings of researchers such as Coutinho (2006) are given credence, should be at the centre of innovated constructed learning scenarios. Using the criteria that two to three times a week and daily usage reflects significant use, Table 4.10 shows that the most frequently used part of online access was for email, followed by access to the university portal from laptops and using management learning systems such as Blackboard. While these may be seen as being predominantly for personal use or as assisting programmes for the preparation of classroom teaching, two areas of note do

stand out, namely the use of Internet access for learning management (Blackboard) to a lesser extent, and for participating in online discussions (chat rooms, groups). In these two areas, 23.2 per cent and 22.0 per cent respectively of survey participants reported usage levels of two to three times a week. If these were predominantly used for the benefit of students (and it is reasonable to assume that they were), then it is an indication of the beginnings of wider and more learning-focused ICT uses. This supports a concerns based adoption model and positions some of the academic staff within the fourth level of the second stage of adoption, but the next level, where there is cooperation and colleagues and a desire to seek further levels of adoption, appears to be something of a bottleneck in terms of the institution as a whole and somewhat dependent on th department concerned.

This point (alignment with concerns based adoption theory and contingency on moving to higher levels being adopted based on departments) is even more evident in the results of the qualitative study, where the findings, as may be anticipated, are more reflective of its exploratory nature, which suggests, with availability and accessibility, the delineations between departments and subjects that may exist between the staff members of the University. These separations into groups were brought to attention through the citation of narratives from two participants (see Chapter 4), one from the deeply ICT-committed staff member in Education Mathematics (P13) who saw technology within a constructivist learning approach as the only really useful way of teaching her subject and the contrasting but equally forcefully committed Science Education academic staff member who could not see beyond himself as being the class leader, could only usefully ensure understanding through an instructional classroom environment, and could only see ICT as a classroom aid and never as a replacement of any sort for himself. These and other points made within this section further emphasises the previously noted belief that a good pedagogical approach with basic but appropriately adopted ICT has the potential to be more effective than a poor pedagogy being positioned alongside a sophisticated and advanced level of ICT adoption, as is supported by the TPACK model and with Collis and Moonen (2001), where the level of adoption and the nature of adoption should be properly aligned with the subject and with the pedagogical arena in which the subject is best positioned.

Indeed, it can be suggested from the wider results of the narrative data that the differences between departments and subjects comes even more strongly into

focus when the area of adoption is analysed. The further separation between subjects and departments is also quite distinctive. For example, the two participants from computer education strongly stated that ICT adoption had been taken as far as was possible with regard to the learning environment and that it was being used at innovative and advanced levels. Furthermore, both of these participants, as previously noted, self-reported themselves as having advanced ICT skill levels and with very high levels of ICT usage in their teaching. Both, furthermore, were evaluated as having very positive attitudes towards ICT. Although one of the two participants who taught Mathematics Education self-reported herself as having medium and intermediate levels of skills and ICT adoption in teaching, her narrative belied this, suggesting that these were actually at much higher levels. Thus, she and her male colleague in Mathematics Education can also be seen as having high and complex levels of ICT adoption within their teaching frameworks and both were evaluated as having positive attitudes with regard to ICT in terms of adoption and teaching. Almost exactly the same can be said of the one participant from Educational Technology, whose approach towards ICT and its adoption was evaluated as being very positive.

These very positive results within three subject areas then begin to blur and fade towards levels of mediocrity before becoming somewhat indifferent and even negative in other subjects areas and departments. For example, of the two participants from Science Education (P6 and P12), one reported high ICT skill levels and the other moderate ones, but both qualified their commitments to ICT adoption in terms of it being used as a 'teaching aid' and as it being introduced to its levels of perceived usefulness. Both participants, furthermore, were evaluated as being 'moderately positive'.

As the subject areas move towards the Arts, Humanities and Physical Education, so the ICT adoption levels decrease; for example, with regard to Curriculum and Instruction, P5 and P14 expressed their adoption levels as being 'medium' and 'limited', while P7, P8 and P9, whose subject areas are Educational Psychology, Art Education and Physical Education, respectively, expressed that they had low levels of ICT adoption and reluctance or resistance to it. These participants were evaluated as being neutral, neutral and quite negative towards ICT use and adoption. For the final subject areas, Islamic and Arabic Education, P10 and P15 were arguably the most negative in terms of ICT adoption. The former stated that he

had adopted the minimum that he felt he could get away with and the latter expressed resistance to it. These participants were respectively evaluated as being negative and mildly negative.

These results may suggest that when the surface is more deeply scratched, the façade of enthusiasm, which has commonly emerged in studies that use quantitative surveys, is seen for what it is. Thus, the qualitative results in particular from this study can be seen in contrast to the findings of, for example, Webb (2007) and Nyirongo (2009), where the reasons for a relative lack of adoption were consistently blamed by staff on institutions and a lack of institutional support. This also suggests that in some departments it is not sufficient to assume that initiatives will come from the bottom up and that appropriate intervention could be usefully made (Roach et al 2009), but that these should come from the wider institutional level because they are not forthcoming from some departments.

Thus, it can again be seen that the quantitative survey has found and enabled the exploration of areas that can be contextualised and even refined from the qualitative interviews. In terms of findings, it is proposed that there is, in a general sense, a gulf between the use of ICT by academic staff members that can be seen as being an aid to teaching and which is, for many, within their 'comfort zones,' while more complex and innovative uses are, to a much greater extent, avoided. Having said this, and based on the finding that significant numbers of participants are using the Internet for learning management and, even more importantly, for online discussions with and between students, may be seen as being an indication that there are moves, in accordance with Rogers' (2003) theories regarding innovation adoption, from the period of innovation/early adapters and towards the 'early majority.' The further significant finding that emerges from this as well as the previous sub-section, is the extent to which there are departmental and subject differences concerning ICT adoption, the levels of that adoption and the attitudes towards it. This may be seen as a useful additional area of analysis and findings that have been enabled by and which provide further justification for the mixed methods approach that has been used in the study. They also suggest that while the theory of Rogers (2003) may be seen as useful in terms of a general approach to innovation adoption, the uniqueness and complexity of ICT suggests that the application of other theories and methods are necessary for the process to move beyond some obvious bottlenecks.

These points can be summarised by stating that it is likely that at Al-Jouf University the following can be concluded or at least inferred with regard to the adoption of ICT:

- There are strong similarities in attitudes towards ICT adoption within departments and subject areas.
- There are sharp contrasts and differences in attitudes towards ICT adoption between departments and subject areas.
- There is a generally clear distinction between basic ICT adoption in terms of it being seen as a teaching aid rather than as a key part of the teaching/learning process.
- These levels of usage are strongly connected with the self-perceived ICT abilities and confidence levels of staff members.
- Despite these distinctions and connections, there is some evidence in some areas of moves towards levels of adoption that go beyond basic and 'teaching aid' parameters among a reasonably significant minority of academic staff members.

5.1.3 ICT skill levels

The third sub-question asked 'what level of ICT skills do the academic staff of COE at Al-Jouf University possess?' While not dealt with as a specific area in Chapter 2, the skill levels were seen to be at the root of some of the other factors that were discussed in the literature. Thus, while issues such as attitudes and relative positiveness towards ICT were considerably addressed, numerous authors explicitly or implicitly stated an understanding that skill levels were an important influencing determinant of ICT adoption (e.g., Klassen & Chiu, 2010; Moseley & Higgins, 1999). These points were also strongly reflected in studies of Saudi Arabia, where the issues of skill levels and self-efficacy were pertinently highlighted (e.g., Al-Asmari, 2005; Braak, 2001).

It can be suggested that the relative lack of direct attention paid to skill levels in the Literature Review, while it was a strong and consistent theme across the chapter, is reflected in the quantitative survey. The fundamental reason is that the only way of eliciting, assessing and considering the levels of skills was to ask the participants. The extent to which these statements are reflective of reality may be

possible to ascertain through a scrutiny of the qualitative narratives. Thus, Table 4.11 shows that the majority of participants, and therefore the largest segment (39.6%) of academic staff members at Al-Jouf University, self-described themselves as ICT beginners. The second largest category is advanced (25.6%) and then intermediate (19.5%). An insignificant minority (3%) self-described themselves as being ICT non-users. This can be interpreted as being a potentially strong explanatory factor in the clear contrasts that appear to exist in terms of differences between a minority of academic staff members in a minority of departments and subject areas who use ICT innovatively and as a key teaching/learning component and a majority of staff members, departments and subject areas among whom it is used at basic and 'classroom aid' levels only.

However, it is important to consider the relative accuracy of this self-reporting and it can be recalled that the narratives of two participants from the qualitative interviews raised doubts about their actual abilities and their interpretations of their ICT abilities. For example, P13 self-evaluated herself as being at an intermediate ICT skill level and a medium-level adopter, but when probed by the researcher, she articulated her beliefs and approaches to ICT and constructed learning to be high, particularly when cross-referenced with her descriptions of how she used ICT within her learning environments. Conversely, P6, who self-rated himself at the same level as P13, demonstrated the accuracy of that self-assessment by describing an instructional approach to teaching and demonstrating a clear reluctance to see ICT as anything more than a classroom aid.

There must be doubts about the accuracy of the self-reporting of skills, although this is often not discussed at any length in other studies, where it seems normal to accept the levels as they are stated. However, the use of self-reporting in research more generally has been questioned (e.g., Donaldson & Grant-Vallone, 2002). Based on the qualitative findings from this work, such an assertion may be seen as having some vindication. There may be a number of reasons for this, such as the differing levels of self-confidence and self-belief in respondents or even their backgrounds and relative age and experience.

With hindsight, it would clearly have been beneficial to have explored skill levels more intensely within the qualitative study but the most that this can now be is a recommendation for future work in this area. Conversely, it can be suggested from the limited narrative data available in this area that P13 was more the exception and

P6 more the rule. Therefore, the skill levels stated should not be amended and the following summary of this sub-section can be made:

- Self-reported skill levels and attitudes towards adoption should be treated with some caution because they have some dependency upon the levels of self-confidence, which will be different across individuals
- Based on the self-reported skill levels from this study, and assuming some level of general accuracy, the fact that the largest group are stated as being ICT 'beginners' while the second largest is stated as being 'advanced' provides some explanation for the differences between factors and attitudes discussed in other parts of this chapter.
- However, the relative importance of this factor remains open to debate.

5.1.4 Academic staff attitudes towards ICT in teaching and learning

The fourth sub-question of Research Question 1 asked 'what are the attitudes of academic staff' of COE at Al-Jouf University towards ICT adoption in teaching and learning?' Although related to the previous sub-questions, this area can be seen as a key driver for dynamic innovation and change on the one hand or for stagnation and indifference on the other. This is of particular importance because not only is it a potential driving force for adoption and pressure to ensure availability and accessibility but can also substitute for, indeed render relatively unimportant, a lack of management and strategic planning, as was one of the findings from Section 5.1.1. Conversely, if attitudes are conservatively for maintaining the present status quo and resisting change, this makes factors such as a lack of management and strategic planning a very important institutional failing.

Unlike variables such as levels of skills, this area had far greater potential for exploration in both the quantitative survey and the qualitative interviews and resulting narratives. Thus, 13 items from the questionnaire are related to this part and summarised in Table 4.12. It was also relevant in this area to utilise a five-point Likert scale, with responses ranging from strongly agree to strongly disagree. A general summary of the results is that they reflect positive attitudes towards the adoption of ICT. While there are some relatively important scores within the neutral mid-point, furthermore, in none of the categories did it represent the majority view and it therefore may be that this choice was not overly used as a safe haven to avoid

expressing an opinion. Thus, it is most likely to be reflective of a lack of skills and knowledge upon which to form an opinion and unlikely to reflect any fears that the participants may have had in revealing the opinions and values – reflective of confidence in the integrity and ethical status of the study.

The extent of the positive attitudes expressed can perhaps be seen by the fact that the most strongly agreed with statement is that 'I feel that ICT can have a positive impact on the way we teach', where 64 per cent of participants strongly agreed. However, aligned with this, the second most strongly agreed with statement is 'I would use ICT in my teaching if I was given some incentive to do so'. Several questions emerge from these statements – of positive attitudes on the one hand and of requiring incentives on the other. Indeed, this requires an understanding of what is interpreted by staff members as being an 'incentive'. As will be seen below, 'incentives' are seen as going beyond tangible rewards by academic staff members and very much include factors such as time, training and recognition as well as evidence that ICT can improve the learning of students. This is of great potential importance because it may be interpreted to mean that at least some of the apparent resistance identified from other areas scrutinised in both the quantitative and qualitative studies is based more within areas such as a lack of training and a lack of understanding of the potential benefits of ICT in education rather than in some intrinsic and deep-rooted disdain for ICT *per se*. If this is the case, it supports some findings from other studies conducted within this field and which were discussed in Chapter 2, namely that while significant constraints may exist, there is a recognised desire to embrace ICT and e-learning (Alkhalaf et al., 2013).

Further results from the 13 items of the questionnaire that are concerned with attitudes of academic staff members towards ICT may provide further support for this underlying enthusiasm for ICT use, though they were not so strongly expressed. For example, 50 per cent strongly agreed that ICT is a valuable teaching resource and the same percentage that it is useful for the engagement of students and interactions with and between them, while only 2.4 per cent and 1.8 per cent respectively disagreed with this proposition. This may support a proposition that the vast majority of academic staff at Al-Jouf have a belief in ICT. However, when combined with other findings, such positive attitudes could be due to a belief that 'ICT' means use as a classroom aid rather than as an intrinsic part of teaching and learning. Areas where less positive certainty was expressed included whether ICT

would be adopted if a proven need was demonstrated for it. However, in this case while only 1.2 per cent strongly agreed, 65.9 per cent agreed, which may reflect a lack of self-confidence rather than less intrinsically positive attitudes. This is because there is an implication of commitment without first having acquired the necessary levels of skill to enable such adoption, a possibility that is endorsed by the responses to the first item in this section where the proposition was that the respondent is interested in learning how to use ICT in their teaching and where 84.1 per cent either agreed or strongly agreed while only 4.8 per cent either disagreed or strongly disagreed. As may be the case with regard to a self-evaluation of computer skills, self-confidence could be a fundamental barrier and it would seem that further implicit support for this comes from item 7, which despite the fact of finding more positive than negative support in response to the proposition that the participant felt comfortable in using ICT in their teaching, was more evenly balanced, with 56.7 per cent agreeing or strongly agreeing, 23.9 per cent either disagreeing or strongly disagreeing, and with a relatively high neutral element of 19.5 per cent.

The results from the items regarding attitudes may have some connectivity with staff training and development and are discussed at greater length in the next section, while this one continues by referring to the results from the qualitative part of the study. In Chapter 4, a part of the narrative from P5 was used to exemplify the fact that participants had made strong connections between attitudes and the extent to which the institution and other influences fundamentally enabled the adoption and appropriate use of ICT; in other words, the attitude will spring from enabling mechanisms such as providing time, providing the right training and by rewarding ICT achievements and the results that spring from them. This, surely, emphasises a finding from Section 5.1.1 of how Research Question 1 should be addressed, namely, that a lack of management and strategic direction is a serious barrier to ICT adoption and its diffusion at the University.

A further point, which has been a consistent theme throughout the analysis from the qualitative part of the study, is the distinctiveness of the differences that exist with regard to attitudes at departmental and subject levels. Rather than repeat findings that have already been made clear in this area, it is perhaps of greater use in this final sub-section regarding Research Question 1 to draw attention to one area of Chapter 2 and to the point made that studies that are focused on one subject or departmental area (e.g., Al-Sarrani, 2010) and science, are likely to produce results

that are very different to those of wider and more subject and department studies, carried out at an institutional level. Thus, it can be recalled that Al-Sarrani (2010) found that professional development and time were probably the most important barriers for staff in science departments, with no significant differences based on characteristics. Wider studies (e.g., Al-Wehaibi, 2008) found a range of further barriers as well as significant differences based on characteristics such as teaching experience, age and gender. Significant differences were also found based on the department and academic discipline of academic staff, something that has found strong endorsement within this work. The point, of course, is that one important element within the results and analysis of a study is the extent to which they can be aligned with or differ from other studies which, if the former is true, enables the differentiation and cementation of building blocks towards a common view which may enable firmer and more convincing conclusions and recommendations.

Assuming the relative accuracy of the findings discussed in this section, the issue in general terms appears not to be one of enthusiasm but to an intrinsic unwillingness on behalf of some participants to adopt and extent ICT use in their classrooms. Again, resonance with theories of ICT adoption can be seen, for example a lack of feedback from students that would vindicate the positiveness of students towards ICT use and provide a strong motivational force for continued ICT development (Wankel and Law 2011), a lack of interventions in terms of peer involvement, observation and feedback (Roach et al 2009) and the challenges that are inherent in ICT adoption and therefore how attention should be paid to its alignment with subject and pedagogy (Mishra and Koehler 2008).

These points aside, there are a number of possible reasons for the finding of interdepartmental differences), which seem to be stronger in this study than in others. It may be, as has been noted above, that sub-cultures have evolved in separate departments at this university to a greater extent than at others, and these cultures determine the ‘group’ approach to ICT adoption to a greater extent than any influences that come from the outside of them. A further possibility is that ICT use and adoption requires a certain level of English competency, which may not be a requisite for the teaching of Arabic and Islamic Education. It could also be that the leadership of a department may be important, or a combination of factors that are relatively unique to Al-Jouf University.

Returning to the analysis of the sub-section of the analysis, it can be held that the attitudes of staff members at Al-Jouf University with regard to the adoption and use of ICT have an underlying positiveness but that this is influenced by levels of self-confidence and by the extent to which institutional support helpfully exists. It is also influenced by the departmental and subject environment in which the academic staff members are positioned. These points can be summarised by suggesting that:

- attitudes are generally positive among academic staff members at the University,
- self-confidence is a strong underlying factor that drives attitudes towards the adoption and use of ICT,
- a lack of English among some faculty members could be an important inhibiting factor that warrants further research, and
- there are clear differences between levels of self-confidence based on self-perceived skill levels between subjects and departments

5.2 Research Question 2

The second research question asked 'What are the factors that have an impact on the use of ICT by academic staff in their teaching and learning?' There are numerous potential factors that may have an effect in this area and these were crystallised into incentives and barriers as well as into two key sub-areas, namely ICT training and ICT policies.

5.2.1 Incentives for ICT adoption and use

The thrust of the questionnaire items that deals with incentives is not so much on those that exist but, rather, on those whose implementation and use would be most likely to provide a positive impetus for the wider adoption and use of ICT by academic staff members at the University. Thus, participants were effectively asked to express, again on a 5-Point Likert Scale, the extent to which 20 areas were perceived as providing an incentive for the adoption and use of ICT. As might be expected from dedicated staff, the most strongly perceived incentive was evidence of improved student learning, where 78.7 per cent of participants strongly agreed and none either disagreed or strongly disagreed. Thus, academic staff are driven to the greatest extent by results of ICT success but, of course, this in turn is driven by the

extent to which the sight of evidence is possible, which in turn is driven by the extent of use. This finding can be seen as being very important because if the majority of staff are driven by student success in terms of ICT adoption but there is a general lack of adoption, the impasse is likely to be a lack of knowledge concerning student feedback, which is an important element of the 4E theory proposed by Collis and Moonen (2001) and which is empirically supported by research such as that undertaken by Wankel and Law (2011). As it has been at least implicitly seen, furthermore, there are sharp differences between attitudes and adoption rates between subjects and departments and they may therefore be seen as 'silos' within which there will be an environment of engagement, adoption and further innovation and use as the positive results of ICT use become clear, or an environment of relative indifference, where the lack of seeing positive results means that the primary incentive for adoption and for an impetus for further use does not substantially exist. This suggests that one area which with hindsight may have been useful would have been whether there are different levels of student feedback obtained between departments and/or different levels of interactions between staff and students.

By positioning further results from this part of the quantitative survey against such a background, a net of causation or non-causation incentives emerges. For example, the next four perceived most important factors with regard to incentives were the availability of equipment and resources, available training programs and support, available classroom technology infrastructure and recognition through some form of rewards for innovating with respective strongly agreed percentages of 75.6, 69.5, 67.7 and 65.9 per cent. However, we have seen (see above) that the extent of availability is strongly connected with the ICT abilities and skill levels that are self-perceived by academic staff members and that these exist at subject and department levels to a greater extent than at individual levels. Thus, while these important factors have been identified, the key variable that is most likely to affect them and motivate change, improvements in student performances as a result of ICT use in learning and teaching, is in turn likely to be dependent upon the environment that exists within departments and within subject areas, a finding that is supported by Collis and Moonen (2001). Such a proposition finds further support from Item 2 from this section of the survey, which found that 60.4 per cent of participants strongly agreed that support and encouragement from the faculty would provide an incentive for the wider adoption and use of ICT in teaching and learning, and from

Item 3 which found that 69.5 per cent of study participants agreed or strongly agreed that support and encouragement from peers would provide an incentive, again a finding which is supported by theory, for example in the second and third stages of the concerns based adoption model as set out by Roach et al (2009). While other areas such as personal computer skills and reduced teaching loads featured relatively strongly as potential incentives, one area in which there was almost no agreement that it would be an incentive is in the setting of ICT implementation standards by the institution or departments within it, where only 1.2 per cent strongly agreed and 77.4 per cent (tactfully perhaps) remained neutral.

This latter point was particularly emphasised in the results from the qualitative study, where the narratives of three participants, P1, P3 and P10 were used as examples of the more expressive nature of these participants with regard to the institution. Thus, rather than a predominantly 'neutral' stance, they felt more freedom in expressing the perception of a lack of institutional support (see Chapter 4). Another feature that emerged from this, apart from the common theme that permeates all of the qualitative findings (the clear distinctions between departments and subjects), is frustrations felt with a lack of support from IT, highlighted in the narrative cited from P11.

A number of possibilities emerge from these findings. With regard to the lack of support for the setting of implementation standards or criteria by the institution, this may be seen as a part of a 'blame game' that academic staff adopt in that many do not implement but would be likely to be resistant to efforts to effectively insist that they implement. Conversely, there is strong support for implementation if evidence of enhanced student learning is in evidence from it. The possibility is that this comes down to reluctance that is based on a lack of ability, which is the fundamental blockage at a departmental level to a greater extent than at a personal one. The alternative possibility is that the responses are strongly influenced by perceptions of what would be satisfactory responses that expressed enthusiasm for ICT adoption based on improved student performance, which are less than true expression of real values and opinions. This possibility gains some support when the qualitative results are taken into account. Support for the findings also gain support across a range of theories, for example an expectation of an institutional lead that is lacking may suggest a culture that prefers a top down approach but this is not being provided at an institutional level (although this may not be the case at a departmental

level in some instances), a lack of appropriate training and a lack of peer collaboration as well as the lack of a system that provides adequate feedback from students.

In summary of this section and of Research Question 2, it is posited that the areas where incentives could most fruitfully and usefully be provided are:

- Evidence of improvements in student performances as a result of ICT adoption and use.
- The availability of ICT in classrooms.
- Support and encouragement from departments and colleagues.
- The environments within departments and subject areas.
- Changing the nature of institutional support from negative to positive associations with the adoption and extended use of ICT in teaching and learning.

It would be difficult to describe, based on an analysis of the findings, the institution as an incentive rather than as a barrier, but it is perhaps sufficient to suggest that while it could provide incentives, it is perceived more as a barrier (see Section 5.2.2).

5.2.2 Barriers to ICT adoption and use

While barriers and incentives may be seen as being connected in the sense that the removal of a barrier de facto must be an incentive, the nature of the items from this section of the survey were aimed at gaining a better understanding of the factors that participants saw as blocking their adoption of ICT as opposed to the areas where positive changes could provide incentives, as was the case with the previous section. A total of 14 were identified and used and the most formidable barrier, based on the strongly expressed agreement of participants (71.3%), was a lack of time for learning about new technologies (Item 4). In an associated way, the next most strongly perceived barrier was the increased workload that they believed to be involved and associated with a wider adoption of ICT (67.1%). Further significant barriers included a lack of training options (64.6%), a lack of technical support (63.4%) and a lack of institutional support (57.9%). The finding that increased workload was a significant factor is an interesting one for several reasons. One is because it was less pronounced when values and opinions were explored

more extensively within the qualitative interviews and, perhaps more importantly, it was not held as being a factor within that part of the study by participants who had already extensively adopted ICT and comprehensively used it within their teaching and learning environments. This would support a belief that ICT and constructivist learning would, if anything, reduce workloads because the tools and the approach is to facilitate the learning of students rather than to instruct them. On the other hand, it may be argued that there is an inevitable period of time while the academic staff member is developing his or her ICT skills and learning to use them within a constructed learning environment. In this sense, the barrier is not a permanent one but, rather, is one that could be removed by the provision of time and appropriate training for staff for a limited period, something that could be closely associated with the development of a relevant strategic plan and with appropriate management approaches.

With regard to the scrutiny of existing works carried out in Chapter 2, it is noteworthy that while it was speculated that time and workload constraints would be likely to be significant factors, there were few, if any, specific findings which endorsed this view, nor has the possibility that an understanding of future time savings once the initial time investments have been made been explored. There may be several possible reasons for the intuitively rational belief that academic staff would be likely to be constrained by time and by workloads in their adoption and use of ICT. These include the possibility that in previous studies both in Saudi Arabia and further afield there has been reluctance by staff to admit to such constraints or they wished to deflect any ‘blame’ by pointing towards institutional deficiencies rather than on themselves in not being able to properly manage their hours. There is a possibility that these factors were generally not held as being significant in a range of other studies but this, it is believed, is unlikely.

This point can be supported when the third, fourth and fifth most important barriers as expressed by survey participants in this study are taken into account, namely lack of training, lack of technical support and lack of institutional support. Here there are a host of works supporting these (relatively less important with regard to the findings of this study) factors. In the wider world, a lack of training and personal development was found to be an important factor by Carroll-Barefield et al. (2005), Drent and Meelissen (2008), Afshari et al. (2009), Mumtaz (2000), Chizmar and Williams (2001) and Ertmer and Otternbreit-Leftwich (2010). Support for the

finding of a lack of institutional support was found in the works of McLean (2005), Wong and Li (2008), Sahin (2006), Derue et al. (2011), Gronn (2002), Chizmar and Williams (2001) and Khan et al. (2012). Evidence for a lack of technical support as a barrier to ICT adoption is given in Sahin (2006). With regard to studies specific to Saudi Arabia, a lack of technical support as a barrier was found by Almalki and Williams (2012) and Al-Ghonaim (2005), a lack of training by Almuqayteeb (2009), Braak (2001), Al-Ghonaim (2005) and Almekhlafi & Almeqdadi (2010), and a lack of institutional support by Al-Harbi (2010). A lack of support in these areas can also be seen in the theories focused on ICT adoption, for example Roach et al (2009), Koehler and Mishra (2009) and Collis and Moonen (2001).

These important points aside, and apart from the finding of a lack of ICT support and infrastructure (as has been found within other sections), one finding of further interest is that the only area where the 'strongly disagrees' outweigh the 'strongly agrees' is in the lack of contribution by ICT to promotion and tenure. This supports an earlier finding (see above) that academic staff members are less inclined to seek tangible rewards for the introduction of ICT and more inclined to be motivated and likely to support further adoption and innovation when they perceive that ICT is having a positive effect on the learning development of their students. Such a belief could be supported by gaining evaluative feedback from students – if the students themselves are given opportunities to support higher levels of adoption by staff members, and if they themselves perceive that their learning could be improved by such adoption, this would surely add to the motivations for staff members (who in the majority are motivated towards ICT if it helps in the learning processes of their students), a point that is in alignment with the 4E theory of Collis and Moonen (2009) and other theories.

If the fact of a perception of a lack of time is a true reflection of attitudes and belief, it may be that a significant change could be made in terms of adopting ICT by providing a temporary period for all staff where their time would be mainly focused on development and training in ICT. However, when other factors regarding the lack of adoption are taken into account, it is likely that single solutions such as this one would not be effective because it may be that the resistance and lack of adoption would remain deeply embedded within departmental cultures.

The analysis of this sub-section has found some interesting and potentially important points. One is that there is a 'block', a significant barrier that is caused by

the perception of extra work and time that is needed to develop ICT classroom skills to the point where they are conducted with ease and expertise, so that academic staff members can become efficient users and adopters of it. Another is that staff members in the majority do not seek tangible rewards such as promotions or enhanced tenures but, rather, that they are more inclined to gain satisfaction through seeing improvements in the performance of their students following the adoption and innovative use of ICT. In summary, the barriers to the adoption of ICT are:

- That the perception and strength of barriers is often related to the departments and subject areas of academic staff members
- That those whose skills and self-confidence are relatively weak perceive a barrier in terms of time commitment to developing ICT skills and an intolerably increased workload associated with it
- That the motivation for adopting and innovatively adapting ICT lies to a greater extent in seeing improvements in the learning of students as a result of adopting and innovating that in the seeking of tangible rewards through promotion and enhanced tenure contracts.
- That the barriers of training, technical support and institutional support, while they exist to a significant degree, are less important at this university than time and workload constraints.

5.2.3 ICT policies

The lack of coherent management and strategy direction has been previously discussed (see above), as has the fact of ambiguities concerning whether all academic staff members have access to ICT hardware and software or whether this is formally or informally restricted to specific departments, subject areas and individuals. This sub-section does not seek to understand the ICT policies of the University but, rather, to better understand the areas where useful strategies could be developed. Six areas were within a high level of importance ratings by the survey study participants, and in a range from 86.5 to 98.7 per cent. These areas included technical support, the availability of ICT resources, the provision of time and a well-defined University goal for ICT. Two areas of relatively less concern are increased levels of funding and the holding of meetings and conferences to promote

interdisciplinary collaboration. One further and very indicative finding of importance is that 79.3 of participants were not aware of ICT policies.

Beginning with this finding, it can be described as one that was not supported by other works (nor by theory), either because the question was not asked or academic staff did have a high level of awareness of ICT policies in other studies. If this is the case, then the finding is not only significant in itself but also again highlights the value and necessity of studies that focus on individual institutions and where extrapolations and generalisations are not made.

The latter point regarding collaboration suggests that there is a lack of connectivity between departments and subject areas, a theme that has permeated this chapter. The fact, furthermore, that six key areas were identified where useful strategies could be developed, suggests that there is a perceived lack of strategic direction and management in ICT policies generally, factors that were found to be commonly cited as reasons for relative ICT failure in Chapter 2 – for example, Howell (2007) with regard to institutional leadership, Alev (2003), who contrasted generally positive attitudes among staff with generally negative ones among institutions, and the lack of leadership support found by Shamaoil (2005). While less pronounced within a specifically Saudi context, similar findings were articulated by Al-Ghonaim (2005), who found key deficiencies in the provision of training and technical support, and Aleklett et al. (2010) who found that the lack of provision and support were strong potential weaknesses that could blunt the enthusiasm of academic staff members. Even relatively small initiatives, such as the show-casing of outstanding examples of ICT use in teaching, would surely be useful in showing some level of support which could contribute to the re-sharpening of enthusiasm.

With regard to the qualitative study, while this area again supported the perception of divisions between subjects and departments and the individuals within them, it also supported the findings of the quantitative survey, providing a more detailed refinement of the views expressed. For example, P5 spoke of a political agenda within the University and of the lack of a workable strategic plan or direction which was a strong inhibiting factor, and one which gave an impression of wanting something for nothing – expecting much from the existing staff but being unwilling to provide the necessary human and other resources to enable the effective adoption and development of ICT within classrooms. This was strongly reiterated by other participants, for example P1, a very positive supporter and user of ICT, spoke of

there being a lack of coherent ICT policies and that those which there were being difficult to understand and the similarly ICT friendly participant, P2, also speaking of incoherence and P3 of the policies lacking clarity.

In summary of this sub-section and in terms of useful strategies that could be developed, therefore, these should be in the areas of technical support, the availability of ICT resources and the provision of time. Most importantly, however, they should provide well-defined goals, have clarity and purpose and be indicative of a clear and rational strategic direction that is supportive of academic staff members. Thus, ICT policies should be aimed at providing:

- Technical support, the availability of ICT resources and the provision of time
- A clear and rational strategic direction that is supportive of academic staff members

5.2.4 ICT training

With regard to the provision of training, this theme figured in several sections of the survey questionnaire and is summarised by the inviting of responses to an item that asked whether it should be more comprehensively provided. These were quite clear, with 92.7 per cent of participants indicating positively that they had received training and only 7.3 per cent giving a negative response. The interest and significance within these response rates is that they were given despite other responses (see above), which expressed concerns with regard to time constraints and workloads, and despite the fact that a majority of participants (see Section 5.2.2) identified a lack of training as being a barrier to ICT use and adoption. Thus, the perceived need for more ICT training overcame, for the vast majority, these other potential constraints. The results from the qualitative study in this area generally supported these findings and also found an association between a relative desire for ICT training and wider attitudes towards ICT. For example, P9 was evaluated as being negative towards ICT adoption and innovation and stated that he was not interested in being trained in its use.

The extent to which participants indicated that they had received ICT training is, at 92.7 per cent, revealingly high. With regard to the expressed preferences for methods of training, it can be seen that the most preferred is workshops (constructed learning), followed by general courses and specific software courses. The notion that

constructed learning is the most useful approach to ICT training and learning is supported by several studies (e.g., Klassen & Chiu, 2010; Moseley & Higgins, 1999; Yidana, 2007) as well as in the wider experiential sense by Olsen (2008). The finding concerning levels of ICT training received, however, is at odds with the majority of findings from the Literature Review (see Chapter 2); for example, Drent and Meelissen (2008) identified a greater need for ICT training particularly in teacher training environments, and more general findings of writers such as Carroll-Barefield et al. (2005), Drent and Meelissen (2008), Afshari et al. (2009), Mumtaz (2000), Chizmar and Williams (2001), Almuqayteeb (2009), Braak (2001), Al-Ghonaim (2005), Ertmer and Otternbreit-Leftwich (2010) and Almekhlafi and Almeqdadi 2010), as noted in Section 5.2.2. However, while a lack of training and support for training has been consistently found in other studies as something that is lacking, it was not the most significantly cited reason for a lack of ICT adoption and use. Therefore, while this may be seen in contrast to the findings of this study, the contrast is relative, particularly when the more refined consideration is made (as is made here) with the effectiveness of the training received, which explains the otherwise contradictory finding that 92.7 per cent of participants had received ICT training while a majority still identified a lack of training as a significant barrier to ICT use and adoption. Based on a theoretical approach in terms of this and other studies cited in this section, the possibility exists that to focus on training in a general sense misses several important points. These are that ICT is too complex an area to be seen as something that may be 'solved' merely through instructions in use (Koehler and Mishra 2009), that guidance and coaching as well a peer collaboration may be a more useful approach (Roach et al 2009) and that workshop approaches within a constructivist paradigm and based on student feedback may overcome bottlenecks to progress.

In summary of this section, it can be proposed that:

1. The majority of study participants have a positive belief in ICT training despite time and workload issues
2. The issue is less about having received training and more about the nature and suitability of that training
3. A small minority of academic staff members who have negative attitudes towards ICT generally appear to have a complete lack of interest in being trained in its use.

5.3 Strategies to Promote ICT Use

The third research question asked 'What strategies need to be implemented by the University in order to assist academic staff to adopt ICT in their teaching and learning in order to meet the needs of students in the digital age?' Although time constraints have figured prominently across the findings of the study, it is interesting to note that it was only the fifth most articulated useful strategy for ICT implementation, with training, technical support, the availability of ICT resources and the provision of rewards and incentives being more highly regarded. It is also noteworthy that more funding and the use of conferences and interdisciplinary meetings were the least likely factors in strategies to support the adoption of ICT.

These findings also seem to be somewhat at odds with others; for example on the one hand academic staff expressed a strong belief that ICT support would promote use but relatively few of them actually use ICT beyond a basic level, and a level that would not normally need such a high level of support. Furthermore, while a training strategy was the most supported factor for developing strategies for greater use, other parts of the study have suggested that there are time constraints that would affect the amount and levels of training that could be taken up. It may be that these different findings suggest that staff are feeling a lack of direction, a lack of an overall strategic direction being taken by management. On the other hand, there is the possibility that at least some participants do not really feel as positively about such factors but felt compelled to give answers, a factor that may have come to the fore from the greater depth that was enabled through the semi-structured interviews and the qualitative study.

The points made in this sub-section can be summarised by noting that with regard to the promotion of ICT use among staff members:

- The most popular means of promoting ICT among academic staff members is training and technical support
- There may be underlying factors which suggest that strategies developed as a direct result for these findings, such as by providing more training and higher levels of technical support, may not on their own be as effective as the survey results may suggest.

5.4 Personal Characteristics and Demographic Variables

The fourth research question asked 'How do the personal characteristics and demographic variables (e.g., gender, experience, age and discipline) of the academic staff at al-Jouf University influence their ICT use and skills?' The previous chapter presented the results of cross tabulations undertaken and this section continues by considering the implications of these findings and how they compare or contrast with other studies. This can be seen as being an important part of the analysis agenda because, as has been noted, there may be more value and accuracy in using studies such as this, based as it is in one institution, as a building block towards a constructed national picture rather than in making assumptions and trying to extrapolate the findings from one or even a small group of studies to make generalised and sometimes intuitively erroneous causal explanations.

5.4.1 Differences in ICT skills based on gender

In what may be considered as a finding that endorses the previously made point, the results from this study with regard to gender differences in Saudi Arabia agrees with a majority but not with all of the work undertaken in this area and within that nation. It was found (see Table 4.19) in this study that differences in levels of ICT skills based on gender were small and that differences that there were could be explained by the small numbers of participants within each sub-group, by parameters used to make competency levels of judgment and possibly differing personality traits which may have affected the levels of skills reported rather than by any inherent differences. For example, while 60 per cent of non-users were female, only 47.7 per cent of self-rated beginners were within this gender category and the differences (57.1% male, 42.9% female) within the 'advanced users' group as well as within the 'expert' group (55% male, 45% female) broadly matched the overall sample numbers.

Such a finding agrees, as noted, with studies that conducted research across one or more institutions in Saudi Arabia (e.g., Al-Wehaibi, 2008) but not with those that had more restricted parameters, such as Al-Sarrani (2010), which was limited to science departments and not only found gender differences to be significant but also no significance in other areas that can be seen as being contrary to 'mainstream' findings. With regard to the wider part of the literature review, variant findings suggest that either the research was narrowly focused and therefore the results could not be generalised or

that gender differences may be more culturally based, as evidenced by the fact that Li (2004) found no differences based on gender from a study based in China, while Abu Samak (2006) did find such differences within Jordanian teacher training.

5.4.2 Relationship between ICT skills and age

The characteristic of age has received some attention in studies conducted in Saudi Arabia and may be associated with a 'generational gap' that was identified in the literature review as being a perhaps more pronounced factor than in other nations (e.g., Almalki & Williams,2012). Table 4.20 presents the results of cross-tabulations for potential differences between ICT skill levels being based on age and these appear to be quite significant. For example, there were no non-users below the age of 40, while there were five above that age mark and 60 per cent (n=3) were above the age of 50. Perhaps more convincingly in terms of numbers, 81per cent of beginners were aged over 40 (n=56), while only 13.9 per cent (n=9) were below that age. Only five academic staff members over the age of 50, furthermore, identified as being intermediate, 4 as being advanced and none as being expert compared with respectively 27, 38 and 20 who were below that age.

These figures can be seen as being strongly supportive of the views expressed concerning a 'generational gap' but it is possible that there may be another association that dilutes the age factor. This is where there may be a possibility that older staff members tend to be within departments and subject areas where the adoption and use of ICT is very low, while departments where it is high tend to have younger academic staff members. An analysis based on departments is presented below but first it is important to consider levels of experience as well as levels of age.

Apart from the relative importance of departmental differences, a theme which has permeated the findings and analysis of the study, it may be that the characteristic of age is important because those who are younger have not had their teaching styles embedded in earlier systems and ways of teaching, that they perceive ICT as being a part of the learning process naturally. Those who are older, on the other hand, have developed and grown in their teaching careers in a culture that did not use ICT and did expect and were expected to lecture and instruct. In these senses, it may be argued that attention to the possibility that pedagogy and subject are the predominantly ingrained aspects of teaching for some older staff members and that they are having difficulties in accepting ICT as a third and equally important paradigm. One analogy would be the ease with which a child can grow up with several languages and easily be fluent in all, while

a person who tries to learn and adopt more languages later in life has a far more challenging and slow road to such an achievement. Recognising ICT adoption and age in these terms and applying mentoring, teaching and peer cooperation as suggested in the concerns based adoption model may provide significant help in overcoming this important barrier.

5.4.3 Relationship between ICT skills and teaching experience

It is a rational assumption that in the main, and commensurate with findings from both the wider literature review and that which was specific to Saudi Arabia, the findings with regard to the teaching experience of academic staff members at Al-Jouf University and ICT skills would be related with those concerning age. This would indeed appear to be the case, with all non-users having more than 20 years of experience 61.6 per cent of those with more than 10 years' experience being classed as beginners but only a total of nine being classed as intermediate, advanced or expert (9.6%).

In a similar vein to the characteristic of age, it could be that those with more teaching experience have been within a relatively unchanging academic culture for so long that such a fundamental change, such a radical alteration of their approaches to teaching would be extremely difficult and whether consciously or sub-consciously, these more experienced members of staff resist such a change – they have difficulties contemplating it as a reality. Less experienced academic staff members, on the other hand, may feel comfortable with twenty-first century technology because for them it is the educational cultural norm. One question that could be asked from this is how that can be reconciled with the interdepartmental differences that have been observed throughout the study and this leads to the possibility that there is an age and experience differential between departments that are keen to adopt and those that are clearly less willing.

5.4.4 Relationship between ICT skills and teaching department

A consistent theme in the discussions and analysis within this chapter has been the extent to which there are significant differences in terms of adopting and innovatively using ICT by academic staff members. Table 4.22, which provides a cross-tabulation of the self-rated skills of staff members by department, provides some vindication for this discussion and, although there are studies that touch upon

it, it is contended that its relative importance is generally understated. A scrutiny of the table shows, for example, that all non-users (n=5) come from the two departments that were represented by participants P10 and P15 in the qualitative study and who were evaluated as having negative attitudes towards ICT (see tables 4.28 and 4.29). Indeed, for Arabic Education, of a total of 20 staff members, 18 (90%) self-rated themselves as beginners or non-users and out of a total of 18 survey study participants from Islamic Education, 14 were self-rated in the same categories. Conversely, there were no self-rated non-users or beginners in Education Technology and Computer Education and only six beginners in Maths Education. Other subjects are more evenly spread between these two extremes but one somewhat surprising result is the number of self-reported beginners from Science Education, a total of 11 (61%). The relative lack of ICT skills within science departments does have some resonance with the work of Al-Sarrani (2010), who found weaknesses in understanding the value of some areas of technology among staff members from such departments. This is also consistent with theories, for example TPACK, where technological content knowledge should provide an understanding that technology will have a different impact on each discipline. Therefore, choosing the nature and type of technology that will be used may constrain or better enable the types of content that is delivered.

The possibility was expressed in a previous discussion that there may be a relationship between age, experience and the department that academic staff members were within. It may also be the case, based on the findings from this part of the study, that while English proficiency is a requisite for some departments, it is not so in others. Bearing in mind that English is the common language used in many ICT programmes, this could also be a factor that cross-references with interdepartmental differences and may be a part of the causal explanation for a lack of adoption in these departments and among individuals within them. It may also be the case that some subjects are of a more technical nature than others, which means that staff members from these would naturally incline more towards ICT, while those from non-technical subject areas would naturally be less so inclined.

However, the data from this and the previous two sections does not enable a full analysis of whether there are connections with age, experience and the departments that individuals within the survey were assigned to but it is nonetheless held that the significant extent to which there are differences between departments

with regard to the adoption and use of ICT has been shown and is a vindication of it having been highlighted through the course of this chapter.

5.4.5 Relationships between level of ICT use and gender, age, teaching experience and department

The final four sets of findings are concerned with self-reported ICT usage in the same areas as were analysed with regard to self-reported skills. It would be anticipated that these would be similar in terms of significance as the findings from the previous four sections and this is, indeed, the case. It is held that this fact also provides some vindication with regard to the consistency of the data and therefore of its internal validity. For example, Table 4.23 shows broadly the same divisions between genders as there were participants of each gender and thus only minor differences, a finding that is consistent with Section 5.5.1. Similarly, Table 4.24 shows that very low and low levels of usage were predominant among the older age groups while usage for this group was very low or non-existent in the categories designated as high and very high use. The opposite was true for the younger age groups and this is commensurate with the analysis contained within Section 5.5.2 and therefore with a finding that there are significant differences in ICT use as well as skill levels between academic staff based on their relative ages. The same inferences can be drawn from Table 4.25 with regard to experience, where relatively more of the older aged staff members are in the low and very low categories of self-reported ICT usage and relatively more of those with less experience are in the high and very high usage categories. Finally, Table 4.26 shows similar levels of relative ICT self-reported usage based on departments as was shown within the analysis in Section 5.5.4.

5.5 Chapter Summary

This chapter has attempted to evaluate the quantitative and qualitative data of this study. This final section will summarise the most important points before the next chapter, which will attempt to draw conclusions and make recommendations. These are that at Al-Jouf University:

- There is a lack of institutional awareness of ICT requirements that would enable enhanced ICT use within constructive and innovative classroom settings.
- There is a lack of awareness by academic staff of which hardware and software is available for their use.
- There is a lack of institutional management or clear strategic direction with regard to ICT adoption and effective educational use.
- There are strong similarities in attitudes towards ICT adoption within departments and subject areas but sharp contrasts and differences in attitudes towards ICT adoption between departments and subject areas.
- There is a generally clear distinction between views of basic ICT adoption as a teaching aid as opposed to a key part of the teaching/learning process.
- These levels of usage are strongly connected with the self-perceived ICT abilities and confidence levels of academic staff members
- Despite these distinctions and connections, there is some evidence in some areas of moves towards levels of adoption that go beyond basic and teaching-aid parameters among a reasonably significant minority of staff members
- Attitudes are generally positive among academic staff members at the University.
- Self-confidence is a strong underlying factor that drives attitudes towards the adoption and use of ICT.
- Those whose skills and self-confidence are relatively weak perceive a barrier in terms of time commitment to developing ICT skills and an intolerably increased workload associated with it, even though this commitment of time and workload would be relatively short term in nature.
- The motivation for adopting and innovatively adapting ICT lies to a greater extent in seeing resultant improvements in the learning of students than in the seeking of tangible rewards through promotion and enhanced tenure contracts.
- A small minority of academic staff members who have negative attitudes towards ICT generally appear to have a complete lack of interest in being trained in its use.
- A significant majority of staff have already received some training in ICT.

- The most popular means of promoting ICT among academic staff members is the use of workshops and the least popular is lectures.
- There are no significant differences with regard to ICT skill levels and usage based on gender.
- There are significant differences with regard to ICT skill levels and usage based on age
- There are significant differences with regard to ICT skill levels and usage based on experience.
- There are significant differences with regard to ICT skill levels and usage based on the department that an academic staff member is attached to.

Chapter 6: Conclusions and Recommendations

6.1 Introduction

Chapters 4 and 5 presented, analysed and discussed the results of the research. Several points from these chapters will be reiterated and emphasised as these have driven the approach and the philosophy that underpins the study. First, while numerous studies have considered the adoption of ICT both in schools and in the tertiary sector in Saudi Arabia and in a wider context, relatively few have been undertaken in teacher training. This is a considerable deficiency considering that teachers, and the methods they adopt in the classroom and their embedded views of ICT, will be one of the primary determinants of the future of ICT in education.

Second, there is the question of whether results from one or even a group of studies can be used to extrapolate and generalise about ICT adoption or whether this is a misleading path that is likely to lead to inappropriate solutions and policies, given the unique situation, culture, environment and academic specialities of each university or college. Based on the evaluation of the diverse results that have been obtained in Chapter 2, it is argued that real progress can only be made by seeing studies of one or several institutions as building blocks towards a diverse and complex national picture, where key changes are made at individual levels, notwithstanding the possibility of establishing broad guidelines when sufficient studies have been undertaken and some points of similarity consistently emerge.

With these points in mind, the chapter proceeds by first highlighting and discussing the major findings of the study, then considering their implications and stating their limitations. It then concludes the thesis with suggestions for future research and key recommendations that the direction of the work leads to.

6.2 Major Findings of the Study

The relevant findings of this study that were summarised in a list in Chapter 5 are refined and considered in greater detail in this section.

6.2.1 Academic departments

A key and consistent finding across both the qualitative and quantitative results, as well as most if not all of the specific items and questions used to elicit data and address the research questions, is the differences between academic

departments with regard to the attitudes of their staff towards ICT and in their actual levels of adoption. Such a finding has not strongly emerged from other studies in Saudi Arabia, with one study even finding no important differences between departments and academic disciplines (Al-Wehaibi, 2008, p. 9). These points on the one hand may reflect differing approaches and focus points in studies but on the other may support the contention that each institution is so unique that assumptions and imposed solutions should not be made for one institution based on results from another. Thus, the fact that it was consistently found in this study is an important finding, at least for Al-Jouf University. The possible reasons for such variations between staff in various academic departments, such as the emergence of strong sub-cultures within departments, differences in age and experience, perceived different ICT requirements and relative English proficiency, have been considered, but, it is held, this is a key factor that is limiting ICT adoption at the University.

6.2.2 Lack of institutional awareness, support and strategic direction

A lack of institutional support and awareness was also found throughout the study, such as in the differences in the academic staff's awareness of the ICT hardware and software that was available, the difficulties expressed by some participants in accessing more than basic equipment compared with the ease with which others could access it, and the statements of key participants in the qualitative study. Although this was not a specific item in the quantitative survey, the responses given in the qualitative study clearly imply that there are few, if any, strategic policies or directions other than for the provision of ICT at the University. The only rational conclusion that can be reached from the range of views, values and opinions expressed is that from an institutional perspective, the uptake and access of ICT is left entirely to the beliefs and whims of the academic staff.

6.2.3 ICT as a classroom aid or a key part of the teaching and learning environment

It is relevant to stress that attitudes towards ICT adoption and use are strongly similar within departments but strongly divergent between them. This point aside, it is clear that for the majority of staff, ICT is used as a classroom aid rather than as an integrated part of a constructivist approach to teaching and learning. Despite this worrying difference, there is some evidence of a slow and evolutionary

move towards greater and wider levels of use; however, the rate of this change would mean that in the majority of their courses, trainee teachers will continue to only experience basic levels of ICT exposure for the foreseeable future.

6.2.4 Academic staff attitudes towards ICT adoption

With several notable individual exceptions, whose deeper opinions and beliefs were expressed in the qualitative study, academic staff attitudes towards ICT adoption and use are positive and in some cases very much so. Furthermore, the beliefs and attitudes of the majority of staff members towards the fundamental rationale for adopting and using ICT is vocational and based on educational principles rather than on the practicalities of self-interest.

6.2.5 Self-perceived levels of skill and self-confidence by academic staff

A notable factor that emerged when the issue of self-perceived levels of ICT skills among academic staff was probed more deeply is that the expression of such skill levels has some contingency on levels of self-confidence and self-efficacy that exist within the minds of individual staff members. While this suggests that the self-reporting of skill levels may be less than accurate for understanding an important barrier to ICT adoption and use, it opens another area of enquiry, that is, on actually finding ways of assessing levels of skill so that an even measure is obtained. The importance of this may be most effectively seen in Sections 6.2.6 and 6.3.

6.2.6 Time and commitment barriers to ICT adoption and use

While it is clear that for a small minority of academic staff members the main barrier to ICT adoption and use is their negative beliefs concerning it, for a significant majority whose levels of self-confidence and self-reported lack of ability are weak, a primary perceived barrier is time. These staff see ICT as involving long-term or even permanent time commitments, while a minority who have adopted and use ICT to, or close to, its full potential, find that their time is not only managed but also that ICT can help to reduce teaching and other workloads. This dichotomy stems from a lack of understanding, or even a fear, that ICT is time consuming in the long term, rather than the widely acknowledged belief that it is time saving once a user has grasped the important fundamentals for its use.

6.2.7 ICT training and development for academic staff

The issue of the most practical and useful means of gaining ICT skills through development and training programmes was extensively surveyed and probed during the course of the research. It is of considerable interest to note that the most desired and usefully perceived means was found to be within a constructivist paradigm, where workshops and therefore peer-to-peer learning and development constructs were believed to be the most useful means for achieving improvements among academic staff members. An anticipation which comes from this is that constructivist and 'community practice' environments will emerge and be transferred into teaching practices.

6.2.8 ICT levels and usage based on academic staff characteristics

Alongside the finding that there are distinct differences between levels of ICT adoption and use across departments, it was found that there are important differences based on age and experience. No other meaningful differences were found based on characteristics, including gender. Such a finding may be seen as lending further support to a belief that the construction of a picture regarding ICT adoption and use can only be accurately built by studies of individual institutions because gender has been variously found to be significant and not significant across a range of research studies (see Chapter 2).

6.3 Implications of the Study

This section considers the implications that can be drawn from the major findings using the same sub-headings as in Section 6.2.

6.3.1 Academic departments

The distinct differences between departments effectively mean that any cohesive and institution-wide policy for ICT adoption and use is likely to be considerably hindered. However, an understanding of the reasons for these differences will determine the extent of the barrier. If, for example, it is predominantly based on the nature of the academic discipline and/or the levels of age and experience within departments, solutions may be found that focus on determining the most appropriate level of ICT by subject area and from leadership,

training and development within the set standards. Conversely, if it is based on distinct sub-cultures that have evolved, the issue may require different and even more radical solutions, such as changing the departmental leadership or even transferring academic staff between departments.

6.3.2 Lack of institutional awareness, support and strategic direction

This can be seen as being at the core of the issue with regard to ICT adoption and use. If, as has been found, there is a lack of institutional awareness of the fundamental problems that exist and a resultant lack of institutional support, it follows that there can currently be no strategic direction. The net result of these aspects is that any other changes will be likely to fail.

6.3.3 ICT as a classroom aid or a key part of the teaching and learning environment

The implications of having a majority of academic staff using ICT as a classroom aid are that the trainee teachers will, despite their enthusiasm for ICT, be likely to carry these methods of using ICT to their classrooms and this will, in turn, be a barrier for future generations in terms of the educationally integrated uses of ICT. Ultimately, this will hinder Saudi Arabia's plans and strategies for ICT that have been developed and heavily invested in.

6.3.4 Academic staff attitudes towards ICT adoption

The generally positive attitudes of academic staff towards the adoption and use of ICT can be seen as a gainful and hopeful factor with regard to future strategies and changes. This is significantly enhanced by the fact that the attitudes are based more on vocation and principles than on self-interest.

6.3.5 Self-perceived levels of skill and self-confidence by academic staff

The finding that self-reported levels of ICT skills by academic staff are inaccurate means that any strategy based on them would be likely to lead to wasteful investments in the training and development of those staff.

6.3.6 Time and commitment barriers to ICT adoption and use

The fact that a significant number of academic staff members at the University perceive ICT adoption and use as being time consuming represents a major barrier. This is especially so because it appears to be of greater significance to many individuals than a belief that ICT may bring positive benefits to students. However, the fact that this belief is not commonly accepted and that others do not see this as a barrier and have adopted ICT towards its optimal use opens further and more positive implications. These are enhanced by the fact that peer-to-peer learning and constructivist workshop environments for training and development are the most preferred means among the academic staff improving their ICT skill levels because this would reduce or remove the fears concerning time commitments.

6.3.7 ICT training and development for academic staff

The overall preference by academic staff for workshops and peer-to-peer learning for training and development implies that there is an understanding that the key for developing ICT skills and therefore its wider adoption and use lies within the human resources of the University, a factor that is of greater significance when it is aligned with the implications that emerged from the previous sub-section.

6.3.8 ICT levels and usage based on academic staff characteristics

The fact that two characteristics have been found which considerably influence levels of ICT adoption and use suggest that particular attention can be paid to those staff members who have these characteristics. This can be applied to other strategies such as departmental structures and training and development needs.

6.4 Limitations of the Study

It could be suggested that the fact that the study cannot be generalised beyond Al-Jouf University is a considerable limitation. However, as has been consistently argued throughout the thesis, the generalisation of work such as this would be misguided. In this sense, the limitation becomes one of scope instead –the study is limited because it could not reasonably cover more than one institution.

A more important limitation is that the study only considered the views of one stakeholder group, when there are at least two more whose values, opinions and

beliefs may have added to the work: students and institutional staff. The rationale for limiting the study to one group is that it was not feasible, given other limitations and constraints, to consider more than one. Academic staff were chosen because they are the key change agents within the University.

Another constraint was that the work had to be completed within a given timeframe and with limited resources. Although the researcher was able to take advantage of the fact of being familiar with the nation and the institution being studied, there were still costs and resource investments made.

6.5 Reflections

Before drawing the study towards its final sections, it is considered pertinent to reflect on it and consider its perceived value as well as how some of the approaches and assumptions may have restricted it. Some of these have been discussed, for example the relative worth of case studies of individual institutions compared with wider studies that seek to extrapolate and generalise their results and the use of mixed methods as a worthwhile bridge between quantification and the seeking of a deeper understanding of values, opinions and beliefs held by key participants.

A further point which arises from such considerations is the extent to which value is gained from seeking to establish an existing situation or from seeking to find explanations for it. In this sense, some weaknesses may be appropriately perceived in this study but, on the other hand, it can be argued that some of the ‘why’ questions emerged, to an extent, or could at least be implied, and this was particularly the case with regard to the qualitative part of the work.

The fundamental question is why the levels of adoption are relatively low at the CoE generally and, emerging from the study, why they vary so much between departments? Again at a general level, it is possible to see some association with the theory of Rogers, but this seems to be limited because of the unique nature of ICT in education as discussed, for example, by Roach et al (2009), Koehler and Mishra (2009) and Collis and Moonen (2001). In this sense, the ‘why’ question is answered because there is a clear lack of understanding of these unique features and in how ICT adoption should be undertaken. A further ‘why’ that emerged is that while some leadership and some direction appears to exist in some departments, there is no

mechanism for its dissemination, and no apparent understanding in some departments of how ICT should be moulded with the subject areas and to the pedagogy.

Relatively straight forward but important factors emerged concerning why adoption has been lacking, for example a lack of understanding by individuals of their own ICT skills and abilities – essentially the main mechanism for deciding how skilful they are was their relative levels of self confidence; also factors such as age and experience, but these all come back to the central tenet, which is a lack of direction and a lack of institutional understanding of how ICT implementation and adoption should be approached. This is further supported by the finding that most staff members were enthusiastic about ICT adoption and most placed student benefits as their measure of whether to adopt or not – yet there were no mechanisms for judging such benefits, a key necessity based on the work of Wankel and Law (2011).

On these terms and on these reflections, it is held that while the study may, with hindsight, have benefitted from a greater focus on the 'why's,' it does stand apart from many other such works in terms of the unique features impeding ICT adoption at the CoE of Al-Jouf University. These features form an important element of the suggestions for future research and recommendations that emerge from the study and which form the final two sections of this work.

6.6 Future Research

Consistent with the stated beliefs and values of the researcher, it is recommended that future researchers focus attention generally on institutes of higher education that have not yet been researched. More specifically, as institutions concerned with teacher training have a pivotal role in future ICT uptake and use in schools, it is recommended that these be prioritised by future researchers.

It is further proposed that future research seek to understand, as this work has sought to, the perhaps less obvious areas of ICT adoption and use in teacher training and wider tertiary teaching, which may be closer to the important causes of a relative lack of uptake than those that have received attention in the past. These are areas such as departmental differences, academic staff preferences with regard to training and development and the relative accuracy of self-reported ICT skill levels.

Two areas of great importance, which with hindsight still need to be pursued at Al-Jouf University and other institutions, are the beliefs, attitudes and values of institutional managers and administrators, the forces and influences that drive strategic planning and policies with regard to ICT adoption, and use and the beliefs, attitudes and values of students towards the issue.

In the most general sense, while studies have been undertaken at institutes of higher education in Saudi Arabia, a considerable research agenda remains outstanding. It is therefore recommended that grants and bursaries be initiated for research in that country for research such as this at individual institutional levels.

While it is not proposed that research methods and designs should be standardised, the subject area may benefit from a study that considers and focuses its attention on the most important variables that contribute both positively and negatively to ICT adoption and use.

6.7 Recommendations

The first and most important recommendation for the University concerns leadership and the development of strategies for ICT adoption and use. University leaders and managers should either be directly involved themselves or appoint a dedicated team under a suitable senior manager to first conduct an audit of the present situation and then develop clear paths to improve the levels of uptake among academic staff members. The following should be included within the audit and associated research:

- The factors that are responsible for the differences between ICT use and adoption across departments and their relative importance should be identified.
- A consistent and standard measure should be established for assessing the existing levels of ICT skills of all academic staff members.
- The procedures that are presently used for obtaining and distributing ICT hardware and software among academic staff should be established and evaluated.

Following this audit and its evaluation at an executive level, the senior managers, or the team appointed under the leadership of an appropriate senior manager, should develop and instigate a strategic plan for change that includes:

- Changes at departmental levels that reflect the audit findings with regard to interdepartmental differences in the adoption and use of ICT.
- Interviews and evaluations of each academic staff member to ascertain specific attitudes towards ICT and requirements for development.
- The establishment by departmental leaders, in consultation with staff members and other departments, of plans for peer-to-peer learning, collaboration and development in ICT.
- The adjustment of timetables for academic staff whose ICT skills are weak for an agreed period so that they can commit appropriate amounts of time to developing and gaining confidence in subject-specific ICT usage.
- The setting of milestones for achievement for all staff members and departments once the strategic plan has been implemented.
- Ongoing reviews and the development of new strategies so that the University can not only establish but maintain a position at the forefront of ICT adoption and use.
- An inclusive approach to the strategic plan, its development, implementation and future reviews so that academic staff come to feel ownership and pride in the ICT excellence that may, in the future, be associated with the University.
- Research into the relative importance of a lack of English ability among some faculty members as an inhibiting factor in ICT adoption should be considered.
- One final and important recommendation is that there is the progressive introduction of a well thought of learning management system (LMS), which will provide a platform for the introduction of elements of blended learning, can become a vehicle for experimenting with elements of constructivism (e.g. online group discussions, small group project work, etc), and which can be a way into postgraduate course development to serve the continuing education needs of practising teachers who cannot attend on campus, and possibly a way to introduce a small measure of integration of classes for men and for women.

References

Abu Samak, Z. (2006). *An exploration of Jordanian English language teachers' attitudes, skills and access as indicator of information and communication technology integration in Jordan.* (Unpublished doctoral dissertation). Florida State University, Tallahassee, Florida.

Afshari, M., Abu Bakar, K., Su Luan, W., Abu Samah, B. & Fooi, F. S. (2009). Factors affecting teachers' use of information and communication technology. *International Journal of Instruction, 2*(1), 77-104

Agboola, A. A. & Salawu, R. O. (2011). Managing deviant behavior and resistance to change. *International Journal of Business and Management 6*(1), 235 - 242.

Ahadiat, N. (2008). Technologies used in accounting education: A study of frequency of use among faculty. *Journal of Education for Business, 83*(3), 123–13~~3~~4.

Alajmi, M. (2010). *Faculty members' readiness for e-learning in the college of basic education in Kuwait* (Unpublished doctoral dissertation). University of North Texas, Denton, Texas.

Al-Alwani, A. (2005). *Barriers to integrating information technology in Saudi Arabia science education* (Unpublished doctoral dissertation). University of Kansas, Lawrence, Kansas.

Al-Asmari, A. M. (2005). *The use of the internet among ELT teachers at the colleges of technology in Saudi Arabia* (Unpublished doctoral dissertation). Ohio State University, Columbus, Ohio.

Alaugab, A. M. (2007). *Benefits, barriers, and attitudes of Saudi female faculty and students toward online learning in higher education* (Unpublished doctoral dissertation). University of Kansas, Lawrence, Kansas.

Al-Degether, R. (2009). *Teacher educators' opinion and knowledge about critical thinking and the methods they use to encourage critical thinking skills in five female teacher colleges in Saudi Arabia* (Unpublished doctoral dissertation). University of Kansas, Lawrence, Kansas.

Aleklett, K., Hook, M., Jakobsson, K., Lardelli, M., Snowden, S. & Soderbergh, B. (2010). The peak of the Oil Age: Analysing the world oil production

reference scenario in World Energy Outlook 2008. *Energy Policy, 38*(3), 1398–1414.

Alenezi, A. M. (2012). *Faculty members' perception of e-learning in higher education in the Kingdom of Saudi Arabia (KSA)* (Unpublished doctoral dissertation). Texas Tech University, Lubbock, Texas, Retrieved from: https://repositories.tdl.org/ttu-ir/bitstream/handle/2346/45399/Ahmed_Alenezi_Diss_Final_May2012%20.pdf

Alev, N. (2003). *Integrating information and communications technology (ICT) into pre-service science teacher education: The challenges of change in a Turkish faculty of education* (Unpublished doctoral dissertation). University of Leicester, Leicester.

Al-Ghonaim, H. S. A. (2005). *Attitudes, barriers and incentives of Saudi college instructors and administrators toward implementation of online instruction* (Unpublished doctoral dissertation). University of Kansas, Lawrence, Kansas.

Al-Harbi, K. R. A. (2010). *Investigating factors influencing the adoption of e-learning: Saudi students' perspective* (Unpublished doctoral dissertation). University of Leicester, Leicester.

Al-Hawiti, M. M. (2011). Faculty perceptions about attributes and barriers impacting the diffusion of online education in two Saudi universities (Unpublished doctoral dissertation). Indiana State University, Terre Haute, Indiana, Retrieved from: http://hdl.handle.net/10484/1758

Al-Kahtani, N. K. (2006). *The internet technology and its potential contribution to research in Saudi Arabia: Possible factors influencing its utilization* (Unpublished doctoral dissertation). George Washington University, Washington, D.C..

Alkhalaf, S., Drew, S., Nguyen, A. & Alhussein, T. (2013). *Towards high quality e-learning systems: Evidence from Saudi Arabia.* Retrieved from: http://eli. elc. edu. sa/2013/en., Riyadh, Saudi Arabia.

Almalki, A. M. (2011). *Blended learning in higher education in Saudi Arabia: A study of Umm Al-Qura University* (Unpublished doctoral dissertation). RMIT University, Melbourne, Victoria.

Almalki, G. & Williams, N. (2012). A strategy to improve the usage of ICT in the Kingdom of Saudi Arabia Primary School. *International Journal of Advanced Computer Science and Applications, 3*(10), 42-49.

Almekhlafi, A. G. & Almeqdadi, F. A. (2010). Teachers' perceptions of technology integration in the United Arab Emirates school classrooms. *Educational Technology and Society, 13(1),* 165–175.

Almorshid, Y. (2003). *Evaluation perceptions of the Social Studies Teacher Training Program at the Al-Jouf Education College in Saudi Arabia* (Unpublished doctoral dissertation). University of South Florida, Tampa, Florida.

Almuqayteeb, T. A. (2009). *Attitudes of female faculty toward the use of computer technologies and the barriers that limit their use of technologies in girls' colleges in Saudi Arabia* (Unpublished doctoral dissertation). Mississippi State University, Oktibbeha County, Mississippi.

Almusalam, S. N. (2001). *Factors related to the use of computer technologies for professional tasks by business and administration teachers at Saudi technical colleges* (Unpublished doctoral dissertation). Ohio State University, Columbus, Ohio.

Al-Musawi A. (2007). Current status of educational technologies at Omani Educational institutions and their perspectives. *Educational Technology Research and Development, 55*(4), 395-410.

Al-Rasheed, M. (2003). *A history of Saudi Arabia*. Trinity Ln, Cambridge: Cambridge University Press.

Alsadoon, E. A. (2009). *The potential of implementing online professional training development for faculty in the College of Education at King Saud University* (Unpublished doctoral dissertation). Ohio University, Columbus, Ohio.

Al-Sarrani, N. (2010). *Concerns and professional development needs of science faculty at Taibah University in adopting blended learning* (Unpublished doctoral dissertation). Kansas State University, Lawrence, Kansas.

Al-Senaidi, S. (2009). *An investigation of factors affecting Omani faculty members adoption of information and computing technology* (Unpublished doctoral dissertation). University of North Texas, Denton, Texas.

Alshangeeti, A., Alsaghier, H. & Nguyen, A. (2009). Faculty perceptions of attributes affecting the diffusion of online learning in Saudi Arabia: A quantitative study. Proceedings of 4th international conference held in

Toronto, Canada, 16-17 July 2009 (pp. 10-24). University of Toronto, Toronto: Academic Conferences Limited.

Al-Shehri, A. M. (2005). *Assessing faculty attitudes toward the significant factors for facilitating the implementation of online courses at the Institute of Public Administration in Saudi Arabia*. (Unpublished doctoral dissertation). Mississippi State University, Oktibbeha County, Mississippi.

Altameem, A. (2013). What drives successful e-learning? An empirical investigation of the key technical issues in Saudi Arabian universities. *Journal of Theoretical and Applied Information Technology, 53*(1), 63-70.

Altermatt, B. (2007). *Evaluating research: How can you tell the good research from the bad?* Retrieved from http://vault.hanover.edu/~altermattw/courses/220/readings/Evaluating_Research.pdf

Al-Wehaibi, K., Al-Wabil, A., Alshawi, A., & Alshankity, Z. (2008). *Barriers to Internet Adoption among Faculty in Saudi Arabian Universities.* Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications held in Vienna, Austria, 30 June 2008 (pp. 24-33). Chesapeake, VA: AACE

Alzaydi, D. A. (2010). *Activity theory as a lens to explore participant perspectives of the administrative and academic activity systems in a university–school partnership in initial teacher education in Saudi Arabia*. (Unpublished doctoral dissertation). University of Exeter, Exeter, Devon.

Alzamil, O. L. (2003). *High school social studies teachers' attitudes and usage of instructional technology in Saudi Arabia*. (Unpublished doctoral dissertation). University of Arkansas, Fayetteville, Arkansas.

Anderson T. (2008). Social Software to Support Distance Education Learners, from Anderson T. (ed.), *The Theory and Practice of Online Learning, 2nd Edition*, Athabasca University: AU Press.

Arouri, Y. M. S. (2013). *Negotiating the dimensions of the digital divide: A phenomenological study of Jordanian pre-service teachers' experiences with information and communication technology (ICT) access*. (Unpublished doctoral dissertation). New Mexico State University, Las Cruces, New Mexico.

Asabere, N. Y. & Ahmed, A. M. (2013). Towards enhancing quality in education through information and communication technologies (ICTs) in higher educational institutions (HEIs). *International Journal of Computer Applications, 62(*8), 10-18.

Asiri, M. J. S., Mahmud, R., Bakar, K. A. & Ayub, A. F. (2012). Factors influencing the use of learning management system in Saudi Arabian higher education: A theoretical framework. *Higher Education Studies, 2*~~8~~(2), 125-137.

Bailey, J., Ellis, S., Schneider, C. & Ark, T. V. (2013). Blended learning implementation guide. *Foundation for Excellence in Education*. Retrieved from http://net.educause.edu/ir/library/pdf/CSD6190.pdf

Beck, R. J. (2009). Teaching international law as a hybrid/blended course. Paper presented at the annual meeting of the ISA's 50th ANNUAL CONVENTION "EXPLORING THE PAST, ANTICIPATING THE FUTURE", New York Marriott Marquis, NEW YORK CITY, NY.

Bennett, J. (2003). *Teaching and learning science.* London: Continuum.

Berman, P. & McLaughlin, M. (1974). *Federal programs supporting educational change. Vol I: A model of educational change.* Santa Monica, CA: Rand Corporation.

Bingimlas, K. A. (2009). Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature. *Eurasia Journal of Mathematics, Science & Technology Education*, *5*(3), 235–245

Birch, D. (2008). *Factors influencing academics' development of interactive multimodal technology-mediated distance higher education courses.* (Unpublished doctoral dissertation).Queensland University Of Technology. Brisbane, Queensland.

Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher,* 33(8), 3–15.

Braak, J. (2001). Individual characteristics influencing teachers' class use of computers. *Journal of Educational Computing Research, 25*(2), 141–158.

British Council. (1997). Five star funding for fab four. *Times Higher Education.* Retrieved from http://www.timeshighereducation.co.uk/news/five-star-funding-for-fab-four/101147.article

Brown, M. (2010). *Using direct marketing to build brand values.* Retrieved from: http://www.wpp.com/~/media/sharedwpp/readingroom/marketing/millward_brown_direct_marketing_sep10.pdf

Buabeng-Andoh, C. (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using Information and Communication Technology, 8*(1), 136–155.

Burns, R. B. (2000). *Introduction to research methods* (4th ed.). Thousand Oaks, California: Sage Publications.

Butler, R. N. (2009). Combating ageism. *International Psychogeriatrics, 21*(2), 211-211.

Cairncross, F. & Poysti, K. (2004). ICTs for education and building human capital. *Visions of the Information Society*. Retrieved from: https://www.itu.int/osg/spu/visions/papers/educationpaper.pdf

Cameron, K. (2004). A process for changing organizational culture. In T. G. Cummings (Ed.), *Handbook of organizational development*. Thousand Oaks, California: Sage Publications.

Carroll-Barefield, A., Smith, S. P., Prince, L. H. & Campbell, C. A. (2005). Transitioning from bricks and mortar to online: A faculty perspective. *Online Journal of Distance Learning Administration, 8*(1). Retrieved from: *http://www.westga.edu/~distance/ojdla/spring81/carroll81.htm*

Chew, M. M. M., Cheng, J. S. L. & Lazarevik, S. P. (2006). Managers' role in implementing organizational change: Case of the restaurant industry in Melbourne. *Journal of Global Business and Technology, 2*(1), 58-67.

Chitiyo, R. (2006). *Integration of instructional technology by university lecturers in secondary school teacher education programs in Zimbabwe: An exploratory study.* (Unpublished doctoral dissertation). Georgia State University, Atlanta, Georgia.

Chizmar, J. F. & Williams, J. B. (2001). What do faculty want?. *Educause Quarterly, 24(1),* 18–24

Clarke, R. (1999). *A primer in diffusion of innovations theory. Xamax Consultancy Pty Ltd* . Retrieved from http://www.rogerclarke.com/SOS/InnDiff.html

Cohen, L., Manion, L. & Morrison, K. (2000). *Research methods in education* (5th ed.). London: Routledge-Falmer.

Collis, B. & Moonen, J. (2001). *Flexible learning in a digital world: Experiences and expectations*. London: Kogan Page.

Collis, B. & Moonen, J. (2005). An ongoing journey: Technology as a learning workbench, Reflection document by the authors on the occasion of their retirement. Retrieved from: http://doc.utwente.nl/50888/1/rede_Collis_Moonen.pdf

Conway, P. F. & Clark C. M. (2003). The journey inward and outward: a re-examination of Fuller's concerns-based model of teacher development, *Teaching and teacher Education, Vol. 19, Issue 5*, pp 465-482

Cooke, A. (2012). *Teacher and student factors related to the use of ICT in upper primary school* (Unpublished doctoral dissertation). Curtin University, Bentley, WA.

Coutinho, C. (2006). *Infusing technology in pre service teacher education programs in Portugal: An experience with weblogs.* In *Society for Information Technology & Teacher Education International Conference* (Vol. 2007, No. 1, pp. 2527-2534).

Cowan, J. (2006). *On becoming an innovative university teacher*. NEW YORK CITY: Open University Press.

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Thousand Oaks, California: Sage Publications.

Creswell, J. W. & Clark, V. L. P. (2007). *Designing and conducting mixed methods research.* Thousand Oaks, California: Sage Publications.

Denzin, N. K. & Lincoln, Y. S. (2003). The discipline and practice of qualitative research. In N.K. Denzin & Y. S. Lincoln (Eds.), *Strategies of Qualitative Inquiry* (pp. 1–45). Thousand Oaks, CA: Sage Publications.

Derue, D. S., Nahrgang, J. D., Wellman, N. & Humphrey, S. E. (2011). Trait and behavioural theories of leadership: An integration and meta-analytic test of their relative validity. *Personnel Psychology, 64(1),* 7–52.

Dooley, K. E. (1999). Towards a holistic model for the diffusion of educational technologies: An integrative review of educational innovation studies. *Educational Technology & Society 2*(4), 35–45.

Dooley, K. E. & Murphrey, T. P. (2000). How the perspectives of administrators, faculty, and support units impact the rate of distance education adoption. *Online Journal of Distance Learning Administration, 3(4).*

Drent, M. & Meelissen, M. (2008). Which factors obstruct or stimulate teacher educators to use ICT innovatively? *Computers and Education, 51(1),* 187–199.

Ebersole, S. & Vorndam, M. (2003). Adoption of computer-based instructional methodologies: A case study. *International Journal of E-Learning, 2*(2), 15–20.

Eichholz, G. & Rogers, E. M. (1964). Resistance to the adoption of audio-visual aids by elementary school teachers: Contrasts and similarities to agricultural innovation. In M. B. Miles (Ed.), *Innovation in education* (pp. 299–316). New York, NY: Teacher's College, Columbia University.

Elliott, R., Fischer, C. T. & Rennie (1999). Evolving guidelines for publication of qualitative research studies in psychology and related fields. *British Journal of Clinical Psychology, 38*(3), 215–229.

Ertmer, P. A. & Otternbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education, 42*, 255–284

Farhat, N. (2008). *The impact of technology on teaching and learning in high schools in the United Arab Emirates* (Unpublished doctoral dissertation). University of Leicester, Leicester.

Fullan, M. G. (2007). *The new meaning of educational change* (4th ed.). New York, NY: Teacher's College Press.

Gauvain, M., & Cole, M. (2005). Readings on the development of children. New York, NY: Worth Publishers.

Gill, J. & Johnson, P. (2002). *Research methods for managers*. London: Sage.

Goktas, Y., Yildirim, S. & Yildirim, Z. (2009). Main barriers and possible enablers of ICTs into pre-service teacher education programmes. *Educational Technology & Society, 12*(1), 193–204.

Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report, 8*(4), 597–606.

Gray, V. J. (2011). *Teaching and learning with ICT in Western Australian government primary schools* (Unpublished Master's thesis). Curtin University, Bentley, WA.

Gronn, P. (2002). Distributed leadership as a unit of analysis. *The Leadership Quarterly,13(4),* 423–451.

Gulbahar, Y. (2008). ICT usage in higher education: A case study on pre-service teachers and instructors. *Turkish Online Journal of Educational Technology, 7*(1), 32-37. Retrieved from http://www.tojet.net/articles/v7i1/713.pdf

Havelock, R. G. & Zlotolow, S. (1995). *The change agent's guide* (2nd ed.). Englewood Cliffs, NJ: Educational Technology Publications.

Haydn, T. & Barton, R. (2008). First do no harm: Factors influencing teachers' ability and willingness to use ICT in their subject teaching. *Computers & Education, 51*(1), 439–447.

Henard, F. & Roseveare, D. (2012). Fostering quality teaching in higher education: Policies and practices. *An IMHE guide for higher education institutions, OECD*. Retrieved from http://www.oecd.org/edu/imhe/QT policies and practices.pdf

Hester, A. J. (2009). *Analysis of factors influencing adoption and usage of knowledge management systems and investigation of Wiki technology as an innovative alternative to traditional systems.* (Unpublished doctoral dissertation). University of Colorado Denver, Denver.

Hew, K. F. & Brush, T. (2007), Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development, 55*(3), 223–252.

Hismanoglu, M. (2012). The impact of a curricular innovation on prospective EFL teachers' attitudes towards ICT integration into language instruction. *International Journal of Instruction, 5*(1), 183-202

Hogg, M. A. (2001). A social identity theory of leadership. *Personality and Social Psychology Review, 5*(3), 184–200.

Honan, E. (2008). Barriers to teachers using digital texts in literacy classrooms. *Literacy, 42(1),* 36–43.

Howell, G. D. (2007). *The experience of university academic staff in their use of information communication technology*. (Unpublished doctoral dissertation). Australian Catholic University, Fitzroy Victoria.

Huberman, A. M. & Miles, M. B. (2002). *The qualitative researcher's companion.* London: Sage.

Inan, F. A. & Lowther, D. L. (2010). Factors affecting technology integration in K-12 classrooms: A path model. *Educational Technology Research & Development, 58*(2), 137–154.

Index Mundi. (2014). *Saudi Arabia.* Retrieved from http://www.indexmundi.com/saudi_arabia/

Iniesta-Bonillo, A., Sanchez-Fernandez, R. & Schlesinger, W. (2013). Investigating factors that influence on ICT usage in higher education: A descriptive analysis. *International Review on Public and Nonprofit Marketing*, 10(2), 163–174.

Ishtaiwa, F. (2006). *Factors influencing faculty participation in e-learning: The case of Jordan* (Unpublished doctoral dissertation). University of Washington, Seattle, Washington.

Islam, A., Ali, A. J. & Wafi, S. M. S. (2010). Resistance to change among first line managers in multinational organizations in Malaysia. *International Review of Business Research Papers, 6*(4), 232–245.

Jafri, P., McGee, P. & Carmean, C. (2006). Managing courses, defining learning: What faculty, students and administration want. *Educause Review*, July–August, 50-70.

Johnson, B. & Christensen, L. (2000). *Educational research: Quantitative and qualitative approaches*. Boston: Allyn and Bacon

Johnson, D. L. & Liu, L. (2000). First steps towards a statistically generated information technology integration model. *Computers in Schools*, *16*(2), 3–12.

Joshi, A., Pan, A., Murakami, M. & Narayanan, S. (2010). Role of computers in educating young children: US and Japanese teachers' perspectives. *Computers in the Schools*, *27*(1), 5–19.

Kadzera, C. M. (2006). *Use of instructional technologies in teacher training colleges in Malawi* (Unpublished doctoral dissertation). Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Kamal, B. (2013). *Concerns and professional development needs of faculty at King Abdul- Aziz University in Saudi Arabia in adopting online teaching* (Unpublished doctoral dissertation). Kansas State University, Lawrence, Kansas.

Kanuka H. (2008). Understanding E-Learning Technologies-in-Practice Through Philosophies-in Practice, from Anderson T. (ed.), *The Theory and Practice of Online Learning, 2nd Edition,* Athabasca University: AU Press

Kennisnet. (2011). Four in balance monitor 2011: ICT in Dutch primary, secondary and vocational education. Zoetermeer, The Netherlands: Kennisnet Foundation. Retrieved from http://downloads.kennisnet.nl/algemeen/Vier-in-balans-monitor-2011-Engelse-versie-internet.pdf

Khan, S. H., Hasan, M. & Clement, C. K. (2012). Barriers to the introduction of ICT into education in developing countries: The example of Bangladesh. *International Journal of Instruction, 5*(2), 61-80.

Kharade, K. & Thakkar, R. (2012). Promoting ICT-enhanced constructivist teaching practices among pre-service teachers: A case study. *International Journal of Scientific Research Publications, 2(1),* 45-51, Retrieved from: http://ijsrp.org/print-journal/ijsrp-jan-2012-print.pdf#page=47

Klassen, R. M. & Chiu, M. M. (2010). Effects on teachers' self-efficacy and job satisfaction: Teacher gender, years of experience, and job stress. *Journal of Educational Psychology, 102*(3), 741–756.

Knobloch N. A. (2010). Building Conceptual and Theoretical Frameworks that Inform Research, Retrieved from: http://www.public.iastate.edu/~laanan/ACTER/2010/symposia/Building_Conceptual_Knobloch.pdf

Koehler, M. J. & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education, Vol. 9, No. 1,* pp 60-70

Kunze, F., Boehm, S. & Bruch, H. (2013). Age, resistance to change, and job performance. *Journal of Managerial Psychology, 28*(7/8), 741–760,

Kusano, K., Frederiksen, S., Jones, L., Kobayashi, M., Mukoyama,Y., Yamagishi, T., Sadaki, K. & Ishizuka, H. (2013). The effects of ICT environment on teachers' attitudes and technology integration in Japan and the US. *Journal of Information Technology Education, 12(1),* 29-43.

Lambert, J. & Gong, Y. (2010). 21st century paradigms for pre-service teacher technology preparation. *Computers in the Schools, 27(1),* 54–70.

Leedy, P. D. & Ormrod, J. E. (2010). *Practical research, planning and design* (9th ed.). New Jersey: Pearson, Merrill, Prentice, Hall

Levine, A. (1980). *Why innovation fails.* New York, NY: State University of New York Press.

Li, Y. (2004). *Faculty perceptions about attributes and barriers impacting diffusion of web-based distance education (WBDE) at the China Agricultural University* (Unpublished doctoral dissertation). Texas A&M University, College Station, Texas.

Liyanage, M. S. (2004). *Factors affecting the demand and implementation of e-learning in Sri-Lankan tertiary education system* (Unpublished doctoral dissertation). University of Moratuwa, Katubedda, Moratuwa.

Lunenburg, F. C. & Irby, B. J. (2008). Writing a successful thesis or dissertation : Tips and strategies for students in the social and behavioral sciences. Thousand Oaks, CA: Corwin Press.

Mahajan, V. & Peterson, R. A. (1985). *Models for innovation diffusion.* Beverly Hills, CA: Sage Publications.

Maslow, A. H. (1970).*Motivation and personality*. New York: Harper & Row.

McLean, J. (2005). Addressing faculty concerns about distance learning. *Online Journal of Distance Learning Administration, 8*(4). Retrieved from: http://www.westga.edu/~distance/ojdla/winter84/mclean84.htm

Medlin, B. D. (2001). *The factors that may influence a faculty member's decision to adopt electronic technologies in instruction* (Unpublished doctoral dissertation). Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Michael, R. S. (2001). Cross-tabulation and chi-square. Retrieved from http://www.indiana.edu/~educy520/sec5982/week_12/chi_sq_summary011020.pdf

Miles, M. (1964). *Innovation in education*. New York, NY: Teacher's College, Columbia University.

MIT. (2013). *Production in the innovation economy report*. Retrieved from: http://web.mit.edu/press/images/documents/pie-report.pdf

Mishra, P. & Koehler, M. J. (2008). Introducing Technological Pedagogical Content Knowledge, Paper presented at the Annual Meeting of the American Educational Research Association New York City. Retrieved from: http://punya.educ.msu.edu/presentations/AERA2008/MishraKoehler_AERA2008.pdf

Moseley, D. & Higgins, S. (1999). *Ways forward with ICT: Effective pedagogy using information and communications technology for literacy and numeracy in primary schools*. London: Teacher Training Agency.

Mumtaz, S. (2000). Factors affecting teachers' use of information and communications technology: A review of the literature, *Journal of Information Technology for Teacher Education, 9(*3), 319-342.

Nussbaum, M. (2010). *Looking into the future: The importance of applications and quality content.* Proceedings of VII International Seminar: Mobile Technologies for Learning and Development conference, Barcelona, Spain, 6-7 October 2010.: Universitat Oberta de Cataluny. Retrieved from: http:// www.slideshare.net/uocunescochair/integrating-technology-and-pedagogy-in-the-classroom-by-miguel-nussbaum

Nyirongo, N. K. (2009). *Technology adoption and integration: A descriptive study of a higher education institution in a developing nation* (Unpublished doctoral dissertation). Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

OECD. (2009). *Education indicators at a glance.* Retrieved from: http://www.oecd.org/education/skills-beyond-school/43636332.pdf

Ofsted. (2011). *ICT in schools 2008–11*. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/181223/110134.pdf

Olsen, B. (2008). Introducing teacher identity. *Teacher Education Quarterly, 35*(3), 3-6.

Oyaid, A. A. (2009). *Education policy in Saudi Arabia and its relation to secondary school teachers' ICT use, perceptions, and views of the future of ICT in education* (Unpublished doctoral dissertation). University of Exeter, Exeter, Devon.

Parisot, A. H. (1997). Distance education as a catalyst for changing teaching in the community college: Implications for institutional policy. *New Directions for Community Colleges, 99*, 5–13.

Patton, M. Q. (2002). *Qualitative research and evaluation methods*. Thousand Oaks, CA: Sage Publications.

Pelliccione, L. (2001). *Implementing innovative technology: Towards the transformation of a university* (Unpublished doctoral dissertation). Curtin University of Technology, Bentley, W.A.

Petherbridge, D. T. (2007). *A concerns-based approach to the adoption of web-based learning management systems.* Raleigh, NC: North Carolina State University.

Gauvain, M., & Cole, M. (2005). Readings on the development of children. New York, NY: Worth Publishers.

Richardson, J. (2000). *Implementation in education: An analysis of implementation strategies in Australia, Canada, Finland and Israel*. Retrieved from: http://suomi.script.lu/activinno/ict_etude_ocde/ictfinalreport.pdf

Ridzuan, A. A., Sam, H. K. & Ahmad, A. (2001). Teacher educators' attitudes toward computers: A study among teacher educators in teacher-training colleges in Johor, Malaysia. *Journal Teknologi, 35(1),* 21–32.

Roach, A. T., Kratochwill T. R. & Frank J. L. (2009). School-Based Consultants as Change Facilitators: Adaptation of the Concerns-Based Adoption Model (CBAM) to Support the Implementation of Research-Based Practices, *Journal of Educational and Psychological Consultation, Vol. 19,* pp 300–320

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). London: Free Press.

Rowley, J. & Slack, F. (2004). Conducting a literature review. *Management Research News,* 27(6), 31-39.

Rutherford, C. (2013, 27 March). *Bringing pre-service teacher education into the 21st century.* Paper presented at Society for Information Technology & Teacher Education International Conference, New Orleans, LA.

Sahin, I. (2006). *Instructional computer use by COE faculty in Turkey: Application of diffusion of innovations theory* (Unpublished doctoral dissertation). Iowa State University, Ames, Iowa.

Samarawickrema, R. G. (2005). *Technology adoption: Voices of teaching academics, educational designers and students.* (Unpublished doctoral dissertation). Deakin University, Burwood, Victoria, Retrieved from: http://hdl.handle.net/10536/DRO/DU:30023276

Sang, G., Valcke, M., Braak, J. & Tondeur, J. (2010). Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviours with educational technology. *Computers & Education, 54(1),* 103–112.

Saunders, M., Lewis, P. & Thornhill, A. (2009). *Research methods for business students*. Prentice Hall.

Scott, R. H. & Fisher, D. L. (2004). Development, validation and application of a Malay translation of an elementary version of the questionnaire on teacher interaction. *Research in Science Education, 34(2)*, 173–194.

Shaabi, I. (2010). *ESP community in transition: A study of ICT use in a tertiary context in Saudi Arabia.* (Unpublished doctoral dissertation). University of Wollongong, Wollongong NSW.

Shamaoil, E. (2005). *Teachers' perceptions and experiences in adopting 'Blackboard' computer program in a Victorian secondary school: A case study.* (Unpublished doctoral dissertation). Victoria University, Melbourne, Victoria.

Solomon A. & Solomon J., 2004, A Conceptual Framework of Conceptual Frameworks: Positioning Corporate Financial Reporting and Corporate Environmental Reporting on a Continuum, Retrieved from: https://business-school.exeter.ac.uk/documents/papers/accounting/2004/0405.pdf

Startic. A. I. (2010). Educational technology for the inclusive classroom. *The Turkish Online Journal of Educational Technology -TOJET, 9*(3), 26-37.

Siepiola, A. (2013). *The power of a teacher's identity.* Retrieved from: http://constructivistteacher.com/2013/02/04/the-power-of-a-teachers-identity/

Stuart, W. D. (2000). *Influence of sources of communication, user characteristics and innovation characteristics on adoption of a communication technology.* Retrieved from ProQuest Digital Dissertations. (UMI No. AAT 9998115).

Toh, Y. (2013). *Sustaining the use of ICT for student-centred learning: A case study of technology leadership in a Singapore ICT-enriched primary school* (Unpublished doctoral dissertation). University of Leicester, Leicester.

Toki, E. I. & Pange, J. (2010). Social learning theories as tools for learning in an ICT educational system. *The Online Journal of New Horizons in Education, 3*(1) , 53-55.

Trochim, W. M. K. (2006). *Positivism and post-positivism.* Retrieved from: http://www.socialresearchmethods.net/kb/positvsm.php

UK Government. (2012). *Innovation report 2012*. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/34805/12-p188-annual-innovation-report-2012.pdf

UNCTAD. (2012). *Technology and innovation report 2012.* Retrieved from: http://unctad.org/en/PublicationsLibrary/tir2012_en.pdf

Usluel, Y. K., Askar, P. & Bas, T. (2008). A structural equation model for ICT usage in higher education. *Educational Technology & Society, 11*(2), 262–273.

Uzonboylu, H. & Tuncay, N. (2010). Divergence of the digital world of teachers. *Educational Technology and Society, 13*(1), 186–194.

Venkatesh, V. & Morri, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly, 24*(1), 115–139.

Victorian Government. (2013). *ICT strategy 2013–2014.* Retrieved from: http://digital.vic.gov.au/wp-content/uploads/2013/02/Victorian-Government-ICT-Strategy-web.pdf

Wang, S. C. (2008). *Towards an understanding of existing e-learning for university science education in Taiwan.* (Unpublished doctoral dissertation). University of Waikato, Hamilton, New Zealand.

Wankel, C. & Law, J. S. (2011). Streaming Media Delivery in Higher Education: Methods and Outcomes: Methods, E-Book, Retrieved from: https://books.google.co.uk/books?id=hXN7pSpD48cC&pg=PA56&lpg=PA56&dq=Collis+and+Moonen+4E+model&source=bl&ots=Qj388EC5eu&sig=poWCnRJsw4uL67E0tK7wp0R8Qdg&hl=en&sa=X&ei=VK4jVefjNciYs

Webb, I. (2007). *Key factors in the use of ICT in primary school classrooms.* (Unpublished doctoral dissertation). University of Tasmania, Hobart, Tasmania

Westen, D. & Rosenthal, R. (2003). Quantifying construct validity: Two simple measures. *Journal of Personality and Social Psychology, 84*(3), 608–618.

Whittemore, R., Chase, S. K. & Mandle, C. L. (2001). Validity in qualitative research. *Qualitative Health Research, 11*(4), 522-537.

Williams, M. K., Foulger, T. S. & Wetzel, K. (2009). Preparing pre-service teachers for 21st century classrooms: Transforming attitudes and behaviours about innovative technology. *Journal of Technology and Teacher Education, 17*(3), 393–418.

Wilson, B., Sherry, L., Dobrovolny, J., Batty, M. & Ryder, M. (2000). Adoption of learning technologies in schools and universities. In H. H. Adelsberger, B.

Collis & J. M. Pawlowski (Eds.), *Handbook on information technologies for education and training* (pp. 293-307). New York, NY: Springer-Verlag.

Wong, E. M. L. & Li, S. C. (2008). Framing ICT implementation in a context of educational change: A multilevel analysis. *School Effectiveness and School Improvement*, *19*(1), 99–120.

Yauch, C. A. & Steudal, H. J. (2003). Complementary use of qualitative and quantitative cultural assessment methods. *Organizational Research Methods, 6*(4), 465–481.

Yidana, I. (2007). Faculty perceptions of technology integration in the teacher education curriculum: A survey of two Ghanaian universities (Unpublished doctoral dissertation). Ohio University, Athens, Ohio.

Zaltman, G., Duncan, R. & Holbeck, J. (1984). *Innovations and organizations.* Malabar, FL: Robert E. Krieger Publishing Company.

Zhiting, Z. & Hanbing, Y. (2001). ICT and pre-service teacher education: Towards an integrated approach. *Using ICT for Teaching, Learning and Management. OECD*. Retrieved from http://www.unescobkk.org/elib/publications / ICTPreservice.pdf

Appendix A: Questionnaire Sample

AL-Jouf University Information & Communication Technologies Survey

SECTION 1: Demographic Information

1. What is your academic discipline?	_____
2. How many years of teaching experience do you have at the university/college level?	○ 0 – 5 years ○ 6 – 10 years ○ 11 – 15 years ○ 16 – 20 years ○ Over 20 years
3. What is your gender?	○Female ○Male
4. What is your age?	○ 21 – 30 years ○ 31 – 40 years ○ 41 – 50 years ○ 51 – 60 years ○ Over 61 years

SECTION 2: ICT Use For Teaching and Learning

5. How often do you use a computer at your institution?	○ Never ○ Daily ○ 1 – 3 times/week ○ 4 – 6 times/week ○ A few times a month (____)
6. How long do you usually stay connected to the Internet during each visit?	○ Never use the Internet ○ 15 – less than 30 minutes/visit ○ 30 – 60 minutes/visit ○ 2 – 3 hours /visit ○ 4 – 5 hours /visit ○ More than 5 hours/visit

7. How often do you use ICT for..

	Never	**Several Times a year**	**2-4 Times a month**	**2-3 Times a week**	**Daily**
1. communication and/or networking					
2.personal education (own development and learning)					
3. organisation of your work and keeping records					
4. preparation of lectures					
5. posting assignments, projects information or other lecture requirements					
6. finding digital learning resources					
7. teaching					

8. How would you rate your ability to use ICT tools into your **teaching? (Please tick only one response)**

○ Non-user ○ Beginner ○ Intermediate ○ Advanced ○ Expert

9. Within your School/Department, how would you rate yourself regarding the adoption of ICT into your **teaching? (Please tick only one response)**
○ Very Low (1-10%) ○ Low (11-25%) ○ Medium (26-50%) ○ High (51-75%) ○ Very High (top 25%)

10. A)Which of the following peripherals (hardware) are available at your college for educational use?

B) How often do you use the following types of hardware for teaching and learning? Place (√) in the relevant box (please note that 'teaching and learning' includes all activities involved in the processes, including time at home, in the office etc.)

Code	Hardware item	Available		Frequency of use			
		Yes	No	Never	Rarely	Sometimes	Regularly
1	Laptop Computer for Lecturer use						
2	Desktop Computer for Lecturer use						
3	Interactive whiteboard (e.g., Smart Board)						
4	Printer						
5	Data Show projector						
6	Devices for digital image or video processing						
7	Overhead projector						
8	Graphic Tablet						
9	Document Camera						
10	scanner						
11	Mp3/iPod						
12	TV monitor/VCR/DVD player						
13	iPad or tablet computer						
14	Mobile phones						

11. a)In your college, which of the following types of software are available for academic staff for teaching and learning?

b) How often do you use the following types of software for teaching and learning? Place (√) in the relevant box (please note that 'teaching and learning' includes all activities involved in the processes, including time at home, in the office etc.)

Code	Software item	Available		Frequency of use			
		Yes	No	Never	Rarely	Sometimes	Regularly
1	Word processing, desktop publishing						
2	Spreadsheet e.g., Excel						
3	Database e.g., Access						
4	Graphics						
5	CAD (computers aided design), CAM (computer aided manufacturing)						
6	Statistical, mathematical programs						
7	Programming Languages						
8	Drill and practice programs						
9	Tutorial programs (for self learning)						
10	Simulations (e.g. Real world simulations)						
11	Educational games						
12	Recreational games/other games						
13	Internet browser						
14	E-mail software						
15	Educational software on CD-ROM						
16	Author-ware and/or audio and/or video clips.						
17	Presentation software (e.g. PowerPoint)						

12. How often do use the following online services in your college for planning and teaching. Place (√) in the relevant box

Online services	Never	Several Times a year	2-4 Times a month	2-3 Times a week	Daily
1. Social networking websites (e.g. MySpace, Flickr, Twitter or Facebook)					
2.Use instant messaging e.g. MSN					
3.Watch videos or live TV on websites (e.g. Youtube)					
4.Upload video or photo content onto the internet					
5. Participate in online discussion groups or chatrooms					
6. Use wikis/blogs/online networks					
7. Personal blog or website					
8. Access the university portal via your own PC/laptop					
9. Access the internet from your mobile/PDA					
10. Learning Management System (e.g., Blackboard)					
11. E-mail					

Section 3: Attitudes towards ICT use in teaching

13. Please indicate whether you agree or disagree with the following statements
(Strongly Disagree = SD, Disagree=D, Neutral= N, Agree= A, Strongly Agree= SA)

	SD	D	N	A	SA
1. I am interested in learning how to use ICT into my teaching.					
2. I am interested in learning how to change my pedagogy to be able to teach using ICT.					
3. I believe that ICT use in teaching would be beneficial to my students interaction and engagement.					
4. I feel ICT can have a positive impact on the way we teach					
5 I am interested in attending workshops on how to teach using ICT.					
6. Adopting ICT in teaching requires necessary curriculum reforms.					
7. I feel comfortable using ICT in my teaching					
8. I think ICT is a valuable resource in my teaching					
9. The use of ICT in my teaching will make my job easier.					
10. I feel that ICT will be useful for my teaching.					
11. I would use ICT in my teaching if I was given some incentive to do so.					
12. I would use ICT in my teaching if I saw a proven need for technology in my teaching area.					
13. I am willing to collaborate with colleague in my area to share my experience of using ICT in teaching.					

SECTION 4: Training

14. Have you ever attended training on using ICTs teaching purposes at [your institution]? ○ **Yes** ○ **No**

15. Given the opportunity to have in-service training in ICT use, what forms would you prefer? (Please select more than one if appropriate)

○ Workshops ○ Lectures ○ Intensive short-term training ○ Face-to-face tutorial

○ Online ○ All day sessions ○ General courses ○Specific Software courses

○ If other, please specify: _____

Section 5: Factors influencing ICT use in Teaching and learning

16. Please indicate whether you agree or disagree with the following statements

Some of the factors that support academics use of ICT include:	(please circle one)				
	SD	D	N	A	SA
1.Requirement by department or university					
2.Support and encouragement from the faculty					
3.Support and encouragement from peers					
4.Access to Internet/ online services in my classroom					
5.Reduced teaching load.					
6.Rewards/recognition for innovation in teaching					
7.Credit toward promotion and tenure					
8.Available classroom technology infrastructure (e.g., connections, computers,, projectors)					
9.Available equipment/resources					
10.Available training programs and support					
11.Time available to learn the use of ICT in teaching					
12.Comfort with technology					
13.Evidence of proven need for technology in my teaching area.					
14.My colleagues' computer skills					
15.My computer skills					
16.Resources about how to apply technology in teaching					
17.Evidence of improved students learning					
18.Easy to use and integrate into teaching					
19. Availability of a well-defined ICT policy					
20. Advantage over traditional teaching					

17. Please indicate whether you agree or disagree with the following statements

Some of the barriers that limit academics use of ICT include:	(please circle one)				
	SD	D	N	A	SA
1. Increase workload for academic staff					
2. Lack of equipment and infrastructure.					
3. Lack of software.					
4. Lack of time of learning about computer technologies.					
5. Lack of training options.					
6. Lack of technical support.					
7. Lack of administrative support.					
8. Lack of colleague support and interaction.					
9. Lack of self-confidence.					
10. Lack of personal interest.					
11. Lack of ICT skills					
12. Lack of contribution toward promotion and tenure					
13. Lack of available well-defined ICT policy					
14. Lack of collaboration with colleagues who teach in my area					
15. Lack of incentives for using ICT in Teaching and learning purposes					

SECTION 6: Policy Framework

18. Does your University/ college /department have policy for the use of ICT?
○Yes ○No ○In progress ○Do not know

SECTION 7: Strategies to promote ICT adoption

19. In what ways can your University/College/Department help academic staff to adopt ICT into teaching and learning? (Please select more than one if appropriate)

○Technical Support

○Rewards or incentives for using ICT in teaching

○Well-defined university ICT goal

○Increased Funding

○Training

○Provide Time

○Availability of ICT resources

○Meetings and conferences to promote interdisciplinary collaborations

○ If other, please specify: **_____**

20. Do you have any other comments you wish to add regarding your ICT use?

_____

_____

21. I would be interested in a brief follow up interview

○ **No** ○ **Yes I can be contacted on: Phone _____**
E-mail: _____

Thank you so much for completing the survey

Appendix B: Arabic Questionnaire Sample

استبانة تبني وانتشار تقنيات الاتصالات والمعلومات في جامعة الجوف للأغراض التعليمية

الجزء الأول : معلومات ديموغرافية

١. حدد التخصص :	_____
٢. كم عدد سنوات الخبرة التدريسية على المستوى الجامعي؟	o صفر- خمس سنوات o 6 – عشر سنوات o ١١- خمس عشرة سنة o ١٦ – عشرون سنة o أكثر من عشرون سنة
٣. الجنس :	○ أنثى o ذكر
٤. العمر :	o ٢١ – ٣٠ سنة o ٣١- ٤٠ سنة o ٤١ – ٥٠ سنة o ٥١ – ٦٠ سنة o أكثر من ٦٠ سنة

الجزء الثاني : استخدام تقنيات المعلومات والاتصالات

٥. كم مرة تستخدم جهاز الحاسب الالي ؟	o لا أستخدمه إطلاقا o يوميا o ١- ٣ مرات / الأسبوع o ٤- ٦ مرات / الأسبوع o مرات متعددة في الشهر
٦. كم تبقى متصلا بشبكة الإنترنت خلال كل زيارة ؟	o لا أستخدم شبكة الإنترنت إطلاقا o ١٥- أقل من ٣٠ دقيقة / زيارة o ٢- ٣ ساعة / زيارة o ٤- ٥ ساعة / زيارة o أكثر من ٥ ساعة / زيارة

٧. كم عدد مرات أستخدامك لمصادر تقنيات المعلومات والأتصالات التالية للأغراض التربوية؟ الرجاء وضع علامة (√) في المكان المخصص.

مصادر تقنيات المعلومات والأتصالات	لا أستخدمه أبدا	عدة مرات في السنة	٢-٤ مرة في الشهر	٢-٣ مرة في الأسبوع	يوميا
١. للتواصل والاتصالات					
٢. للتعلم الذاتي (تطوير القدرات الذاتية)					
٣. تنظيم عملي الأكاديمي وحفظ البيانات الخاصة					
٤. تحضير المحاضرات					
٥. وضع الواجبات والمشاريع أو المحاضرات للطلاب					
٦. البحث عن مصادر رقمية للتعلم					
٧. للتدريس					

8. كيف تقيم قدراتك في استخدام تقنيات الاتصالات والمعلومات للأغراض التربوية؟ ؟ الرجاء وضع علامة (√) واحده في المكان المخصص.

☐ لا أستخدمها مطلقا ☐ مبتدئ ☐ متوسط ☐ متقدم ☐ خبير

٩. ضمن القسم الذي تتبع له ، كيف تصنف معدل تبنيك لتقنيات الاتصالات والمعلومات في الأغراض التربوية؟ الرجاء وضع علامة (√) واحده في المكان المخصص.

☐ منخفضة جدا (١-١٠ %) ☐ منخفض (١١-٢٥ %) ☐ متوسط (٢٦-٥٠ %) ☐ كبير (٥١-٧٥ %)
☐ كبير جدا (ضمن أعلى ٢٥ %)

١٠. أي من الأجهزة التالية متوفرا في الكلية لعضو هيئة التدريس لأستخدامها للأغراض التربوية؟و ما هي درجة استخدامك للأجهزة التالية للأغراض التربوية؟ الرجاء وضع علامة (√) في المكان المخصص ..

التسلسل	الجهاز	التوفر		درجة الاستخدام			
		نعم	لا	لا أستخدمه أبدا	نادرا	أحيانا	غالبا
١	جهاز حاسب محمول لاستخدام المحاضر						
٢	جهاز حاسب مكتبي لاستخدام المحاضر						
٣	السبورة الذكية						
٤	طابعة						
٥	جهاز عرض الالكتروني						
٦	أجهزة للصور الرقمية						
٧	جهاز العرض الفوق رأسي						
٨	جهاز لوح للرسم (Graphic Tablet)						
٩	كاميرا وثائقية						
١٠	ماسح ضوئي						
١١	مشغل اصوات (ام بي ثري)/ اي بود						
١٢	شاشة عرض / فيديو						
١٣	ايباد أو حاسب لوحي						
١٤	الهاتف المحمول						

١١. من البرامج التالية متوفرا في الكلية لعضو هيئة التدريس لأستخدامها للأغراض التربوية؟وما هي درجة استخدامك للبرمجيات التالية للأغراض التربوية؟ الرجاء وضع علامة (√) في المكان المخصص.

التسلسل	البرنامج	التوفر		درجة الاستخدام			
		نعم	لا	لا أستخدمه أبدا	نادرا	أحيانا	غالبا
١	برنامج معالجة النصوص، برامج النشر المكتبي						
٢	الجداول الإلكترونية						
٣	قواعد البيانات						
٤	برامج تصميم ومعالجة الصور (مثل: Photoshop)						
٥	برامج التصميم بمساعدة الحاسب (CAD)						
٦	برامج الاحصاء						
٧	لغات البرمجة						
٨	برامج التدريب والتطبيق						
٩	برامج التمرينات (للتعلم الذاتي)						
١٠	برامج المحاكاة						
١١	الألعاب التعليمية						
١٢	ألعاب للترفية والتسلية						
١٣	متصفح ومستعرض للإنترنت						
١٤	برامج البريد الإلكتروني						
١٥	برامج تربوية مثل برامج الموسوعات						
١٦	برامج تأليف الدروس						
١٧	برمجيات العروض (مثل: PowerPoint)						

١٢. كم عدد مرات أستخدامك لمصادر تقنيات المعلومات والأتصالات التالية للأغراض التربوية؟ الرجاء وضع علامة (√) في المكان المخصص.

مصادر تقنيات المعلومات والأتصالات	لا أستخدمه أبدا	عدة مرات في السنة	٢-٤ مرات في الشهر	٢-٣ مرات في الأسبوع	يوميا
١. مواقع شبكات التواصل الأجتماعية (مثل:Facebook, MySpace, Flickr, Twitter or)					
٢. استخدام خدمات التراسل الفوري مثل: MSN Messenger					
٣. مشاهدة الفيديو أو البث المباشر على الإنترنت					
٤. رفع أفلام فيديو والصور على شبكة الإنترنت					
٥. المشاركة في مجموعات النقاش الاني أو غرف المحادثات					
٦. استخدام الويكي – المدونات (wikis/blogs/online networks)					
٧. استخدام الموقع أو المدونة الخاص بك					
٨. الدخول على نظام الجامعة من خلال حاسبك الشخصي أو المحمول					
٩. الدخول على شبكة الإنترنت من خلال هاتفك المحمول الخاص					
١٠. استخدام بوابة الجامعة الإلكترونية مثل : نظام جسور					
١١. البريد الإلكتروني					

الجزء الثالث : الاتجاهات والمواقف نحو استخدام تقنيات المعلومات والاتصالات في التدريس

١٣. حدد ما إذا كنت توافق أو تخالف العبارات التالية :

العبارة	درجة الموافقة				
	غير موافق بشدة	غير موافق	محايد	موافق	موافق بشدة
١. أنا مهتم بتعلم كيفية استخدام تقنيات المعلومات والاتصالات في تدريسي					
٢. أنا مهتم بتعلم كيفية تغيير طرق تدريسي لكي اتمكن من التدريس باستخدام تقنيات المعلومات والاتصالات زيادة المحفزات المالية					
٣.أعتقد أن استخدام تقنيات المعلومات والاتصالات في التدريس سيكون مفيدا لتفاعل الطلاب ومشاركتهم					
٤.أنا اشعر أن تقنيات المعلومات والاتصالات لها تأثير ايجابي على طريقة تدريسي					
٥.أنا مهتم بحضور ورش عمل استخدام تقنيات المعلومات والاتصالات في التدريس					
٦. تبني تقنيات المعلومات والاتصالات في التدريس تحتاج اصلاح وتطوير في المناهج					
٧.أنا اشعر بالارتياح عند استخدام تقنيات المعلومات والاتصالات في التدريس					
٨. أنا اعتقد أن تقنيات المعلومات والاتصالات مصدر ثمين يستفاد منه في التدريس					
٩. استخدام تقنيات المعلومات والاتصالات في التدريس سيجعل وظيفتي أسهل					
١٠.أنا أشعر أن تقنيات المعلومات والاتصالات مفيدة لتدريسي					
١١. سأستخدم تقنيات المعلومات والاتصالات في التدريس اذا أعطيت بعض الحوافز على استخدامها					
١٢. سأستخدم تقنيات المعلومات والاتصالات في التدريس اذا رأيت حاجة ملموسة للتقنية في مجال تدريسي					
١٣. أنا مستعد للتعاون مع الزملاء في مجال تخصصي لمشاركة التجارب والخبرات في استخدام تقنيات المعلومات والاتصالات في التدريس					

الجزء الرابع : التدريب على استخدام تقنيات الاتصالات والمعلومات للأغراض التربوية

١٤. هل سبق أن حضرت أية تدريب على استخدام تقنيات الاتصالات والمعلومات للأغراض التربوية؟
(الرجاء ضع علامة (√)في المكان المخصص)

☐ **نعم** ☐ **لا**

١٥. إذا اتيحت لك فرصة التدريب أثناء الخدمة على استخدام تقنيات الاتصالات والمعلومات للأغراض التربوية أي شكل من أشكال التدريب تفضل (الرجاء وضع علامة (√) في المكان المخصص)

☐ **ورش عمل** ☐ **محاضرات** ☐ **تدريب مكثف قصير المدى** ☐ **تدريب وتمرين وجها لوجه**
☐ **مباشر عن طريق شبكة الأنترنت (اونلاين)** ☐ **جلسات لمدة يوم كامل** ☐ **مقرر عام**
☐ **مقررات خاصة ببرامج وتطبيقات الحاسب** ☐ **غير ذلك ، الرجاء تحديده** _____

الجزء الخامس : العوامل المؤثرة في استخدام تقنيات المعلومات والاتصالات في التدريس
١٦. حدد ما إذا كنت توافق أو تخالف العبارات التالية :

العوامل التي تساعد على استخدام تقنيات الاتصالات والمعلومات	درجة الموافقة على العبارة				
	غير موافق بشدة	غير موافق	محايد	موافق	موافق بشدة
١. كونه متطلبا من قبل القسم أو الجامعة					
٢. الدعم والتشجيع من قبل الكلية					
٣. الدعم والتشجيع من قبل أعضاء هيئة التدريس					
٤. الوصول لخدمات الانترنت داخل الصف الدراسي					
٥. تقليل العبء التدريسي					
٦. الجوائز والاعتراف بالابتكارات في التدريس					
٧. جعله رصيد لعضو هيئة التدريس عند الترقية والعلاوات					
٨. توفر البنية التحتية التقنية في الفصل الدراسي (التوصيلات، الحاسبات، ادوات العرض)					
٩. توفر الأجهزة و المصادر					
١٠. توفر برامج التدريب والدعم					
١١. توفر الوقت للتعلم على استخدام تقنيات المعلومات والاتصالات في التدريس					
١٢. الشعور بالارتياح عند استخدام التقنية					
١٣. دلائل مثبتة للحاجة للتقنية في مجال التدريس الخاص بي					
١٤. المهارات التقنية لزملائي					
١٥. مهاراتي التقنية					
١٦. مصادر لكيفية استخدام وتطبيق التقنيات في التدريس					
١٧. دلائل على تحسن مستوى التعلم لدى الطلاب					
١٨.سهولة الاستخدام والدمج في التدريس					
١٩. توفر سياسة واضحة لاستخدام تقنيات المعلومات والاتصالات					
٢٠. أفضلية استخدام تقنيات المعلومات والاتصالات في التدريس على الطرق التقليدية للتدريس					

١٧. حدد ما إذا كنت توافق أو تخالف العبارات التالية :

العوامل التي تعيق استخدام تقنيات الاتصالات والمعلومات	درجة الموافقة على العبارة				
	غير موافق بشدة	غير موافق	محايد	موافق	موافق بشدة
١. زيادة العبء التدريسي لعضو هيئة التدريس					
٢.قلة الأجهزة وضعف البنية التحتية					
٣. عدم توفر البرمجيات لعضو هيئة التدريس					
٤. عدم توفر الوقت الكافي لتعلم تقنيات المعلومات والاتصالات لعضو هيئة التدريس					
٥. عدم توفر خيارات التدريب على تقنيات المعلومات والاتصالات لعضو هيئة التدريس					
٦. عدم توفر الدعم التقني لعضو هيئة التدريس					
٧. عدم توفر الدعم الإداري لعضو هيئة التدريس					
٨. عدم توفر التفاعل و الدعم من قبل الزملاء لعضو هيئة التدريس					
٩. عدم توفر الثقة بالنفس لعضو هيئة التدريس					
١٠. عدم توفر الاهتمام الشخصي بتقنيات المعلومات والاتصالات					
١١. عدم توفر المهارات التقنية لعضو هيئة التدريس					
١٢. عدم اسهام استخدام تقنيات المعلومات والاتصالات في الترقية والتثبيت					
١٣. عدم توفر سياسة واضحة لاستخدام تقنيات المعلومات والاتصالات من قبل عضو هيئة التدريس					
١٤. عدم توفر التعاون من قبل الزملاء الذين يدرسون في نفس المجال					
١٥. عدم توفر المحفزات على استخدام تقنيات المعلومات والاتصالات في أغراض التدريس والتعلم					

الجزء السادس : اطار وسياسة استخدام تقنيات المعلومات والاتصالات في التدريس

١٨. هل لديك علم بتوفر خطة وسياسة للجامعة /الكلية/ القسم لاستخدام تقنيات الاتصالات والمعلومات للأغراض التربوية؟ (الرجاء ضع علامة (√) على ماينطبق على الجمل التالية)

☐ **نعم** ☐ **لا** ☐ **الخطة تحت الاعداد والتطوير** ☐ **لا أعلم**

الجزء السابع : استراتيجيات تساعد على استخدام تقنيات المعلومات والاتصالات في التدريس

١٩. بأي الطرق التي يمكن للجامعة / الكلية / القسم مساعدة عضو هيئة التدريس لتبني أستخدام تقنيات الأتصالات والمعلومات في عملية التعليم والتعلم؟(الرجاء ضع علامة (√) على ما ينطبق على الجمل التالية):

☐ الدعم التقني
☐ سياسة واضحة لاستخدام تقنيات المعلومات والاتصالات من قبل عضو هيئة التدريس
☐ توفير جوائز ومحفزات على استخدام تقنيات المعلومات والاتصالات في أغراض التدريس والتعلم
☐ زيادة الدعم
☐ توفير خيارات متنوعة للتدريب على تقنيات المعلومات والاتصالات
☐ توفير وقت الكافي لتعلم تقنيات المعلومات والاتصالات لعضو هيئة التدريس
☐ توفير مصادر تقنيات المعلومات والاتصالات للاستخدام في أغراض التدريس والتعلم
☐ المؤتمرات والاجتماعات لتشجيع التعاون بين مختلف التخصصات على استخدام تقنيات المعلومات والاتصالات للأغراض التربوية
☐ غير ذلك ، الرجاء تحديده _____

٢٠. هل لديك أية تعليقات أخرى تود إضافتها فيما يخص أستخدام تقنيات الأتصالات والمعلومات ؟

_____

_____

٢٠. أنا لدي استعداد للمساهمة في المقابلات

☐ **لا** ☐ **نعم ويمكن التواصل معي على : هاتف**_____

بريد الكتروني _____

شكرا جزيلا لوقتك و تعاونك على إتمام هذه الاستبانة

Appendix C: Participant Information Sheet

Dear Academic staff Member

The attached questionnaire is part of a dissertation study being conducted at the School of Education at Curtin University of Technology which focuses on the use of Information & Communication Technology (ICT) by education academic staff members in AL-Jouf University.

The aim of the questionnaire is to identify the ICT environment at the University and determine the ICT profile of the academic staff within College of Education. I would appreciate your assistance by completing this questionnaire. Your feedback is extremely important for the success of this study. It is important to note that your participation in this study is purely voluntary. It is estimated that the questionnaire should not take more than 10-15 minutes to complete. The information will be used for research purpose only. Confidentiality of your identify and data will be guaranteed. This study has been approved by the Curtin University Human Research Ethics Committee, (Reference No. ##########).

Please complete the attached questionnaire within one week and return it to the mailing box, which will be placed in the office of the secretary of your deanship. If you have any questions regarding this study, please feel free to contact me at or call at.
Thank you for your participation.

Zayed Alruwaili
PhD Candidate
Department of Education
Curtin University of Technology

Appendix D: Participant Consent Form

The Adoption and Diffusion of Information and Communication Technologies Among Teaching Staff at Al-Jouf University in Saudi Arabia

Participant statement

I …….. (Print Full Name)

have read the information on the attached information sheet regarding this study titled 'The Adoption and Diffusion of Information and Communication Technologies Among *Teaching Staff at Al-Jouf University in Saudi Arabia'*. The nature, purpose and intent of this study have been explained to me as well as the requirements of participation including the collection of field notes. I agree to have the interview tape recorded.

I have also been informed where to direct any future questions. I also understand that I can withdraw at any time without explanation or consequences. I understand that my anonymity, privacy and confidentiality are guaranteed. I voluntarily agree to participate in this study.

I am aware that information gathered from me for this study may be published and all names or any other identifying information will not be used.

Signature …….. Telephone……..

Signature …….. Researcher …….

Date …….

Appendix E: Semi-Structured Interview Questions

Follow –up Interviews Questions

1. How would you rate your ICT skills on a scale of 1-5 where 1 is poor and 5 is excellent?

   1 2 3 4 5

2. What is your reasoning there?
3. when and what was the last training session you attended?
4. Given the opportunity to have in-service training in ICT use, what form would you prefer?
5. How would you rate the adequacy of your work facilities on a scale of 1-5 where 1 is poor and 5 is excellent?

   1 2 3 4 5

6. What is your reasoning there?
7. How would you rate your ICT skills on a scale of 1-5 where 1 is poor and 5 is Advanced?

   1 2 3 4 5

8. What is your reasoning there?
9. Can you describe ICT facilities available for academic staff members to use in their teaching?
10. Within your School/Department to what degree do you rate yourself regarding the adoption of ICT into your teaching?

    1. Very Low 2.Low 3.Medium 4.High 5.Very High

11. What do you see the benefits of adopting ICT into your teaching for yourself?
12. In your opinion, what do you think are the factors that impact the effective use of the ICT in the academic environment ?
13. In your opinion, what do you think are the biggest barriers that hinder the effective use of the ICT in the academic environment ?
14. In your opinion, what could your university do to promote the effective use of the ICT among teaching staff?
15. what changes are necessary for the university and/or for teaching staff from your perspective?

Appendix F: Questionnaire Panel Experts

Dr. Salem Basunduah, Department of Educational Psychology &Leadership, Al-Jouf University (Saudi Arabia)

Dr. Mohammed AlBalkhi, Department of Educational Curriculum and Instruction, ،Al-Jouf University (Saudi Arabia)

Dr. Yousef Abdualghani, Department of Arabic Education, Al-Jouf University (Saudi Arabia)

Dr. Aseam Abdelatea, Department of Educational Curriculum and Instruction, ،Al-Jouf University (Saudi Arabia) .

Dr. Mohammed Abdulraoaf, Department of Educational Psychology and Leadership, Al-Jouf University (Saudi Arabia)

Dr.Nedhal Al-Taani, Department of Educational Technology ،Al-Jouf University (Saudi Arabia)

Dr.Islam Allam, Department of Educational Technology ،Al-Jouf University (Saudi Arabia)

Dr.Walead Jalal, Department of Educational Technology ،Al-Mansurah University (Egypt)