Preparing Pre-service Teachers for the Effective Use of Educational Technology in Saudi Arabia

Submitted by

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Abstract

The aim of this thesis was to investigate the possibilities and limitations for the effective integration of digital technologies in the pre-service teacher education curriculum in Saudi Arabia. In the context in which there is too little teacher preparation and related training, the issue of technology integration in teaching and learning is widely reported to be problematic. Despite its rapidly developing economic base and government support for technology adoption, Saudi Arabia remains culturally and socially very conservative. These traditions appear linked with reluctance to deliver pedagogical change.

To test the relationship that exists between teaching practices in Saudi higher education, specifically pre-service teacher preparation, the research involved a mixed-method study approach that included document analysis, survey questionnaires, and semi-structured interviews. Participants included policymakers (n = 3), academic instructors (n = 50), and pre-service teachers (n = 325). Investigative issues consisted of three main perspectives. First, the technological perspective studied the participants' digital technologies construct, perceived self-efficacy and awareness of technology importance and usefulness. Second, the pedagogical perspective considered the curriculum design and its associated technology-based pedagogical practices. Third, the administration perspective focused on four key roles of leadership, which included the importance of technology integration, infrastructure, training and support, and the importance of building a technology resource base.

The core result of the current study is that the effective integration of digital technologies in pre-service teacher education seems to be very challenging at the present time. Although all groups of participants generally had some difficulties conceptualising the effective integration of technology, other results were optimistic. Participants reported high levels of technology familiarity, expertise, awareness and self-efficacy. However, three major challenges were identified. First, the domination of cultural-religious conservatism on Saudi pre-service teacher education curriculum; second, the domination of traditionalism on the current curriculum design and associated pedagogical practices; and third, the continuing centralisation in the process of defusing, supporting and operating technology.

Context-appropriate recommendations include enhancing instructors and pre-service teachers' technological beliefs, enforcing innovative technology-based pedagogical models, and developing effective leadership.

Statement of Authorship

- Except where reference is made in the text of the thesis, this thesis contains no material published elsewhere or extracted in whole or in part from a thesis submitted for the award of any other degree or diploma.
- No other person's work has been used without due acknowledgment in the main text of the thesis.
- This thesis has not been submitted for the award of any degree or diploma in any other tertiary institution.
- All research procedures reported in the thesis were approved by the University Human Ethics Committee (UHEC) at La Trobe University (# 08-077).

Date: 25 / 11 / 2011 **Signature** ....

Abdulrahman M. Al-Zahrani

Dedication

I dedicate all my achievements including this thesis and to my great father Mohammed and my lovely Mother Maleha who both wished me to have the best of everything they missed.

I also dedicate my success to my soul mate, my wife, Sharifah Al-Zahrani and my lovely children, Mohammed, Sarah, Shahad, Joud and Jumana.

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Prophet Mohammed (Peace Be Upon Him) said '*He who would not be thankful to people, he will not be thankful to Allah*' (Reported by Ahmed). I wish to thank all those who helped me. Without them, I could not have completed this thesis.

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List of Abbreviations

CITC	Communication and Information Technology Commission
DET	Department of Educational Technology
DSL	Digital Subscriber Line
EDP	Eighth Development Plan
EPSA	Educational Policy in Saudi Arabia
ERC	Educational Resources Centre
ERfKE	Education Reform for the Knowledge Economy
GITEX	Gulf Information Technology Exhibition
ICT	Information and Communication Technology
ISTE	International Society for Technology in Education
KACST	King Abdulaziz City for Science and Technology
LMS	Learning Management Systems
MANOVA	Multivariate analysis of variance
MCIT	Ministry of Communications and Information Technology
MoE	Saudi Ministry of Education
MoEP	Ministry of Economy and Planning
MoHE	Saudi Ministry of Higher Education
MTC	Micro Teaching Centre
NCES	National Centre for Education Statistics
NCITP	National Communications and Information Technology Plan
PSTE	Pre-service teacher education
SA	Saudi Arabia
SAHCI	Saudi Arabian Home Computing Initiative
UHEC	University Human Ethics Committee

Chapter 1 INTRODUCTION AND OVERVIEW

1.1 Introduction

For the last few decades, Saudi Arabia has boomed economically. As a rapidly developing Islamic country, Saudi Arabia has willingly partaken in global digital technology developments. Largely through earnings linked with the petroleum industry, this wealth has aided health, public education, higher education, and levels of consumption of technology (Al-Issa, 2009; Bank Audisal, 2008; Hartley & Al-Muhaideb, 2007; Joseph & Lunt, 2006; Nelson, 2010; Onsman, 2011; Ramady, 2010; Saudi Ministry of Education [MoE], 2005; Zeen, 2007). Despite the fact that Saudi Arabia has been considered a mono-cultural and conservative society from both insider (Al-Asmari, 2008) and outsider (Burkhart & Goodman, 1998) viewpoints, it provides significant insights into cultural change associated with the global competitiveness of the digital age (Onsman, 2011). This study sought to better understand the impact of these challenges on teacher education, particularly in the context of technology integration.

In Saudi Arabia, there is strong public policy that supports the development of new technologies in all aspects of daily life, including the education sector. In releasing its Eighth Development Plan (EDP) 2005–2009, the Saudi Arabian government brought into focus the nation's challenges in the current era. In particular, the Saudi Ministry of Economy and Planning (MoEP) in the EDP has stressed four important demands, which are improving and expanding the current digital technology infrastructure, expanding Arabic online content, bridging the digital gap between all segments of the nation, and applying the concept of e-government (MoEP, 2005).

In addition, the Ministry of Communications and Information Technology (MCIT) took the initiative of formulating and implementing the National Communications and Information Technology Plan (NCITP) in 2007. This plan sets out a long-term vision for transforming Saudi Arabia into an information society and increasing productivity through providing Information and Communication Technology (ICT) services for all sectors and parties of the Saudi community (MCIT, 2007). As one implication of this plan, the Communication and Information Technology Commission (CITC) has started sponsoring the Saudi Arabian Home Computing Initiative (SAHCI) that has the core mission of enabling all Saudi families to obtain a personal computer through an easy and affordable instalment plan (CITC, 2010). Through cooperation with private sectors, the mission of the CITC is also to provide support and supervision to ensure that this initiative fulfils the long-term vision of the NCITP (CITC, 2010).

Most recently, in the educational policy, the MoE has released its Ten-Year Plan 2004–2014, which includes the goals of developing the required infrastructure for digital technology to be better implemented in education (MoE, 2005).

1.2 Overview of Saudi context and background

This section provides general information relevant to Saudi history, culture and development. It also discusses Saudi technological transformation in relation to globalisation and technology consumption. An overview of Saudi education, leadership and policies is further provided. Finally, this section focuses on the implementation of technology in Saudi education.

1.2.1 Saudi history, culture and development

Saudi Arabia is located in the southern part of Asia and occupies almost four-fifths of the Arabian Peninsula. The first state of Saudi Arabia was established in the early eighteenth century. This state was expanded and named the Kingdom of Saudi Arabia in 1932 by King Abdulaziz ben Abdulrahman Al-Saud (Ministry of Foreign Affairs, 2006). Since the establishment of Saudi Arabia, it has played an important role in the Gulf region and the Arab world as well as worldwide (Onsman, 2011). After discovering oil in Saudi Arabia in the early 1930s, Saudi Arabia started to use the income from the petroleum industry to improve the country in various areas and at different levels. The speed of its developments has been fascinating. For instance, Krieger (2007) expresses that 'Saudi Arabia has been developing at breakneck speed since the end of World War II, when oil production transformed this country of Bedouins into one of the richest polities in the world' (p. 1). The most dramatic changes have been observed in terms of the economy and social change (Ramady, 2010). Modern Saudi Arabia ranks first in the world in oil reserves, production and exports. The estimated amount is more than 25 per cent of the world's total (Ministry of Petroleum and Mineral Resources, 2009). The increasing economic role of Saudi Arabia allowed the state to join the World Trade Organization in 2005 and meet its obligations (Ramady, 2010). Figure 1-1**Error! Reference source not found.** shows the map of Saudi Arabia with its main 13 administrative regions.

Figure 1-1: The map of Saudi Arabia (Source: Ministry of Interiority. Accessed July 30, 2011, from: http://www.riyadh.gov.sa/Eng/EngKSA.asp)

The Saudi Arabian population is growing rapidly. Population growth in Saudi Arabia is considered one of the most booming rates globally (Al-Issa, 2009). According to the Saudi Central Department of Statistics and Information, the most recent statistics indicate that the Saudi population in 2010 was about 27 million people with a growth rate of 3.2 per cent since 2004 (Central Department of Statistics & Information, 2010). The Saudi population is projected to reach 43 million by 2025 (Al-Hamed, 2007). While this goes against global trends with economic development, the Saudi rapid growth rate can be considered a result of its economic boom in addition to other cultural and religious factors. Saudi wealth has aided the creation of a more stable environment with proper social services such as work, housing and healthcare (Al-Hamed, 2007). A case in point, Krieger (2007) affirmed that, ‘the country’s oil wealth has led to a sweeping rise in living standards and subsequent population surge’ (p. 2). From another perspective, as an Islamic culture, Saudi Arabian people tend to have and prefer large families.

Culturally, Saudi Arabia is an Islamic country with the *Holy Quran* as its constitution and Arabic designated as its national language. The two holiest cities (Makkah and Al-Madina) of the Islamic world are located in Saudi Arabia. Hence, Saudi Arabian culture can be defined as a mixture of social, historical, and religious principles that influence individuals’ behaviours, practices, relationships and worldviews (Al-Aqeel, 2005; Al-Issa, 2009; Saleh, 1987). Saudi Arabia is essentially driven by strong social and religious beliefs. In fact, Islamic law, known as *Shariah,* dominates Saudi culture, identity and the entire social life, especially education, which is essentially religious (Al-Aqeel, 2005; Al-Issa, 2009; Bingimlas, 2010; Krieger, 2007; Ministry of Foreign Affairs, 2006; Oyaid, 2009; Prokop, 2003).

Al-Asmari (2008) classified Saudi culture from an emic perspective as ‘Islamic, Arabic, mono-cultural, and conservative context’ (p. 5). Accordingly, Saudi people may contradict ideologies that might conflict with their cultural customs and/or religious fundamentals or beliefs. For example, Ziadah (2007a) warned that globalisation would lead Saudi national identity to melt by causing tension between the local and the global cultures. Hence, it is acceptable in such a context to value and prefer centralised systems that may assist in protecting religious and cultural fundamentals from being exposed to incompatible cultures, especially those that are western-related. According to Al-Asmari (2008), this role of authority in conservative contexts such as Saudi Arabia can be better described by what is known as ‘cultural sheltering’, which he defined as ‘the proactive measures undertaken by authority figures/educators in a conservative environment to minimise perceived threats to C1 by blocking exposure to FC’ (p. 250). In this definition, C1 refers to local culture, while FC means foreign culture.

From an outsider’s perspective, Burkhart and Goodman (1998) argue that ‘the Saudi society remains one of the world’s most conservative’ (p. 22). More recently, Krieger (2007) mentions that Saudi Arabia is still strongly committed to its social and religious character. Therefore, introducing any cultural change into Saudi Arabia is not an easy task. It requires long-term development and strong influential factors. Burkhart and Goodman (1998) point out that:

> Changes come slowly, usually preceded by extensive debate. Religious and social concerns are often more important than technical or economic benefits. In turn, telegraph, telephone, television, and now the Internet have been denounced as systems that could easily be abused, only eventually to be controlled and accepted. (p. 22)

However, there is no doubt that societies change. In Saudi Arabia, Al-Saif (1997) concluded several important factors that are responsible for social and cultural change. Some of these factors are the country's unity, stability and peace coupled with its good fortune in terms of oil, minerals and many natural resources. Ramady (2010) mentions other factors, such as the increase in the population, the economic growth, and changes in the social structure. Globalisation can be also a strong factor (Al-Aqeel, 2005; Ziadah, 2007a). Recently, Saudi Arabia has experienced many remarkable changes. For instance, more openness to the world; increased migration from rural areas to urban cities to seek better opportunities; an increase in imported labour in either specialists or general workers; increased consumption of new technologies; and increased private businesses and trading activities (Al-Aqeel, 2005; Aba-nama, 1995).

Despite the success of Saudi modernisation and development, especially in the last three decades, Saudi Arabia has succeeded in preserving and strengthening its cultural principles and beliefs, especially in education (Al-Issa, 2009; Krieger, 2007). In doing this, Saudi Arabia aimed to prepare its society for the challenges of the twenty-first century by embracing a modern approach while also conserving its uniqueness (Ramady, 2010). While preserving its cultural and religious fundamentals, Saudi Arabia recently started thinking, acting and interacting differently. With a more global outlook, 'opening up to the rest of the world by a process of inter-faith dialogue, fostering a culture of moderation and dealing with other nations and cultures based on mutual respect' have been three important demands in Saudi Arabia (Ramady, 2010, p. 4). In this regard, it can be argued that 'ultimately, international competitiveness is likely to impact significantly and possibly irrevocably on Saudi cultural traditions and religion norms' (Onsman, 2011, p. 1).

1.2.2 Saudi technological transformation

Linked with the change in Saudi Arabia is the technological transformation. The consumption of technology has dramatically increased in Saudi Arabia recently. The country consumes an enormous amount of technology every year due to society's technological transformation. In addition, this sizeable consumption of technology lessens Saudi's dependency on its oil industry and builds a strong economic system, which is anticipated to be 'one of the top 10 competitive economies in the world' within the coming few years (Bank Audisal, 2008, p. 3). More recently, many observers such Krieger (2007), Ramady (2010), and Onsman (2011) noted that the Saudi government's primary aim is to lessen the dependence on its oil industry that is predicted to come to an end in less than 100 years.

Leaders in Saudi Arabia have devoted much effort to adopting new technologies and coping with enhanced technological development, globally. This increase in the variety of available technologies has provided the Saudi community with various resources for entertainment and research (Al-Towjry, 2005). Al-Towjry (2005) also demonstrated that most Saudi families have at least one computer, one telephone line, one mobile phone and one satellite television. For instance, according to the latest statistics of the MCIT (2011), the mobile phone market has been experiencing massive developments in terms of both quality and quantity. In 2001, the total number of mobile users did not exceed 3 million. This number grew to more than 53 million by the end of the first quarter of 2011 (see Figure 1-2).

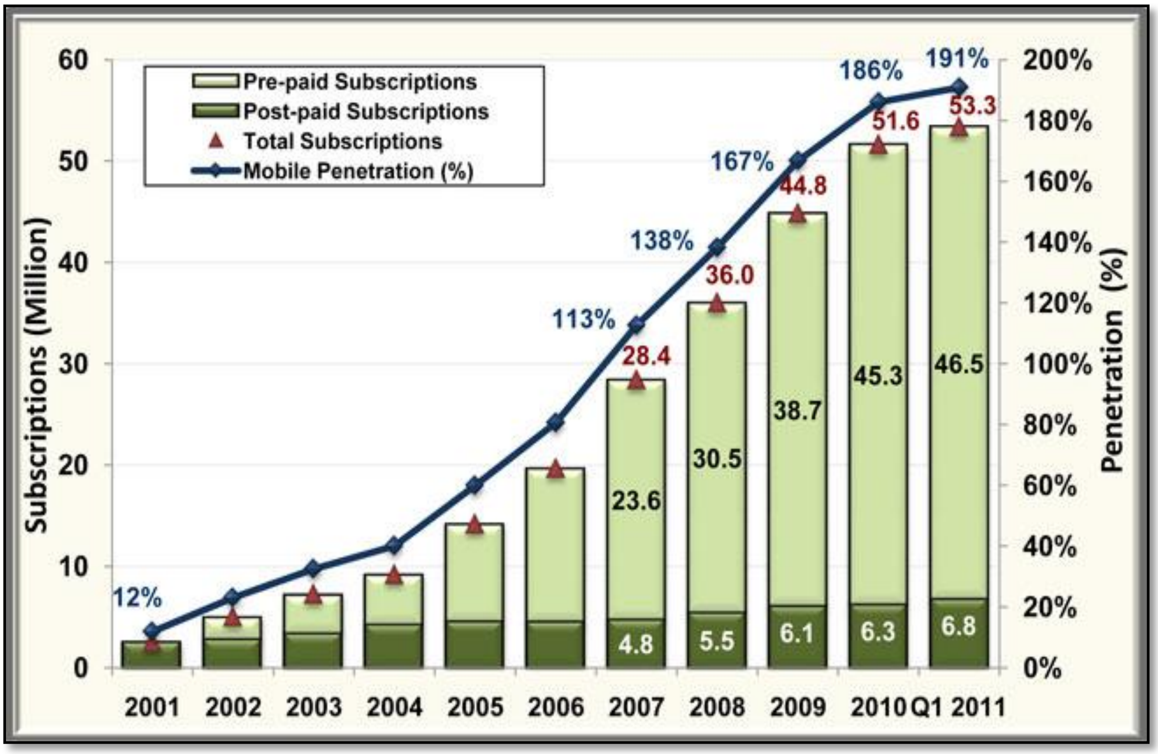

Figure 1-2: Saudi Mobile phone market (MCIT, 2011)

Further, investment in the technology business in Saudi Arabia has boomed recently. Sutton (2007) reported that Saudi Arabia's disbursement on security solutions was the largest in the Gulf being 41 per cent of the total market of this region. The investment in the technology industry in Saudi Arabia has expanded from US$2.92 billion in 2006 to US$3.4 billion in 2007 (Bank Audisal, 2008). Moreover, according to the ninth International Gulf Information Technology Exhibition (GITEX) for Saudi Arabia held concurrently with Saudi Communications (GITEX Saudi Arabia, 2010), the Saudi market for software solutions remains the largest in the Gulf region with a value of value of $637 million in 2009. This market is expected to grow at 12 per cent over the forecast 2008–2013 period (GITEX Saudi Arabia, 2010).

Internet services emerged in Saudi Arabia in 1994 for academic, medical and research purposes. They were officially made available in 1997 by a ministerial decision for public access and finally released in 1999 (Communications and Information Technology Commission, 2011). The Internet is commonly accessible and available through five main mediums: dial-up, Digital Subscriber Line (DSL), satellite, wireless networks and broadband connections (Communications and Information Technology Commission, 2011). Internet usage in the Gulf region grew by more than 300 per cent between 2000 and 2005, whereas in Saudi Arabia, it was 1,000 per cent (Joseph & Lunt, 2006). Figure 1-3 presents the growth in the Internet market in Saudi Arabia between 2001 and 2011.

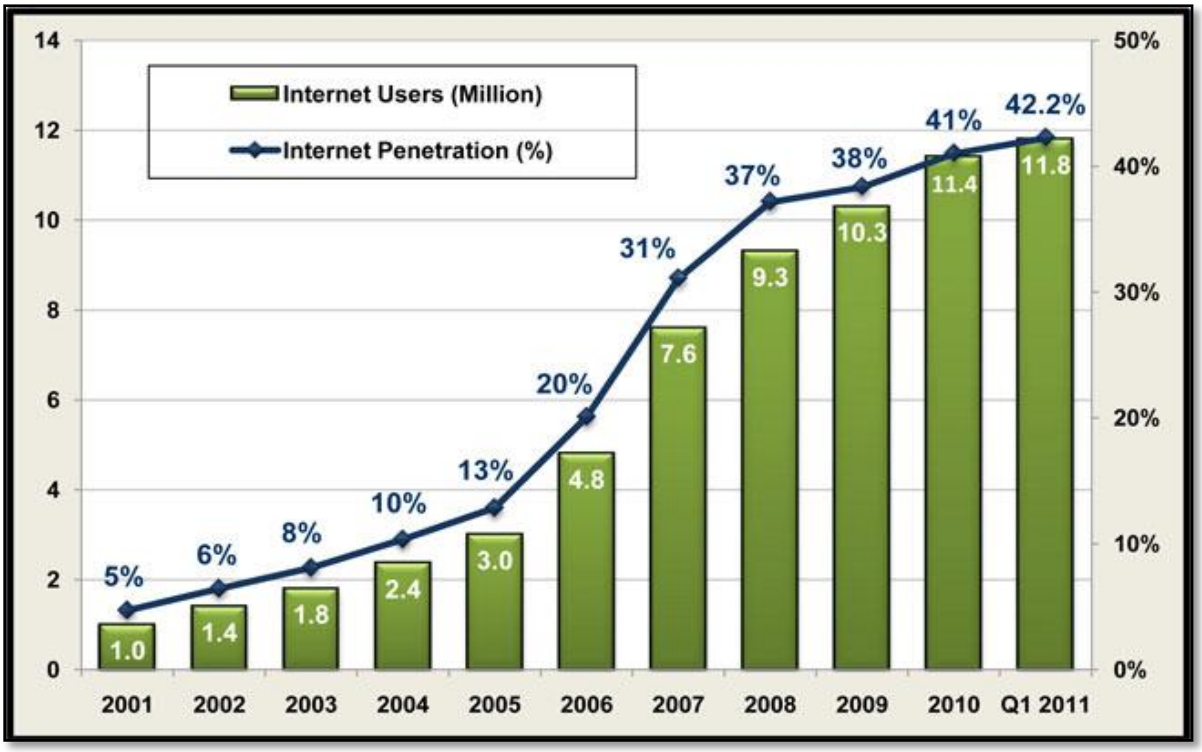

Figure 1-3: Internet market in Saudi Arabia (MCIT, 2011)

According to the Internet World Stats (2010), the number of Internet users in Saudi Arabia has increased from only 200,000 in 2000 to 9.8 million users in 2010. As shown in Figure 1-3, this number is estimated to reach about 12 million users at the end of the first quarter of 2011, with a diffusion increased to 42 per cent of the population (MCIT, 2011). This indicated that the number of Internet users in Saudi Arabia has grown by about 800 per cent between 2000 and 2010 (Internet World Stats, 2010). In addition, the number of Facebook users reached nearly 2.6 million users on August 2010 (Internet World Stats, 2010). However, these numbers are expected to triple within the next few years.

However, despite this, restrictions are still applied on Internet access and the only way to access the Internet is via the Communications and Information Technology Commission. This Commission is a highly specialised institution authorised by the government and charged with regulating the ICT sector in Saudi Arabia. The Commission also monitors Internet access and blocks any websites that are considered culturally or religiously inappropriate, such as pornographic, anti-religious, and violence-related websites (Communications and Information Technology Commission, 2011).

1.2.3 Overview of Saudi education, leadership and policies

Educational policies in Saudi Arabia emerged from Islamic ideology, which is widely accepted as a way of living, conducting relationships, and devising strategies and systems (Abd-Al-Jawad, 2005; Al-Aqeel, 2005; Metwalli, 2008a; MoE, 1980). Education in Saudi Arabia is completely free and shaped by four main factors including Islam, the Arabic language (the language of the *Holy Quran*), centralised monarchy political views and finally economic growth (Al-Aqeel, 2005; Al-Garfi, 2010; Al-Sonbol, 2008; Metwalli, 2008a). Thus, the education system as a whole is subject to the Supreme Committee for Education Policy that is responsible for planning, supervising, directing and funding education (Al-Aqeel, 2005; Al-Sonbol, 2008). The main goals of the educational policy are to eliminate illiteracy among Saudi citizens; to ensure more efficiency for education as well as to ensure equal access to education for both boys and girls, and finally to meet the country’s needs in its religious, social, cultural, and economic development (Abd-Al-Jawad, 2005; Al-Aqeel, 2005; Al-Garfi, 2010; Metwalli, 2008a; MoE, 1980; Ramady, 2010). According to Al-Issa (2009), more than five million Saudi students, both males and females, are officially enrolled in the education system. In 2008, the amount of government spending on the education sector in Saudi Arabia was the second highest in the world at more than US$20 billion, representing 25.45 per cent of the general Kingdom budget (Al-Issa, 2009). A case in point, Onsman (2011) confirms that Saudi Arabia currently has a multi-billion dollar investment dedicated to building new schools and universities. This is to increase the productivity of its education sector and lessen the dependency on the oil industry (Onsman, 2011).

However, despite the main goals and the expansion of Saudi education quantitatively (Al-Aqeel, 2005), there was no evolution in terms of pedagogical and educational philosophical foundations (Al-Issa, 2009, 2010). Educational policy in Saudi Arabia needs to be revised and updated with more global goals and relevant practical objectives (Abd-Al-Jawad, 2005; Al-Aqeel, 2005). Al-Issa (2009; 2010) argues that Saudi education generally focuses too much on teaching Islamic knowledge and the Arabic language in all stages of public education over other areas such as natural sciences, mathematics and social studies. Saudi education also seems to be conditional upon the traditional model of teacher-centred education (Al-Aqeel, 2005; Al-Otaibi, 2007; Bingimlas, 2010; Krieger, 2007; Oyaid, 2009). Factors that have contributed to the formulation of Saudi teachers' traditional role can be summarised in four points, according to Al-Otaibi (2007):

1. The initial preparation of Saudi teachers is heavily dominated by traditionalism and lacks effective access to global and modern trends including technology.
2. Saudi teacher preparation is isolated from the requirements of the social organisations of the society such as schools.
3. There is a hidden resistance to the role of technology by many in-service teachers, especially those who avoid change and prefer traditional methods of teaching.
4. The prevailing style and/or culture of leadership in schools often prefers traditional teachers who act traditionally and move away from the new approaches that may bring trouble for the management.

These factors have resulted in moulding students so that they act and think in a similar way. Students always revolve in the orbit of their traditional teacher (Al-Aqeel, 2005; Al-Otaibi, 2007). Other cultural-religious issues also contribute to the enhancement of this role. For instance, Saudi students who are typically conceptualised as only receivers ultimately respect their teachers' identity, knowledge and practice (Al-Aqeel, 2005; Al-Gamedi, 2005a; Al-Otaibi, 2007; Bingimlas, 2010; Oyaid, 2009). Teaching from the

Islamic perspective is highly respected, as it is the profession of prophets and apostles (Al-Gamedi, 2005a; Metwalli, 2008a, 2008b).

In relation to policy, educational policies in Saudi Arabia lack relevant practical objectives in their performance (Al-Miman, 2003). Some of these policies have not been implemented at all and other policies have been applied inappropriately in accordance with Al-Miman (2003) who also found that:

- Centralisation is controlling the educational administration, which results in inadequate staff in terms of both quality and quantity, monotony, routine, and fewer opportunities for renewal and change.
- There is a dissociation between the functions of educational institutions, creating misconceptions and disturbances in the learners' vision, concepts and behaviours.
- There is a lack of adequate infrastructure in schools, such as laboratories and audio-visual equipment.

With a similar point of view, Al-Otaibi (2007), Al-Sonbol (2008), and Al-Issa (2010) emphasised that the Saudi educational system suffers from centralisation, like the rest of the educational systems in the Arab world. All decision-making processes related to education are in the hands of the central educational authority including determining the educational needs, building schools, appointing teachers, staff and personnel, and determining curricula content and textbooks (Al-Issa, 2010; Al-Otaibi, 2007; Al-Sonbol, 2008). This system has negatively reflected on the efficiency of Saudi education and resulted in more complex bureaucracy and an apparently boring routine (Al-Issa, 2010; Al-Otaibi, 2007). Centralisation also has other consequences such as the lack of innovative leaders, the lack of attention dedicated to research and development, and the lack of financial resources (Al-Sonbol, 2008; Al-Issa, 2010). Most significantly, human resources working under central regulations usually resist change, in spite of its importance to the organisation (Al-Issa, 2010; Al-Otaibi, 2007).

Despite the fact that globalisation may threaten Saudi identity (Abd-Al-Jawad, 2005; Al-Aqeel, 2005; Ziadah, 2007a), ensuring the delivery of an appropriate education to cope with its propositions seems to be a non-existent concern in Saudi Arabia (Al-Issa, 2009, 2010). In this regard, Al-Mane (2004) conducted a study aimed at investigating global education in Saudi Arabian schools and teachers' attitudes towards it. Al-Mane (2004) found that curricular activities place emphasis on national, cultural and religious principles.

Activities that contribute to building independent learning skills and socially interactive personality are only partly emphasised. Finally, activities that enhance or develop knowledge about global changes and international relationships do not exist at all. Conversely, a high percentage of the teachers' sample had not heard about global education so they did not understand the importance of its implications on the educational system.

Regarding the challenges of globalisation in Saudi Arabia, the education system needs to be improved to meet these challenges. The biggest challenge of globalisation is preserving the Saudi cultural-religious identity (Abd-Al-Jawad, 2005; Al-Aqeel, 2005; Ziadah, 2007a). In this context, education should emphasise the Arabic–Islamic character as a fixed constituent in the Saudi national identity (Abd-Al-Jawad, 2005; Al-Aqeel, 2005; Ziadah, 2007a). Curricula are in charge of stressing Saudi history, geography, heritage, values and the *Holy Quran* (Abd-Al-Jawad, 2005; Al-Aqeel, 2005; Ziadah, 2007a).

Another significant challenge of globalisation is how to meet the accelerated market needs. Ramady (2010) argues that the Saudi educational system should be reformed in line with market needs. Further, Al-Jarf (2004) recommends that it is important to offer a course on global education in junior and high schools. The importance of this course would be in assisting students to understand the world as a group of related and cooperating relationships and cultures, to analyse and participate effectively in global issues, and to understand the relationships between their own country and other countries. Al-Bakr (2004) stresses the necessity of a total revision of the current educational system's objectives. These objectives should adopt educational concerns, not only the ideological ones. In this way, the education system will be able to meet international standards and consequently, the students graduating from this type of educational system will be equipped to compete in the international labour market. Al-Homaid (2004) reported almost the same findings and contributed four principles that should be taken into consideration to improve curricula in Saudi Arabia in relation to globalisation. These principles are learn to know, learn to work, learn to participate, and finally, learn to be. However, re-shaping the curriculum in order to address globalisation as well as to qualify students to meet the demands of the future seems to be impossible without integrating technology along with maintaining Saudi uniqueness and cultural perspective (Hamdan, 2004).

1.2.4 The implementation of technology in Saudi education and curriculum

Educators in Saudi Arabia have realised the importance of implementing and integrating new technologies in the educational system. The educational policy document that was released in 1970 asserts the importance of integrating new technologies, especially in education, to cope with accelerated development around the world (MoE, 1980). Thus, Saudi Arabia has a remarkable growth rate in the consumption of computers and related technologies in the ‘knowledge-based economy’ (Ramady, 2010, p. 4) and ‘non-oil activities or knowledge-based industries’ such as education (Bank Audisal, 2008, p. 3). This can be attributed to the massive financial expenditure (Krieger, 2007; Onsman, 2011).

The early steps of integrating and implementing technology in the education system of Saudi Arabia were taken in 1985. The MoE decided to initiate the teaching of three computer courses in all public secondary schools. After that, implementing technology in Saudi Arabia went through several stages at multiple levels of the educational system including the MoE as well as the Ministry of Higher Education (MoHE). As a result, the development in the education system of Saudi Arabia grew rapidly in many aspects such as teaching, learning, the curriculum, technology, policies and strategies (Abd-Al-Jawad, 2005; Al-Aqeel, 2005; Bank Audisal, 2008; Hartley & Al-Muhaideb, 2007; Joseph & Lunt, 2006; Krieger, 2007; MoE, 2005; Nelson, 2010; Onsman, 2011; Ramady, 2010; Zeen, 2007).

The wide expansion of technological development in Saudi Arabia brings to the fore the need for the effective integration of new technologies, especially in education. However, despite the increasing consumption of technology, its integration, particularly in education, has been ineffective. According to Al-Otaibi (2007), this inefficiency is mainly attributed to the lack of technology awareness (importance and usefulness) among educational leaders and curriculum designers. Consequently, Saudi curricula traditionally focus on theory over practice and conventional methods of teaching rather than innovative use technologies (Al-Otaibi, 2007). Due to the prevailing traditionalism, learners also became passive and developed negative attitudes towards traditional learning. Another factor that contributed to the dilemma is the lack of financial resources dedicated to providing, supporting and enhancing the effective use of technology (Al-Otaibi, 2007).

1.3 Pre-service teacher education in Saudi Arabia

The aim of this section is to provide information relevant to teacher education in the Saudi context. It firstly provides a general overview of teacher preparation in the Arabic world. This is followed by an exploration of the current situation of Saudi tertiary education and a brief history of teacher preparation. The implementation of technology specifically into Saudi pre-service teacher education curriculum is then discussed.

1.3.1 Overview of teacher preparation in the Arabic world

Despite some efforts in the Arabic world to include technological improvement in teacher preparation, real technological change is yet to occur. Meanwhile, teacher preparation programs in the Arabic world still support the old vision of instruction through applying traditional methodologies of teaching and learning (Al-Otaibi, 2007; Zeen, 2007). Arabic educators believe that the current pre-service teacher education systems in the Arabic world are insufficient to prepare prospective teachers to act more positively in regard to technology integration (Zeen, 2007). For this reason, Zeen (2007) states that it is of vital importance that teacher preparation programs in the Arabic world prepare pre-service teachers not only technologically, but also psychologically, so that they can integrate technology into their current learning as well as into their teaching approaches in the future. Increasing training programs in teacher education, especially on technology, will assist in achieving the proposed goals of teacher preparation in the technology era (Al-Nassar, 2002).

Educators in the Arabic world have realised the importance of necessary developments needed in their teacher preparation systems. For instance, the Developing Arabic Teachers' Preparation Approaches Conference was held at the Arabic World University in Cairo in 1999. This conference was concerned with how to develop teacher education in the Arabic world to cope with the rapid developments in technology in the twenty-first century. This conference revealed the importance of technology integration into pre-service teacher education systems and the importance of adopting the new international models in teachers' preparation approaches such as the individual learning, electronic learning, distance learning, and educational networks (Developing Arabic Teachers' Preparation Approaches, 1999).

The second conference for Arabic Ministers of Education, held in Jordan in 2000, recommended that teachers in the Arabic world should acquire a suitable level of computer literacy and skills to enable them to integrate technology into their teaching approaches (Zeen, 2007). Zeen (2007) described the particular kind of computer knowledge and technology competency needed by pre-service teachers to integrate technology into their learning. Further, in 2001, the Teacher Preparation in the Arabic Countries' Conference was held in Lebanon. The final report addresses the fact that pre-service teacher education curricula in the Arabic countries should be redesigned to ensure pre-service teachers can integrate new technologies in their learning approaches as well as training academic staff to integrate technology into their teaching approaches (Teacher Preparation in the Arabic Countries, 2001). Moreover, the Second International Conference, held in Cairo in 2003, emphasised the importance of training pre-service teachers in technology through the effective integration of computer technologies into their curriculum (Zeen, 2007).

Despite the paucity of research on pre-service teacher education in the Arabic context, several studies have indicated that there is a lack of pre-service teacher preparation in relation to technology. For example, Mahdi (1999) studied ways in which pre-service teachers are able to integrate technology into their learning approaches. He recommended that every pre-service teacher should reach the level of being able to design his or her own home page (Mahdi, 1999). In addition, Mandoura (1989) investigated possibilities of improving pre-service teacher education in the Arabic world for the technology era. His study recommended that pre-service teacher education programs should provide pre-service teachers with an adequate level of computer literacy, implement computer technologies as a learning tool to enhance pre-service teachers' competency, and utilise computers in the administrative management field.

1.3.2 Current situation of Saudi tertiary education

The desire to develop an appropriate higher education curriculum in Saudi Arabia emerged in the early 1970s. Essentially, developing Saudi higher education was considered a high priority to cope with the rapid development of the country's economy and infrastructure (Abd-Al-Jawad, 2008; Al-Aqeel, 2005; Al-Gamedi, 2005b; Al-Hamed, 2007; Metwalli, 2008a). For this purpose, the MoHE was established in 1975 to take responsibility for arranging, planning, developing and supervising higher education in Saudi Arabia, making scientific research a priority and supporting highly specialised projects (Abd-Al-Jawad, 2008; Al-Aqeel, 2005, Al-Gamedi, 2005b; Al-Hamed, 2007; Krieger, 2007). One of the most important tasks of the MoHE in Saudi Arabia is to ensure there are well-trained, qualified and highly educated specialists and staff in various areas of knowledge to achieve the country's developmental goals and objectives, and to address Saudi Arabia's need for labour (Abd-Al-Jawad, 2008; Al-Aqeel, 2005; Al-Gamedi, 2005b; Al-Hamed, 2007; Krieger, 2007).

McCloskey (2007) mentioned that Saudi Arabia has prepared a 25-year strategy for higher education. This strategy was initially proposed to be in tune with the rapid developments in Saudi Arabia as well as to meet labour market requirements. Al-Ouhali (cited in McCloskey, 2007, para. 3), the director of the project, states that 'an important segment of the plan deals with specialized issues such as faculty, students, and information technology'. As Onsman (2011) argues, Saudi higher education is experiencing rapid growth in terms of student numbers as well as infrastructure in response to the massive expenditure of money. Krieger (2007) observed that between 2004 and 2007, Saudi higher education received approximately $15 billion to cover the costs of opening more than 100 new educational institutions including new colleges and universities. The recently announced budget for the MoHE was more than $2 billion out of more than $13 billion dedicated to improving Saudi education in general (Onsman, 2011). Hence, the Saudi ambition is the establishment of world-class leading universities. Krieger (2007) stated that:

> King Abdullah has provided $10-billion of his own money to establish a graduate-level science-and-technology university instantly making it the sixth wealthiest university in the world. And the government has lifted a decades-old ban on private institutions, offering free land and more than $10-million toward scholarships and building costs for what they hope will become the Harvards and Yales of the Middle East. (p. 1)

However, quantitative expansion in higher education has minimal influence, unless it meets the need to improve the quality of Saudi tertiary education. According to Onsman (2011), 'the main concern for KSA's Higher Education development is to maintain its Arabian base whilst striving to become internationally relevant, the funds are applied in a centrally controlled manner that aims to balance the two ambitions' (p. 1). It seems that the philosophy of Saudi higher education is unable to maintain alignment or harmony between social, cultural and religious identity and globalisation (Abd-Al-Jawad, 2008; Al-Aqeel, 2005; Al-Hamed, 2007; Al-Issa, 2009, 2010; Krieger, 2007; Onsman, 2011). In addition to the challenges of globalisation, Al-Aqeel (2005), Al-Hamed (2007), and Al-Gamedi

(2005a, 2005b) argue that Saudi higher education is challenged by the accelerated rate of population growth, ensuring internal and external efficiency of higher education and finally recruiting, attracting and preparing qualified professors for higher education. Further, Al-Aqeel (2005) and Krieger (2007) asserted that, despite the massive financial support for higher education, research gained little attention with less than 0.25 per cent of the Saudi income spent on research and research institutions such as King Abdulaziz City for Science and Technology (KACST). Most Saudi universities also lack cooperation with the private sector (Al-Aqeel, 2005; Krieger, 2007). In terms of regulations and funding, Saudi universities follow the centralised system of higher education (Al-Issa, 2010). Therefore, freedom, creativity, excellence and competition among universities are very limited (Al-Issa, 2010). Further, as higher education students in Saudi Arabia receive a monthly allowance, this approach undermines the seriousness of students and eliminates the universities' ambition to attract creative and talented learners (Al-Issa, 2010). Therefore, previous obstacles have collectively caused Saudi higher education to have a limited impact on global academia (Onsman, 2011).

In relation to technology implementation in Saudi higher education, Al-Shehri (2004) conducted a study on the possibility of setting up a virtual university in Saudi Arabia. He posits that it is possible, but he found that there was an imbalance between the needs and abilities in students in the tertiary education sector in Saudi Arabia. Further, he observed that outcomes in terms of students do not match the planned objectives. In another exploratory study regarding this issue, Al-Jarf (2003) found that fewer than four per cent of female students in tertiary education in Saudi Arabia could search electronic databases. Therefore, she recommended that Saudi Arabian colleges and universities should offer a course in electronic searching, targeting postgraduate and undergraduate students. Al-Jarf (2007) also conducted another study to investigate the status quo of online learning at Saudi tertiary education. She found that only six universities (43 per cent) use WebCT or Blackboard for online courses. This use was not cost effective due to a lack of motivation, poor online teaching skills, inadequate professional support and training, insufficient infrastructure, and lack of funds (Al-Jarf, 2007). Al-Haizan's (2008) findings also revealed that there is an ambiguity about the perceived concept of electronic learning among the academic staff. He found that more than one-fifth of academic staff in Saudi universities lack adequate knowledge about using new electronic learning tools such as Smart Boards and Smart Classes. At the same time, the majority of them had adequate knowledge about using other traditional electronic learning tools such as e-mails, CDs and PowerPoint presentations. Further, on the level of current implementation of electronic learning tools, he found that nearly half of the academic staff were not using these tools at all. In general, Al-Haizan's (2008) findings highlighted important issues in relation to the absence of clear plans and strategies for the effective implementation of electronic learning as well as the lack of training programs for the professional development of academic staff in Saudi universities. Similarly, Al-Rumaih (2004) results also indicated that the current use of technology in the Saudi higher education was inadequate and should be improved.

1.3.3 History and overview of teacher preparation in Saudi Arabia

Saudi teacher education focuses on the preparation of teachers who are able to undertake multiple educational, psychological and societal roles. According to many scholars (e.g. Al-Aqeel, 2005; Al-Gamedi, 2005a; Metwalli, 2008a, 2008b), these roles include acting inside and outside the school as a social and psychological advisor, as a director to the educational process and as a cultural-religious transmitter. This implies performing actively in their societies, schools and teaching profession communities (Al-Gamedi, 2005a; Metwalli, 2008a, 2008b). To be able to reincarnate this personality, Saudi teacher education can be considered a multi-disciplinary preparation in which they gain general, academic, educational and psychological knowledge (Al-Gamedi, 2005a; Metwalli, 2008a, 2008b). The development of teacher preparation in Saudi Arabia has gone through two main critical phases. The first phase included the need to prepare the largest number of Saudi teachers as possible to work in public education. The second phase included improving the level of Saudi pre-service teacher education as well as developing the level of existing in-service teachers.

The first phase was associated with the early stages of establishing adequate education in Saudi Arabia. There was an urgent need for a large number of Saudi teachers to assist spreading education across this young state. This approach was taken under the policy known as 'Saudisation', which aims to establish a level self-sufficiency in the various areas of professions, including education, through a well-trained Saudi labour force (Abd-Al-Jawad, 2008; Al-Aqeel, 2005; Metwalli, 2008b). Accordingly, temporary institutions for teacher preparation were established to meet this need. These institutions included Intermediate Teachers' Institutes (1925–1965), Secondary Teachers' Institutes (1965–1975), Intermediate Teachers' Colleges (1975–1988) and finally Teachers' Colleges

(1988–2004) (Al-Gamedi, 2005a; Ziadah, 2007b; Metwalli, 2008b). Table 1-1 summarises the important stages of this phase (Al-Gamedi, 2005a; Metwalli, 2008b; Ziadah, 2007b).

Table 1-1: Stage of the first phase of Saudi teacher preparation (1925–2004)

step	Institution	Description and Characteristics
1	Intermediate Teachers' Institutes (1925–1965)	- To meet the shortage of Saudi teachers - Three years preparation - Require the primary level of education - Certificate of Intermediate Teachers' Institutes - Under the supervision of the MoE - Graduated teachers exclusively work in primary schools
2	Secondary Teachers' Institutes (1965–1975)	- To meet the shortage of Saudi teachers and to develop their level - Three years preparation - Require the intermediate school certificate - Provide Certificate of Secondary Teachers' Institutes - Under the supervision of the MoE - Graduated teachers exclusively work in primary schools
3	Intermediate Teachers' Colleges (1975–1988)	- To meet the shortage of Saudi teachers and develop to their level - Two years preparation - Require the secondary school certificate - Provide a Diploma Certificate of Intermediate Teachers' Colleges - Under the supervision of the MoE - Graduated teachers mainly work in primary schools
4	Teachers' Colleges (1988–2004)	- To meet the shortage of Saudi teachers and to develop their level - Require the secondary school certificate - Provide a Bachelor Certificate of Teachers' Colleges - Under the supervision of the MoE - Graduated teachers mainly work in primary schools

The most significant stage in the first phase was the final stage, which is the establishment of Teachers' Colleges that were under the supervision of the MoE as an initiative to improve the proficiency of primary school teachers in Saudi Arabia (Abd-Al-Jawad, 2005; Al-Gamedi, 2005a; Al-Garfi, 2010; Metwalli, 2008b; Ziadah, 2007b). At the same time, other Saudi Universities were given the responsibility to prepare and qualify intermediate (Years 7–9) and secondary school (Years 10–12) teachers (Al-Gamedi, 2005a; Al-Garfi, 2010; Metwalli, 2008b; Ziadah, 2007b).

In the second phase, due to the desire to improve higher education in Saudi Arabia including pre-service teacher education, Teachers' Colleges came under scrutiny. Should they continue to exist under the supervision of the MoE or should they be under the supervision of the MoHE? To resolve this debate, on 22 May 2004, King Abdullah Ben Abdulaziz initiated policy No. 143 to articulate Teachers' Colleges with higher education institutions (MoHE, 2009). This was the first step in uniting Teachers' Colleges with the nearest university after developing appropriate transfer strategies. In the 50th Supreme Committee for Education Policy meeting in 2007, the committee, under the presidency of his Royal Majesty King Abdullah Ben Abdulaziz, approved the final procedures to unite each Teachers' College with the region's nearest university. This policy document revealed that each Teachers' College had been following the nearest university financially and academically, thus it should meet its policies, requirements, needs and roles (MoHE, 2009).

However, despite the massive capacities and efforts that have been harnessed to improve Saudi teacher preparation, the quality of many of the Teachers' Colleges has been declining (Al-Aqeel, 2005). In addition to the notion that traditionalism is dominating pre- and in-service teachers' practices (Al-Aqeel, 2005; Al-Otaibi, 2007; Bingimlas, 2010; Krieger, 2007; Oyaid, 2009), other issues contributed to this dilemma. According to the Arab Bureau of Education for the Gulf States (ABEGS) (1991), the issues causing teachers' poor productivity in Saudi Arabia include:

1. the weakness of their initial preparation
2. teaching courses that are unrelated to their speciality, especially at the primary level
3. poor preparation (written and mental) of lessons by some teachers
4. lack of ambition, enthusiasm and job satisfaction
5. lack of teaching experience and administrative maturity, especially among beginner teachers.

Understanding the weaknesses associated with Saudi teacher performance demonstrated the need for urgent improvements. Al-Aqeel (2005) suggested a number of critical improvements such as increasing the entry requirements to teacher preparation institutions to allow the careful selection of students who are really interested in the role and able to fulfil it well. Further, teacher preparation and training institutions must have research centres dedicated to improving their practices and the teaching profession in general. Moreover, teacher preparation institutions must establish connections with schools to identify their needs, preferences and challenges, and act accordingly. Innovating teacher training is also crucial because of the most recent global trends including the effective use of technology and associated pedagogies. Finally, it is important to provide in-service teachers with adequate professional development training to develop their levels, capacities and capabilities.

1.3.4 The use of digital technologies in Saudi pre-service teacher education

With regard to the effective implementation of digital technologies, educational institutions, especially pre-service teacher education institutions, seem to lag behind developments in other areas such as industry, health and agriculture (Al-Otaibi, 2007; Al-Towjry, 2005). There is a lack of teacher preparation and training in technology in Saudi Arabia (Al-Saleh, 1999, 2002, 2003). Al-Saleh (1999) attributed this to the limited role of technology in pre-service teacher curriculum development. Bin-Taleb (2005) affirmed that digital technologies such as laptop technology have been slowly introduced in the process of Saudi teacher preparation. Further, Al-Miman (2003) agreed that there was a lack of teacher preparation and training, which hampered their efficient performance. This is due to the curriculum, which essentially focuses on quantity rather than quality (Al-Miman, 2003; Al-Otaibi, 2007).

Therefore, many Saudi scholars such as Al-Debasi, Al-Mosheqeh and Al-Saleh (1999), Al-Saleh (1999; 2002; 2003), Al-Miman (2003), Abd-Al-Jawad (2005), Al-Towjry (2005), Bin-Taleb (2005), Abu-Arrad and Fosaiel (2006), Al-Jarf (2006), Ziadah (2007b), Al-Otaibi (2007), Al-Asmari (2008), and Bingimlas (2010) asserted that Saudi teacher preparation programs needed a complete revision, not only in relation to the inclusion of technology in the curriculum, but also in relation to current teaching methodologies. It is necessary to improve the level of pre-service teachers' use of technology by utilising new methodologies such as online systems, in light of the successful experiences of developed countries (Abd-Al-Jawad, 2005; Al-Jarf, 2006; Al-Otaibi, 2007; Al-Saleh, 2003; Ziadah, 2007b). They should be provided with adequate training, knowledge and practice in relation to digital technologies and associated pedagogies (Ziadah, 2007b; Al-Otaibi, 2007). Moreover, technology standards for pre-service teachers' performance should be developed and utilised in their curriculum (Abd-Al-Jawad, 2005; Al-Saleh, 2003). According to Al-Debasi et al. (1999), the final report of the Educational Technology and Information Conference held in Saudi Arabia stressed that that there is a need to integrate technology effectively into the Saudi pre-service teacher education curriculum by recommending that:

- Educational institutions should offer more educational technology programs to support both pre-service and in-service teachers.

- They should develop their teaching methodologies, especially with regard to the implementation of technology.
- They should evaluate their educational technology modules in light of global trends.
- They should offer more access to Internet and research databases especially for university staff and pre-service teachers.
- They should develop and implement a long-term plan to address their educational technology needs.

Al-Jarf (2006) confirms that the integration of technology into the pre-service teacher education curriculum, such as online instruction, is hindered by a lack of computer affordability, a lack of Internet accessibility in some colleges, a lack of trained academic staff on technology, and a lack of organisational support. As such, According to Al-Asmari (2008), several barriers, including ineffective curriculum design, access issues to technology and the instructors’ inadequate computer literacy, have hindered the effective integration of technology into the Saudi pre-service teacher education curriculum. Consequently, increasing the academic instructors’ involvement with technology and encouraging the increased use of computer technology are two ways to address this deficiency in pre-service teacher education curriculum design (Al-Asmari, 2008). Abu-Arrad and Fosaiel (2006) studied the use, attitudes and obstacles of using computers in Saudi pre-service teacher education. The results revealed that Saudi pre-service teacher institutions might lack computer networks, technology infrastructure, adequate computer laboratories and adequate technology support and maintenance. In addition, some of the university teaching staff lack adequate training and experience in computer use and technology, they have a low level of awareness related to technology and its uses, and in fact, they often do not even have an Internet connection in their offices. Conversely, the data showed that university teaching staff have a positive attitude towards using computers. In addition, the use of computers had a positive impact on tertiary institutions in both the academic and research areas. Accordingly, Abu-Arrad and Fosaiel (2006) recommended that university staff should be offered more training in technology, appropriate infrastructure and adequate technology support and maintenance. All of this would increasing the awareness of faculty staff, educators and policymakers in relation to the usefulness of technology. More recently, the findings of Bingimlas (2010) imply that Saudi teacher preparation, especially that of science teachers, was generally weak in terms of effective use of digital technologies.

1.4 Statement of the research problem

The technology landscape reflects global patterns and appears to be extremely optimistic. However, the reality is different. Effective integration of technology in Saudi pre-service teacher education seems to lag behind other developments in the country. Saudi-based literature, despite its paucity, acknowledges that there is too little teacher preparation and training in terms of digital technologies (Abu-Arrad & Fosaiel, 2006; Al-Asmari, 2008; Al-Jarf, 2006; Al-Otaibi, 2007; Al-Towjry, 2005; Bingimlas, 2010; Bin-Taleb, 2005). For example, the introduction of technology in Saudi pre-service teacher education has been given little attention (Bin-Taleb, 2005). Al-Jarf (2006) confirms that the integration of digital technologies into the pre-service teacher education curriculum such as online instruction is not well known due to issues related to computer affordability, Internet accessibility, trained academic staff, and finally, the levels of organisational professional support. Hence, barriers to success include ineffective curriculum design, access issues to digital technologies, and the instructors' inadequate computer literacy (Al-Asmari, 2008). Further, theoretical and philosophical perceptions about learning and teaching approaches with digital technologies are also behind international trends (Al-Saleh, 2002).

In terms of the take up rate of technology, the current study context is a mirror image of global trends. However, with the limitations noted in the context of Saudi Arabia, the hypothesis was that content and teaching approaches in higher education in general are not keeping pace with more generic societal trends in both the developed (Reimer, 2005; Vannatta, 2007) and developing countries, such as most of the Arab world, including Saudi Arabia (Al-Hamed, 2007; Al-Issa, 2009; Al-Otaibi, 2007; Krieger, 2007; Onsman, 2011; Zeen, 2007). While traditional approaches in pedagogy are still widely accepted and practiced in Saudi Arabia (Al-Otaibi, 2007; Bingimlas, 2010; Krieger, 2007; Oyaid, 2009), less opportunity for effective integration of digital technologies is presented. Therefore, as many scholars have noted, there is a global challenge to prepare prospective teachers to use technology effectively and meaningfully (Chao, 2003; Chitiyo, 2010; Goktas, Yildirim & Yildirim, 2009; Mosenson & Johnson, 2008; Otero et al., 2005; Peeraer & Van Petegem, 2011; Rogers, 2007).

Accordingly, there is always the need for more research, especially with regard to digital technology and pre-service teacher preparation. As Kay (2006) states, pre-service teacher education needs to be further explored, described and investigated by more, various and comprehensive research in order to assess, evaluate and understand key factors affecting the effective integration of digital technology into the curriculum.

1.5 Research aim, scope and key question

Improving the use and levels of adoption of digital technologies in pre-service teacher education curriculum, especially in Saudi Arabia, is the major issue been more explored and critically investigated in the current thesis. The limited research literature is part of the research context. Saudi Arabia characterises a unique situation of Islamic, Arabic, mono-cultural and conservative societies.

The primary aim of this thesis was to investigate the possibilities of effective integration of digital technologies into Saudi pre-service teacher education curriculum. Outcomes anticipated included the development of context-appropriate implications that may help inform Saudi pre-service teacher education in terms of pedagogy, policy and practice in association with digital technologies.

To achieve this aim, the status quo of Saudi pre-service teachers' technological preparation is critically examined. Theoretically, many perspectives surround technology integration into pre-service teacher education curriculum in the global context. However, it is a complex process. Smolin and Lawless (2007) argue that 'technology-based reform is especially challenging because it is a multifaceted endeavour' (p. 2). In addition, the process of technology integration into the pre-service teacher education curriculum can be described as a 'terrain of complexity, multiplicity and interconnectedness' (Gale, 2007, p. 471). Despite this complexity, much of the literature emphasises the three main perspectives presented in the scope of this current study.

The first is the practitioners' technological perspective. It includes their perceived concept (e.g. Chai, Hong & Teo, 2009; Judson, 2006; Teo, Lee & Chai, 2008; Pianfetti, 2005), perceived technology awareness (e.g. Hall, Loucks, Rutherford & Newlove, 1975; Robertson, Fluck & Webb, 2007; Smith & Kelley, 2007) and perceived self-efficacy (e.g. Bong & Skaalvik, 2003; Chao, 2003; Maninger & Anderson; 2007; Sang, Valcke, Braak & Tondeur, 2010; Webb, 2006).

The second is the pedagogical perspective regarding the effective integration of technology. It looks into the curriculum design of pre-service teacher education (e.g. Altun, 2007; International Society for Technology in Education [ISTE], 2007; Smith & Kelley, 2007). It is also concerned with technology-based pedagogical practices that are associated with the curriculum design (e.g. Barnett, 2006; Robertson et al., 2007; Vannatta, 2007).

The third perspective is the administration. Four key roles of leadership are examined including the priority of technology, infrastructure, training and support, and building a technology resource base (e.g. Altun, 2007; Goktas et al., 2009; Lessen & Sorensen, 2006; Robertson et al., 2007; Smith & Kelley, 2007).

Taking into consideration the complexity associated with effective integration of technology from both local (i.e. Saudi Arabia) and global perspectives, the main research question was:

- What are the possibilities for the effective integration of digital technologies into the Saudi pre-service teacher education curriculum?

In order to answer the research main question, a number of sub-questions were addressed in Chapter 3 (see p. 72).

1.6 Significance of the study

Considering the three investigative perspectives mentioned previously, there has not been a major study that collectively investigates these aspects as an accumulative system for technology integration into the pre-service teacher education curriculum. It is hoped that this study will provide a genuine contribution to the field of educational technology in general and to pre-service teacher preparation in particular. It is also hoped that this study will contribute to the improvement of the educational system in Saudi Arabia, in relation to educational technology as a field and in ways to integrate technology effectively. In addition, it is hoped that the findings of this study can provide insights into other similar contexts of developing countries in the conservative Arabic and Islamic world. At the same time, findings from this economically emerging region provide a timely contribution to the international literature.

1.7 Limitations of the research

Associated research limitations that affect the generalisability of the current thesis can be categorised into three main points. The first is an acknowledged subjectivity. As an Arabic

Muslim researcher from Saudi Arabia, I grew up in and was influenced by one of the world’s most conservative Islamic and Arabic societies. Being in such a position implies that I am partly influenced by some conservative assumptions, such as that the law and traditions of the society can be more important than the tasks or goals of change. Despite these conservative assumptions, I believe that technology integration in Saudi Arabia is certain in the near future. Technological developments globally are widely influencing Saudi Arabian people’s lives in numerous ways, including in education. Educational systems and learning and teaching environments are a part of these developments, thus technology should be effectively integrated to create and manage meaningful technology-rich educational settings. However, this cannot be achieved without the effective integration of technology into the Saudi pre-service teacher education curriculum.

Another major limitation that may attract criticism is the gender imbalance. The current research focuses only on the male section of pre-service teacher education under the umbrella of Saudi tertiary education (i.e. MoHE). Despite the argument put forward in Chapter 3 with regard to this issue, the Saudi educational system is gender segregated. Therefore, regulations restrict access to women’s education sites and contact with female instructors and/or students. This can be understandable from a socio-cultural perspective considering that Saudi Arabia is a highly conservative and Islamic society in which education is gender segregated.

Hence, one might argue that the research methodology could be modified to include alternative context-appropriate data collection methods such as phone interviews with female participants. Taking carefully into consideration the methodological issues such as accessibility to research sites, locations and participants demanded that this research focus only on male section. Further, different data collection methods such as face-to-face interviews and phone interviews may result in different data quality, which may affect the inferences made from them. Moreover, field notes that were taken during the face-to-face interviews recorded participants’ impressions, gestures, emotions and feelings. They were highly appreciated in terms of data understanding, presentation and analysis. Quality field notes cannot be collected in case of phone interviews. Female participation in the current study was associated with countless difficulties at multiple levels such as culture, ethics, methodology and methods. Hence, the current findings may fall short in being applied to the female section, despite the fact that they belong to the same context and agency.

The third limitation noted in the current study was in terms of the study sample size. The current study was conducted in one pre-service teacher institution, the Faculty of Education at King Abdulaziz University in the city of Jeddah. Although Saudi teacher education widely adopts the same approach, ideology, standards and most importantly, the same cultural-religious fundamentals, each university may have slightly different policies in terms of logistic support, curriculum and learning activities as well as in the operation and the implementation of technology. Therefore, the results may not be generalisable to other Saudi teacher institutions that belong to other universities.

Despite the fact that the numbers of participants in the current study seems to be satisfactory from both quantitative (325 pre-service teachers and 50 instructors) and qualitative (13 pre-service teachers, eight instructors and three policymakers) perspectives, these numbers may fall short if we look at the number of Saudi teacher preparation institutions. It is most likely that there is a faculty of education at each university; therefore, the number of these institutions may exceed the 19 faculties for the male section only. For the female section, this number can be doubled or even tripled since working in education is preferable for Saudi females more than other sectors such as health or economy since it is segregated. However, in terms of diversifying the current results, it was hoped to include more than one university (i.e. faculty of education), but this unfortunately was difficult. Gaining access to more than one university required more than one application to the MoHE and more than one letter of permission, which can be an obstacle in light of the Saudi centralised system. In addition, it required more time and effort to establish effective communication with people such as policymakers to facilitate access to research sites and participants. Moreover, as most Saudi universities were located in different regions and cities, including more than university could be significantly exhausting.

1.8 Overview of the thesis structure

Structurally, this thesis consists of seven chapters. Chapter 1 presented an introduction with a general overview of the thesis, the problem, the aim and scope, the study significance and layout. Further, it provided a comprehensive picture of the study context including an overview of Saudi developments, culture, education system, technology consumption, pre-service teacher education and related issues. In addition, it considered the growing demand for technology integration into the Saudi pre-service teacher education curriculum.

Chapter 2 provides the theoretical framework of the research. This includes the need and the importance of technology integration into pre-service teacher education curriculum globally along with the influential factors, which shaped this need as well as the importance and the purpose of reforming pedagogical technology practices to achieve integration.

The third chapter presents the research methodology and related methodological issues. It includes the research design and data collection and management. This is followed by the data analysis framework with a discussion and a conclusion.

Data analysis and the presentation of results regarding the effective integration of technology in Saudi pre-service teacher education policy is detailed in the fourth chapter, which consists of two main sections. The first section concerns the analysis of relevant documents, both national policies and curriculum-based documents. The second section provides the results of the analysis of the policymakers' semi-structured interviews. Discussion, conclusions and a progressive focus are presented at the end of this chapter.

In the fifth chapter, possibilities for the effective integration of digital technologies in the instructors and pre-service teachers' practices are demonstrated. Instructors and pre-service teachers' responses to both the quantitative survey and the qualitative interviews are presented for discussion. Finally, findings are included regarding the main three investigative perspectives, followed by a discussion and conclusions.

Following this, in the sixth chapter, a vivid synthesis of the established findings is presented for comprehensive discussion. Structurally, it consists of two main sections. The first section discusses findings relevant to the context readiness. This includes familiarity with technology, the concept of technology integration and levels of technology awareness and self-efficacy. The second section discusses major challenges and obstacles to the effective integration of technology into pre-service teacher education curriculum. Contextual challenges include traditionalism, centralisation and conservatism.

Finally, the seventh chapter of this thesis presents the research initiatives towards the better integration of digital technologies in the Saudi pre-service teacher education curriculum.

These initiatives proposes to inform the Saudi pre-service teacher education curriculum with more appropriate pedagogical practices in terms of digital technologies. This chapter provides conclusions and proposals for future research directions.

1.9 Summary

This chapter presented an introduction to the thesis. It provided the research context, background, history and development, statement of the research problem, aim and scope, significance and overview of the thesis layout. Chapters Two and Three situate the current research. Chapter 2 describes the process of effective integration of technology into the pre-service teacher education from a global context. It comprehensively discusses the investigative perspectives associated with the current study. Chapter 3 presents arguments relating to the appropriate research methodology, associated philosophical foundations, appropriate research design and procedures for ethical issues, data collection and analysis frameworks.

Chapter 2 LITERATURE REVIEW

2.1 Introduction

In the previous chapter, a general introduction and overview of the current research thesis was provided, including a critical overview of Saudi Arabia's history, development, technological transformation, education, curriculum and pre-service teacher education.

In this chapter, a review of the literature related to the integration of digital technologies into pre-service teacher education is the focus. The literature reviewed in this chapter demonstrates a strong need for pre-service teacher education innovation and renewal with digital technologies. Bagwell (2008) suggests many reasons for this, including rapidly affordable and accessible digital technologies, social pressure, and globalisation. There is a need to develop a new generation of teachers who can adapt and teach the new generation of digital learners. There is also a need to innovate the traditional methods of pre-service teacher preparation with new styles of thinking and pedagogy.

To match the needs of the twenty-first century learners, improving levels of adoption of technology in pre-service teacher education is part of the solution for professional practice. However, this is challenging. In this chapter, the main issues considered in the research literature include the technology practitioners' perspective, which concerns their perceived concept, perceived self-efficacy and perceived awareness of technology importance and usefulness. The pedagogical perspective focuses on the curriculum design and its associated technology-based pedagogical practices. Finally, the administration perspective discusses key roles of leadership that connect theory and practice. The chapter concludes with a synthesis of current thinking and overview of the research questions that have guided the research in this study.

2.2 Exploring benefits of the effective integration of technology

Technology and educational development, especially in the current era, cannot be separated. Digital technologies are an acknowledged as powerful tools in the development of education that is relevant and meaningful in the twenty-first century (Peeraer & Van Petegem, 2011). Globally, optimising the use of technology can be the catalyst that encourages productivity. It helps to create competitive economies, construct knowledge-based societies, and enhance the process of innovative education (Bongo, 2005; Fong, 2009; Nasab & Aghaei, 2009; Poorfaraj et al., 2011). Under this perception, exploring the benefits of integrating technology in education is a growing research area (Peeraer & Van Petegem, 2011; Pulkkinen, 2007). Digital technologies today contribute to the creation of an authentic and rich learning environment and help to redefine current educational models (Peeraer & Van Petegem, 2011; Polly, Mims, Shepherd & Inan, 2010; Reimer, 2005). Wright, Ben and Scarcella (2003) assert that implementing technology in education may actively help to improve the learning process. Optimistically, digital technologies are assumed to revolutionise the current educational paradigms and help the proposed change to occur (Peeraer & Van Petegem, 2011). Therefore, the ability to integrate digital technologies must be an integral part of teaching and learning (Anderson & Glenn, 2003).

An important consideration is the benefit of technology integration to the level and the quality of education. Scholars, especially in educational technology, have assumed the benefits of integrating technology in education by establishing an understanding of the strong relationship between knowledge, technology and implementation (Robertson et al., 2007). In so doing, Robertson et al. (2007) state: ‘there is also a high level of agreement that for the potential benefits of ICT to be realised, it is necessary for teachers to change their pedagogies’ (p. 3). This is supported by Pulkkinen’s (2007) assumption that to take fully advantage of the effective integration of information and communication technologies, they should be broadly understood as systems in education rather than mere technical systems, tools or infrastructure. Information and communication technologies, as systems in education, can reshape ‘educational institutions by changing the structure of its constitutive element: internal and external systems of communication and information’ (Pulkkinen, 2007, p. 16).

Robertson et al. (2007) also found that the relationship between computer technologies and learning is perpetual. Bearing this in mind, technology should be a part of pedagogical practices not only a part of the classroom (Dawson, 2006). Therefore, the focus of technology integration in education should be on methodologies, techniques and applications that advance collaboration rather than focusing primarily on content delivery (Pulkkinen, 2007). For this reason, Dawson (2006) has identified three main uses of technologies in the classrooms including general uses, using technology to support all students, and using technology in classroom instruction. Hence, to assist teachers performing these functions professionally, technology must be an integral part of their preparation. The next section explores the importance and the benefits of the effective integration of digital technologies into pre-service teacher education curriculum.

2.3 Technology integration in pre-service teacher education

The importance of providing pre-service teachers with an authentic education to integrate digital technologies into their classrooms has grown dramatically (Dawson, 2006; Mosenson & Johnson, 2008). Complementing this, the potential of technology to positively impact upon teaching practices and the learning environment specifically for pre-service teacher education has increased recently and become very powerful (Chao, 2003; Mosenson & Johnson, 2008; Peeraer & Van Petegem, 2011). The result is that teacher education programs have been challenged to prepare prospective teachers to use technology effectively and meaningfully (Chao, 2003; Mosenson & Johnson, 2008; Otero et al., 2005; Peeraer & Van Petegem, 2011; Rogers, 2007). In relation to this, the quality of teachers is becoming a key concern for educators and policymakers across the world. Teacher preparation must ensure it is not left behind (Capper, Fitzgerald, Weldon & Wilson, 2007; Leach & Moon, 2007; Mosenson & Johnson, 2008; Valli, Rinke & Ringo, 2007).

In the digital era, digital technologies expose lecturers and pre-service teachers in the faculties of education to more and rich educational resources that are seemingly limitless and boundless (Mosenson & Johnson, 2008; Peeraer & Van Petegem, 2011; Roblyer & Edwards, 2003). Therefore, it is expected that faculties of education implement digital technologies as well as teach and train their pre-service teachers how to use them effectively as a tool to acquire, manipulate and communicate knowledge and information (Lessen & Sorensen, 2006). There is need to ensure that pre-service teachers have been provided with an all-inclusive and thorough preparation to meet the needs of the digital era as well as to support education reform efforts with a greater knowledge and a wider variety of skills (Darling-Hammond, 2007; Mosenson & Johnson, 2008; Reimer, 2005; Rogers, 2007). Reforms are important in making prospective teachers realise and understand the wide pedagogical implications of including technology in their future classrooms such as supporting teaching and improving students' learning (Mosenson & Johnson, 2008; Wright

& Wilson, 2007). Improvements to pre-service teacher programs should be made systematically by integrating technology in their educational experiences (Mosenson & Johnson, 2008; Mullen, 2001). In relation to this, Otero et al. (2005) argue that faculty members in teacher education programs should be technologically proficient with the understanding of its content-specific and pedagogical implications for their own teaching. Moreover, Rogers (2007) posits that in order to prepare well-trained and technologically savvy teachers, faculty members themselves must be technologically proficient.

From another perspective, improving prospective teachers' learning through the effective use of technology should be within the community's acceptable social, moral, ethical and legal frameworks (Mosenson & Johnson, 2008). Due to safety issues raised by various agents of the community, especially parents, 'teacher education programs need to ensure that pre-service teachers are prepared to use technology, especially the Internet, in a safe and ethically responsible manner' (Mosenson & Johnson, 2008, p. 185).

The importance of integrating technology in pre-service teacher education derived its importance from two main reasons. The first is the need for a new generation of teachers. The second is the need for innovation, new thinking and new outcomes. These main reasons are discussed in following sub-sections.

2.3.1 Demand for a new generation of teachers

Teachers play a vital role in any plan aimed at improving teaching and learning approaches with digital technologies (Altun, 2007; Capper et al., 2007; Mosenson & Johnson, 2008; Smolin & Lawless, 2007; Townsend, Bates, Davis & Moely, 2007). Teachers design the learning environments as well as choose the best pedagogies and strategies (Glenn & Carrier, 1986; Mosenson & Johnson, 2008). Most importantly, 'teachers have a great responsibility for shaping the minds of generations of students and are the world's most valuable commodity' (Townsend et al., 2007, p. 283). Stetson and Bagwell (1999) found that research regarding technology integration into pre-service teacher education curriculum acknowledges that teachers who were trained to higher levels of computer technologies are better prepared to integrate them in their classrooms. Further, teachers who already integrate technology into their teaching approaches are more likely to be able to create better student-centred learning environments and enhance students' learning (Judson, 2006; Polly et al., 2010; Teo et al., 2008). During their training, if they are given more practical opportunities to interact with digital technologies, teachers will become a more positive model for their students (Webb, 2006). As Katyal (2010) argues:

> For teachers to be leaders in contemporary classrooms, teacher education programs need to now focus more on the deeper and wider implications of ICT and the Internet in education than has hitherto been the practice, in order for student teachers to become teacher leaders when they assume their professional lives. (p. 273)

The rapid developments in digital technologies worldwide have changed the nature of learning so radically that it has become difficult for current educational paradigms to keep up (Gao, Wong, Choy & Wu, 2010; Mosenson & Johnson, 2008). An important issue that has accelerated the need for a new generation of teachers who can effectively integrate technology into their classrooms is the fact that the new generation of children are so familiar with digital technologies. Computers, videogames and handheld technologies are part of their everyday life styles and routine practices (Enochsson & Rizza, 2009; Gao et al., 2010; Prensky, 2001a, 2001b; Robertson et al., 2007; Valentine, Holloway & Bingham, 2002). The digital generation can be defined as ‘people who were born in the latter 1980s grew up surrounded by digital technology and the Internet’ (Enochsson & Rizza, 2009, p. 7). Smolin and Lawless (2007) stress ‘the world in which we are preparing our students is shifting, and requires that we emphasize different literacies, habits of mind, and skills than are traditionally targeted in school’ (p. 5). Current traditional schools can be better described as ‘schools that are still at the initial stages of experimenting with using computers in labs, with often limited integration in teaching and learning’ (Sime & Priestley, 2005, p. 24).

The preparation of the new generation of teachers requires courage. Robertson et al. (2007) argue that despite the massive benefits of digital technologies that may be an offer to the current learners, ‘there is always the need for teachers to steer the learner into the right knowledge zone, skills and competences’ (p. 7). Rogers (2007) shares the same notion and emphasises the need for renewal in pre-service teacher education to cope with the technological era, simply stating, ‘teacher preparation programs must deliver teachers who can effectively teach to these children’ (p. 14). It is clear that contemporary teachers are encouraged to use digital technologies effectively in their teaching to meet the current learners’ needs, preferences and learning styles. Various bodies of the community including government, educational authorities, media and parents are all lobbyists for this change (Mosenson & Johnson, 2008; Polly et al., 2010; Zhao & Bryant, 2006).

Yet, evidence shows that reality is different. The infusion of digital technologies in schools has been slow and still has not transformed their everyday life and learning (Mosenson & Johnson, 2008; Polly et al., 2010; Sime & Priestley, 2005; Smolin & Lawless, 2007; Zhao & Cziko, 2001). Zhao and Cziko (2001) and Polly et al. (2010) state that despite the rapid and massive use of technology in everyday life, evidence of the impact of technology, especially on teachers' practices is still far from satisfactory. Hence, changes are needed to enable teachers to survive, succeed and fully function in the new digital globalised societies (Bagwell, 2008; Darling-Hammond, 2007; Mosenson & Johnson, 2008).

2.3.2 Demands for innovation, new thinking and new outcomes

More than a decade ago, researchers reported that teacher education programs globally seemed to be heavily dominated by traditional approaches to teaching and learning (Bagwell, 2008; Capper, et al., 2007; Enochsson & Rizza, 2009; Katyal, 2010; Navarro & Natalicio, 1999; Peeraer & Van Petegem, 2011; Polly et al., 2010; Reimer, 2005; Song, 2010; Vannatta, 2007; Willumsen, 1998). As Willumsen (1998) stated, 'communications technology had for some time been introduced in teacher education but the speed in which this was done was relatively moderate' (p. 61). Reinforcing this, Navarro and Natalicio (1999) observed that teacher preparation has had no remarkable changes for more than 50 years and seems set to maintain their traditional approaches for years to come. Although technology integration still is a critical issue in pre-service teacher education, these programs lag behind in teaching technology skills to university lecturers, staff, students and personnel (Reimer, 2005). As Vannatta (2007) states:

> Most educators at every level struggle to fully understand the complexity of developing an effective technology user. In an attempt to fulfil standards and facilitate effective use, teachers and teacher educators have often focused their efforts on the acquisition of technology skills for themselves and for their students' skills that are only one component of becoming an effective technology user. (p. 132)

Despite having access to digital technologies, Bagwell (2008) argues that in the recent times, no remarkable changes have been noted in teaching styles and the methods that many teachers have adopted. For the developing countries, this case can be more critical. For instance, in Vietnam, effective integration of technology in teachers' preparation programs has been incredibly slow (Peeraer & Van Petegem, 2011).

Traditional styles of teaching and learning approaches have been perceived as major consequences of old styles of thinking, which do not match the needs of the new generation of learners (Robertson et al., 2007) (see Table 2-1).

Table 2-1: Perceived differences between new and old styles of teaching and learning: (Adapted from Robertson et al., 2007, p. 37)

New Thinking	Old Thinking
• People create meanings in different ways—personal systems	• Everyone learns in the same way—perspective learning, often by rote memorisation
• Not all learners are in the same place—personalised mobile spaces such as iPod, handhelds	• All learners are in the same place—process: logical order, liner, rules and control
• Not all learners are engaged at the same time—real time, interactive, vibrant	• All learners engage at the same time—seeking order (systems); external frame of references: rational, rigid and control
• Not all learners use the same tools: e.g. weblogs, chat, bulletin boards and zines	• All learners use the same tools—print and auditory focus
• Leading to the different outcomes	• Similar outcomes intended
• Knowledge sharing	• Knowledge acquisition

Therefore, the current styles of thinking, understanding and assumptions in pre-service teacher education should be updated (Capper et al., 2007). As Song (2010) states, ‘teacher education in particular needs to go through paradigm shift’ (p. 120). The proposed shift needs to focus on innovative and meaningful learning through the effective integration of digital technologies. An illustrative example is the capabilities of the Internet (Song, 2010).

However, there is need for further studies to encourage, enable and increase effective integration of technology in classrooms (Rogers, 2007). In addition, Kay (2006) recommends that the field of pre-service teacher education needs to be further explored, described and investigated by a variety of comprehensive research and studies. Improving the pre-service teachers’ learning and the academic instructors’ teaching practices through developing their technology skills and enhancing their computer confidence is fundamental for the requisite change in practice (Peeraer & Van Petegem, 2011). To achieve this end, there is need for a greater understanding and evaluation of key technology integration issues, challenges and strategies into pre-service teacher education programs.

2.4 Challenges to the effective integration of technology

In a rapidly developing globalised world, a major concern in education is the lack of effective integration of technology, especially in education (Zhao & Bryant, 2006). The literature in this regard is both instructive and limited. It is instructive in the sense that some indicators are clarified. It is limited in the sense that solutions for undertaking the changes are far from settled. For instance, Rogers (2007) mentions that despite increased access to various types of technology in the classroom such as computers and Internet in the last decade, there are several reasons for the lack of computer use. This can be attributed to two major concerns with technology relating to its cost and teaching/learning models, in accordance with Kaganoff (1998). The first obstacle is the high cost of technology in terms of hardware, software, maintenance, human resources, training and professional support. The second obstacle is the domination of traditional approaches of teaching and learning that require direct interaction between learners and teachers. Here, 'it is not readily apparent to many how technology fits into that paradigm' (Kaganoff, 1998, p. viii). As such, Robinson (2007, pp. 274–275) classified two kinds of barriers to the effective integration of technology. Primary barriers are lack of access to technology, insufficient time to plan instruction, and inadequate technical and professional support. Secondary barriers include beliefs about teaching and technology; established classroom practice, and an unwillingness to change. Robertson et al. (2007) attempt to capture these issues as set of constraints. The two parts of information technology (i.e. information and technology) should be considered in terms of the value and the cost. Table 2-2 provides a summary of some of these possible values and costs.

Table 2-2: Information and technology issues (Adapted from Robertson et al., 2007, p. 80)

Part	Value	Costs
Information	• Information acquired • Processed (value added) • Transferred (value returned)	- Time - Effort - Storage - Maintenance
Technology	• Efficiency (reducing costs) • Effectiveness (adding value): by increasing accuracy, completeness, currency, timeliness ...	- Hardware - Software - Training - Operating - Vulnerability - Maintenance - Development - Facilities

It seems clear from the brief overview that establishing full integration of technology is not an easy task. If pre-service teacher institutions want to adequately prepare and improve student learning, they must recognise the challenges and obstacles to the integration of digital technologies (Reimer, 2005). Otherwise, such challenges will continue to affect pre-service teachers and in-service teachers in terms of the level of the proficiency of technology integration (Duhaney, 2001). Hence, challenges to the effective integration of technology vary and can be at multiple levels. The misconception with pre-service teacher education programs, as Rogers (2007) and Smith and Kelley (2007) noted, is that most of the teacher preparation programs designed to prepare prospective teachers only use technology rather than teaching them strategies for its effective integration. In this regard, Rogers (2007) argues that this kind of pre-service teachers' preparation is inefficient to prepare knowledgeable consumers of technology.

Many studies report the difficulties and challenges facing technology integration in pre-service teacher education (e.g. Al-Asmari, 2008; Al-Jarf, 2006; Chitiyo & Harmon, 2009; Duhaney, 2001; Goktas et al., 2009; Johnston & Cooley, 2001; Keiper, Harwood & Larson, 2000; Kleiner, Thomas & Lewis, 2007; Magambo, 2007; Moursund & Bielefeldt, 1999; Mukama, 2009; Pierson & McNeil, 2000; Polly et al., 2010; Zeen, 2007). The challenges identified can be classified into three main categories. The first category comprises challenges in relation to administration and leadership. The second category focuses on challenges related to pedagogy, practice and curriculum design. The third category explores challenges in relation to the practitioners' skills, beliefs, attitudes and perceptions. Table 2-3 synthesises different challenges and obstacles that have been explored in the literature.

Table 2-3: Challenges and obstacles to technology integration in pre-service teacher education

Category	Challenges and obstacles	Relevant study
Administration and leadership	• Technology planning • Professional supervision on technology • Inadequate instructional, technical and organisational support • Specialised human resources • Insufficient technology infrastructure: lack of accessibility and availability to computers, technology and Internet • Funding and financial support • The alignment between teacher education programs and schools' needs	- Moursund and Bielefeldt (1999) - Al-Saleh (1999) - Keiper et al. (2000) - Pierson and McNeil (2000) - Johnston and Cooley (2001) - Duhaney (2001) - Al-Jarf (2006) - Kleiner et al. (2007) - Zeen (2007) - Magambo (2007) - Al-Asmari (2008) - Goktas et al. (2009) - Chitiyo and Harmon (2009) - Mukama (2009) - Polly et al. (2010)
Pedagogy, practice and curriculum design	• Incorporation of technology tools into teaching and learning • Lack of technology integration models • Ineffective curriculum guidelines • Standardised and testing focused time of teaching • Addressing teaching technology with a single course • Issues of consistency between courses in pre-service teacher education • Time constraints • Competing priorities in the classroom • Paucity of research regarding pedagogical computing • Limited amount of information about technology integration is available pre-service teacher education	- Moursund and Bielefeldt (1999) - Al-Saleh (1999) - Keiper et al. (2000) - Pierson and McNeil - (2000) - Johnston and Cooley (2001) - Duhaney (2001) - Chao (2003) - Bin-Taleb (2005) - Kleiner et al. (2007) - Zhao and Bryant (2006) - Al-Asmari (2008) - Goktas et al. (2009)
Practitioners' skills, beliefs, attitudes and perceptions	• Technological ability and proficiency • Levels of self-confidence • Willingness • Computer anxiety • Learner innovativeness level • Technology training • Competency and productivity	- Keiper et al. (2000) - Pierson and McNeil (2000) - Kleiner et al. (2007) - Rogers (2007) - Magambo (2007) - Al-Asmari (2008) - Chitiyo and Harmon (2009) - Mukama (2009)

Challenges and obstacles presented in the previous table are further discussed in the following sub-sections.

2.4.1 First: Challenges related to administration and leadership

Studies conducted in both developing and developed countries regarding challenges related to administration and leadership have mostly reported challenges relevant to infrastructure such as availability and accessibility issues.

In the context of developed countries, Duhaney (2001) documents some challenges to the integration of technology in pre-service teacher education including access issues, limitation of funds, and lack of training and technical support. Combined with this, Johnston and Cooley's (2001) study reveals that the lack technical support is the key issue hindering the effective integration of technology. Further, adequate access to technology was reported as the key obstacle by Pierson and McNeil (2000). Keiper et al. (2000) found four obstacles and three of them fall under the current category including accessibility and reliability issues. Interestingly, pre-service teachers sampled in their study reported that they were concerned about supervising their future students who use the Internet in relation to them accessing inappropriate websites. Another survey study, conducted in 2007 by the National Centre for Education Statistics (NCES) in US, aimed at investigating technology training and preparation in pre-service teacher education. The majority of institutions reported the availability to technology infrastructure in the schools as very significant challenge (Kleiner et al., 2007). Most recently, Polly et al. (2010) analysed 'findings across projects from the U.S. Department of Education's Preparing Tomorrow's Teachers to Use Technology (PT3) initiative' (p. 863) and identified some challenges. In addition to the inadequate administrative support, the real alignment between teacher preparation programs and the nature of existing schools seems to be missing.

Reviewed studies conducted in the context of developing countries, mostly in Africa, suggest similar issues. For example, in Zimbabwe, Chitiyo and Harmon (2009) studied the use of technology by university lecturers in pre-service teacher education and the contextual constraints that they probably face. Obstacles included the lack of availability and accessibility to adequate technological infrastructure, the lack of organisational support in terms of funding, policies, and opportunities of professional development. In a comparable context, Mukama (2009) investigated the use of digital technologies in pre-service teachers' learning activities in National University of Rwanda. Suggested challenges can be categorised into two main types: institutional and individual constraints. The term 'institutional constraints' refers to insufficient infrastructure such as computer facilities, disrupted Internet connection and electricity issues. Further, Magambo (2007) investigated the effective integration of technology in teacher preparation programs in many sub-Saharan countries including Cameroon, Kenya, Rwanda and Uganda. He found that these countries are still at low levels of technology use and implementation into pre-service teacher education curriculum. The main constraints associated with this include inadequate technology infrastructure, lack of technology training and lack of professional support. In Egypt, Zeen (2007) reported on barriers to technology integration into pre-service teacher education curriculum being a lack of technical and human resources, a lack of training opportunities, a lack of computers and related technology and finally a lack of funds to meet the high cost of offering new technologies.

In Saudi Arabia, the situation is similar. Bin-Taleb's (2005) study concerned with the challenges facing the integration of laptop technology into pre-service teacher education curriculum. Major challenges included the availability of technology and the inadequate administrative support. As Al-Jarf (2006) verifies, the utilisation of online instruction in pre-service teacher education in Saudi Arabia is yet unknown. She attributed that to the lack of computers; the lack of Internet accessibility, and the lack of organisational support. In his study, Al-Asmari (2008) investigated the effectiveness of implementing technology tools in the process of integrating foreign culture in Saudi pre-service teacher education curriculum. He found that access issues among other several barriers were the most significant challenges to the effective use of technology.

2.4.2 Second: Challenges related to pedagogy, practice and curriculum design

Even in the technologically advanced countries, most studies highlighted the domination of traditional approaches on pedagogy and practice. In the US, for example, Moursund and Bielefeldt (1999) found that despite the widespread growth of technology infrastructure, a lower level of incorporation of technology tools into teaching and learning were noticed. Further, most pre-service teacher education programs lacked adequate technology plans to integrate technology into the curriculum. They also found that pre-service teacher education lacks theoretical models for the integration of technology. To deal with this, PT3 projects are assumed to develop K-12 teachers' technological capacities by providing assistance at the planning the application levels (Polly et al., 2010). Further, Pierson and McNeil (2000) identified four key challenges including the lack of consistency and the disconnection between courses in pre-service teacher education. The current plans address teaching technology with a single course taken typically during the program. Duhaney (2001) added that there is a lack of credible, reliable and objective research regarding the efficient use of pedagogical computing. Johnston and Cooley (2001) also reported a lack of time as a significant constraint to the effective integration of technology in pre-service teacher education. Similarly, the majority of institutions in the study of Kleiner et al. (2007) reported that competing priorities in the classroom and the lack of time as the most significant obstacles. In Taiwan, Chao (2003) pointed out that the most important obstacles to technology integration in pre-service teacher education are the limited amount of educational technology information available in schools and in pre-service teacher education.

In the Saudi context, Al-Saleh (1999) considers that the obstacles facing technology integration in pre-service teacher education are the limited role of educational technology in the process of curriculum development and the limited reflections of the research implications and contributions of educational technology field to pre-service teacher education. In addition, Bin-Taleb (2005) reported that the lack of time is significantly associated with the ineffective use of technology. Al-Asmari (2008) concluded that curriculum guidelines are ineffective, and this issue can be very challenging.

2.4.3 Third: Challenges related to the practitioners' skills, beliefs and attitudes

Pierson and McNeil (2000) identified the lack of technology-related self-confidence and skills as key challenges to technology integration into pre-service teacher education. Further, Keiper et al. (2000) revealed that technology skills varied widely from pre-service teachers and their instructors who did not want to feel inadequate. In the study of Kleiner et al. (2007), reported barriers include the lack of technology skills and training as well as the lack of willingness. From another perspective, Rogers (2007) found that computer anxiety was a problem among pre-service teachers; some learners felt uncomfortable using various types of technology and the learners' innovativeness level influences technology integration in pre-service teacher education.

Instructors in the study of Chitiyo and Harmon (2009) demonstrated low levels of technology and computer proficiency, competency, confidence and productivity. Similarly, both Zeen (2007) and Magambo (2007) reported that the lack of training opportunities is associated with the low levels of technology integration. Moreover, the individual constraints according to Mukama (2009) included fears of technology, the lack of technology awareness and finally the unwillingness to use technology.

In the context of Saudi pre-service teacher education, Al-Jarf (2006) and Al-Asmari (2008) added that the inadequate computer literacy and the lack of trained staff in technology are also hindering effective use of technology such as online instruction.

It can be concluded that the development of technology integration in teacher education programs is not an easy task. The following sub-section provides the theoretical background to studying the effective integration of technology.

2.5 Towards studying the effective integration of technology

Theoretically, there are many perspectives on technology integration in pre-service teacher education curriculum (Nkonge & Gueldenzoph, 2006; Polly et al., 2010). As Smolin and Lawless (2007) argue, 'technology-based reform is especially challenging because it is a multifaceted endeavour' (p. 2). In addition, the process of technology integration in pre-service teacher education curriculum can be described as a 'terrain of complexity, multiplicity and interconnectedness' (Gale, 2007, p. 471). However, a review of the literature emphasises three main perspectives. They are:

1. The practitioner perspective, which includes perceived concept, perceived self-efficacy and perceived awareness in terms of technology importance and usefulness.
2. The pedagogical perspective, which includes curriculum design, and technology-based pedagogical practices.
3. The administration perspective, which includes the role of the educational policies and the main functions of effective leadership such as infrastructure, training and support.

These three perspectives are discussed in the following sub-sections.

2.5.1 The practitioners' perspectives

In the context of teacher training, understanding pre-service teachers' perceptions and beliefs related to digital technologies holds the key to improving their professional preparation and development (Lee et al., 2007; Northcote, 2009; Sang et al., 2010; Wabuyele, 2003). Beliefs also contribute to their successful integration of digital technologies in their future classroom (Sang et al., 2010). As Leach and Moon (2008) state, 'good teachers are intellectually curious about pedagogy' (p. 4) and a better understanding of their beliefs may effectively contribute to the enhancement of pedagogies as well as learning styles and approaches with digital technologies.

The importance of studying perceptions in relation to technology integration and their role has been emphasised in the literature. For example, Roberts (2004) suggests that 'teacher educators with a sense of designer self-efficacy and flexible or symbolic perceptions of technology and its function(s) are more likely to integrate technology into their practice in ways that extend and support specific teaching and learning goals and processes' (p. iii). As such, Sang et al. (2010) pointed out that 'ICT integration is influenced by the complex of student teachers' constructivist teaching beliefs, teaching self-efficacy, computer attitudes in education and their computer self-efficacy' (p. 109). Therefore, the focus here is on three main perceptions: perceived concept, perceived self-efficacy, and perceived awareness of technology importance and usefulness, as shown in Figure 2-1.

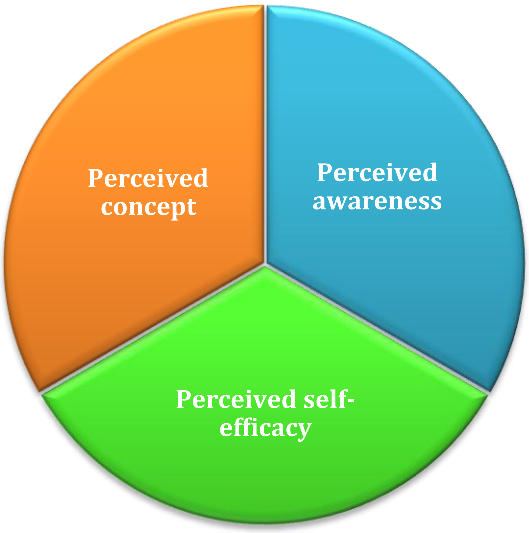

Figure 2-1: Practitioners' technology integration-related perceptions

2.5.1.1 *Perceived concept*

Perceived concept can be defined as the constructed mind image that practitioners hold for the concept of technology integration. According to the Oxford Online Dictionaries (2011), a concept is a 'mental image which corresponds to some distinct entity or class of entities, or to its essential features, or determines the application of a term (especially a predicate), and thus plays a part in the use of reason or language'. Shortly, 'a concept can be understood as an abstract object, abstractum, or a mental representation' (Bergman, 2010, p. 171). It is the way of understanding the world in accordance with Einstein (1936):

> The first step in the setting of a 'real external world' is the formation of the concept of bodily objects and of bodily objects of various kinds... the concept owes its meaning and its justification exclusively to the totality of the sense impressions which we associate with it. (p. 4)

Accordingly, this mind image can be shaped and constructed by many factors such as beliefs, attitudes and ability. Mumtaz (2000) argues that what teachers believe about teaching and learning with computer technologies is essential to the process of technology integration in education. For the same reason, Chai et al. (2009) highlight the complexity of the relationships between teachers' epistemological and pedagogical beliefs as well as their perceptions of technology. Regarding attitudes, Teo et al. (2008) found that teachers' attitudes intersect with their perceptions about technology by stating that 'success of any initiatives to implement technology in an educational program depends strongly upon the support and attitudes of teachers involved' (p. 128). Similarly, Judson (2006) argues that there is a possibility that teachers' poor attitudes towards integrating technology results in a less effective implementation of technology in their classrooms. Therefore, increasing pre-service teachers' ability to use technology results in a relatively significant degree of change in how they perceive technology (Pianfetti, 2005).

However, one significant challenge is how to conceptualise the integration of technology for effective implementation and use of technology in pre-service teacher education programs (Pianfetti, 2005). Although a clear definition is needed to understand the wide implications of this concept in teaching and learning environments, there is currently no common definition or agreed conceptualisation. Regardless, the most recent conceptualisations in terms of the effective integration of technology face the difficulty of establishing a common understanding. Hence, a diachronic perspective for the development of this concept shows certain changes in experts' perceptions (see Table 2-4).

Table 2-4: Definition and concept of technology integration: A diachronic perspective

Definition	Concepts of the definition
Dockstader (1999): 'Technology integration is using computers effectively and efficiently in the general content areas to allow students to learn how to apply computer skills in meaningful ways... Integration is incorporating technology in a manner that enhances student learning. Technology integration is using software supported by the business world for real-world applications so students learn to use computers flexibly, purposefully and creatively. Technology integration is having the curriculum drive technology usage, not having technology drive the curriculum. Finally, technology integration is organising the goals of curriculum and technology into a coordinated, harmonious whole.' (p. 74)	- The effective use of computers - The efficient use of computers - Content areas - Computer Skills - Incorporation of technology - Enhancement of student learning - Support from private sectors - Real-world applications - Flexibility, purposefully and creativity in computers' use - Technology driven by curriculum - Coordinating technology and curriculum
Technology in Schools (2003): 'The incorporation of technology resources and technology-based practices into the daily routines, work, and management of schools. Technology resources are computers and specialized software, network-based communication systems, and other equipment and infrastructure. Practices include collaborative work and communication, Internet-based research, remote access to instrumentation, network-based transmission and retrieval of data, and other methods.' (No page number)	- Broad definition Incorporation of technology and practice into daily routine, work and school management
Dawson (2006): 'Technology is *a part* of what is already happening in the classroom instead of *apart* from it'. (p. 268)	- Technology as a part of pedagogical practice in the classroom not apart from the physical classroom
Smolin and Lawless (2007): 'Technology-based reform is especially challenging because it is a multifaceted endeavour. There are multiple groups involved, multiple perspectives through which to analyse technology-based reform efforts, and multiple domains in which to integrate technology.' (p. 2)	- Complexity of the issue - Challenging issue - Multifaceted endeavour - Considering reform efforts
Gale (2007): 'Terrain of complexity, multiplicity and interconnectedness'. (p. 471)	- Multiplicity and complexity
Dede (2011): 'we must reconceptualize technology integration not as automating conventional classroom processes—or even as innovating within the structure of industrial era schools—but instead as bridging to ways of teaching/learning so different that integration is no longer an accurate description'. (p. 4)	- Complexity of the issue - New meaning for teaching and learning practices with technology - Technology as powerful tools that may change the nature of teaching and learning

As shown in Table 2-4, Dockstader (1999) defined technology integration with some specific concepts that are related to teaching and learning environments. These concepts include the effective and the efficient use of computers, the enhancement of student learning and the coordination between technology and curriculum (Dockstader, 1999).

Moreover, Technology in Schools (2003) broadly defined the concept with the focus on the effective use of technology in the daily routines of work, school and management. Such concepts recently have been developed into shorter definitions, but with ideas that are more sophisticated. For instance, Dawson (2006) stresses that to integrate technology effectively; it must be an integral part of the normal everyday pedagogical practices of the classroom. Further, Smolin and Lawless (2007) argue that it is a multi-dimensional effort that involves collaboration between various domains such as learners, teachers, personnel, curriculum and administration. As this concept becomes more complex, Gale (2007) approved the difficulty in establishing common understanding of the effective integration of technology by describing this concept as 'terrain of complexity, multiplicity and interconnectedness' (p. 471). More recently, Dede (2011) affirmed the complexity of this concept. He addresses that the concept 'integration' needs to be re-conceptualised beyond the dominant view of introducing technology such as computers into a traditional teaching/learning environment. Instead, the integration of technology in education as expressed by Dede (2011) implies new meanings of teaching/learning related pedagogical practices, especially with technology.

Previous studies indicate the importance of appropriate technology conceptualisation. Pianfetti (2005) developed a framework that aimed at helping 34 pre-service teachers achieve specific technological skills that are related to their content areas. His framework resulted in a considerable perceived gain in National Educational Technology Standards for Teachers. At the same time, there were no changes to a significant degree in their perceptions of the value of integrating technology in education generally (Pianfetti, 2005). Moreover, Willis and Raines (2001) conducted a study to examine changes in attitudes of pre-service teachers towards educational technology and their perceptions about technology in the classroom. They found that students had positive changes in their attitudes and self-efficacy by using various educational technologies. Students also reported that a lack of access to technology might hinder or limit their participation. This study found that there is a need to provide more opportunities for instructors and academic staff to renew and refresh their technological skills. They also recommended that education staff should have the appropriate skills to teach pre-service teachers the necessary skills to integrate technology in their classrooms in the future. Further, all content offered in educational technology courses should be assessed using performance-based measures rather than only using content knowledge assessment. Most recently, Chitiyo (2010) found that technology conceptualisation by the majority of lecturers was narrow and has not exceeded the view of traditional audio-visual tools. Technology is used for illustration and lecture delivery rather than being effectively integrated into pedagogy.

2.5.1.2 Perceived awareness

Another critical perception to the effective integration of digital technologies is the perceived awareness of the importance and the usefulness of technology. Existing literature has suggested that perceived awareness of the importance and usefulness of technology contributes to the integration of technology into pre-service teacher education curriculum (Gregor et al., 2005; Hall, Loucks, Rutherford & Newlove, 1975; Lee et al., 2007; Lockyer & Patterson, 2007; Nkonge & Gueldenzoph, 2006; Robertson et al., 2007; Sime & Priestley, 2005; Smith & Kelley, 2007; Yuen & Ma, 2002).

As a definition, Lee et al. (2007) state that ‘perceived usefulness reflects the prospective users’ subjective probability that applying the new technology will be beneficial to his/her personal and/or the adopting organisation’s well-being’ (p. 556). Therefore, raising technology awareness should be an initial phase in the educational change process model (Robertson et al., 2007). In this regard, Gregor et al. (2005) states that ‘what you do is less important than how you do it and success requires ICT-awareness, persistence and being open to change’ (p. 14). Accordingly, determining the users’ level of technology awareness seems to be a key factor for the effective integration of technology. Hall et al. (1975) emphasised four levels of technology awareness. These levels include:

- Non-use: Technology users have no knowledge about technology.
- Awareness: Users have limited knowledge. They are aware but need more skill training and support.
- Proficient: Users have the skills to use technology, but their skills need to be expanded.
- Advanced: Users are expert in the use of technology and have the ability to transfer this knowledge to others.

Consequently, technology integration into the pre-service teacher education curriculum has been influenced by the instructors and pre-service teachers’ level of technology awareness. In other words, different levels of users’ technology awareness affect their real practice of technology in the educational institutions. However, different pre-service teacher programs incorporate the use of technology in the classroom in their curriculum, but at different levels of technology awareness (Smith & Kelley, 2007). For example, pre-service teachers in the study of Sime and Priestley (2005) perceived the importance of using technology as a feature of modernisation. Further, pre-service teachers observed the usefulness of this process in the latter study as a catalyst that has the possibility to innovate the nature of teaching and learning (Sime & Priestley, 2005). In the study by Lockyer and Patterson (2007), digital technologies such as the Internet were perceived by pre-service teachers as useful tools that can effectively enhance pedagogy in their future classrooms.

For the instructors' technology awareness, Nkonge and Gueldenzoph (2006) found that integrating technology such as online instruction is perceived by instructors in the US higher education context to facilitate 'constructivism, communication, feedback, encouraging collaboration and cooperation, enforcing academic rigor, providing both structure and flexibility, and supporting student success' (p. 42). Nonetheless, high technology awareness may not always reflect the real practice. Technology awareness is one component to the effective use of technology. Despite the fact that instructors reported high technology awareness levels in the study of Nkonge and Gueldenzoph (2006), some instructors had difficulties teaching in online environments such as WebCT and managing the students' learning activities including discussions and files sharing.

2.5.1.3 Perceived self-efficacy

One's self-efficacy influences the level of technology integration into pre-service teacher education curriculum. Bandura's theory of self-efficacy in the early 1970s is the key concept in the social cognitive theory, which has triangulated the relationship between one's personality, behaviour and environment (Chao, 2003). In addition, Bandura's theory advocated the educational field to adapt it in different settings, populations and problems (Chao, 2003).

A definition of self-efficacy is that it is the individuals' judgements of their abilities to execute a certain and conditioned course of behaviour/s or to complete specified tasks (Bandura, 1997). In other words, self-efficacy is a strong component that comes from learners' beliefs, which influences their capabilities and performance in certain tasks (Driscoll, 2000). It can also be defined as a concept of self-related perceptions in personality and social psychology interests (Bong & Skaalvik, 2003; Chao, 2003). Sumner and Niederman (2003) clarify self-efficacy as the positive expectation that what needs to be done can be done depending on the degree of trust they have in their own abilities. The perception of self-perceptions is deeply rooted in learners' previous experiences and history of achievement, which can affect their further growth and development in the future (Bong & Skaalvik, 2003). Accordingly, self-efficacy is predicted to contribute to students' learning and academic performance as well as the general environment of educational institutions (Jungert & Rosander, 2010; Lancaster & Bain, 2007).

Pre-service teachers usually have different self-efficacy levels of cognitive, social and emotional engagement in their preparation (Bong & Skaalvik, 2003). Chao (2003) stress the influence of self-efficacy on technology integration in pre-service teacher education by emphasising that 'for many people, the ability to utilize computers is limited by an incapability of controlling or even using them. As for self-efficacy expectations, it may be the beliefs of an individual that results in the inability to use computers' (p. 414). According to Bong and Skaalvik (2003), there are different levels of self-efficacy among pre-service teachers. These differences in self-efficacy levels occur depending on several key questions including the way they construe themselves, the attributes they think they possess, the roles they presume they are expected to play, the capabilities they believe they have acquired, the view they share in comparison with others, and the way they judge that they are viewed by others.

One important issue that should be considered in studying self-efficacy is the ambiguity in the general understanding of self-efficacy and other relatively similar self-related perceptions such as self-confidence. To clarify this, Webb (2006) explains that 'self-efficacy is closely related to self-confidence; however, it is self-confidence about a particular task rather than overall self-confidence' (p. 118). Bong and Skaalvik (2003) found another ambiguity between self-concept and self-efficacy, stating that establishing clear definitions for both self-concept and self-efficacy is not an easy task due to a lack of educational research in this field. However, they also identified several similarities between self-concept and self-efficacy, stating that 'self-concept and self-efficacy share many of the presumed antecedents such as past experience, social comparison, and reinforcements from significant others. They share many of the presumed outcomes related to cognitive, affective, and behavioural functioning as well' (p. 6). In contrast, self-efficacy level is shaped by the individual's near short history, unlike self-concept, which is usually characterised by the long-term history (Bong & Skaalvik, 2003).

Lucas, Cooper, Ward and Cave (2006) have suggested that self-efficacy can be classified into two different forms. According to Lucas et al. (2006), the first form is general self-confidence, which is based on an individual's judgement about his or her ability generally towards adventure, and to accomplish certain tasks in a domain. The second form is an individual's confidence in his or her ability to use new technology in that domain. The standard process to determine self-efficacy with learners is to present a problem or a certain task that is relevant to the actual problems they must solve (Bong & Skaalvik, 2003). This may include reports on the task or the problem, such as 'How sure?' and 'How confident?' (Bong & Skaalvik, 2003). Another way to measure self-efficacy includes expectations about accomplishing the task, such as 'I expect to do...' and 'I am sure that I can...' (Bong & Skaalvik, 2003).

In the case of digital technologies, self-efficacy is highly significant (Compeau & Higgins, 1995; Hakverdi, Gücüm & Korkmaz, 2007; Liang & Tsai, 2008; Lin, 2005; Milbrath & Kinzie, 2000; Mosenson & Johnson, 2008; Sam, Othman & Nordin, 2005; Sang et al., 2010; Webb, 2006; Yi & Hwang, 2003). Self-efficacy strongly influences learners' decision making in specific content areas and tasks (Bandura & Wood, 1989; Galpin, Sanders, Turner & Venter, 2003). For instance, Liang and Tsai (2008) and Sam et al. (2005) found that pre-service teachers with higher levels of self-efficacy tend to demonstrate more progress and ease in their using online learning tools. Further, perceived self-efficacy has a strong correlation with the one's expectations, emotions and reactions towards using technology such as computers (Gong, Xu & Yu, 2004). Judson (2006) found that fears and a low level of instructors' confidence in integrating digital technologies caused them to decide not to implement them in their teaching. Similar findings were reported by Gosselin (2009), who suggests that instructors in pre-service teacher education should be provided with professional development programs to boost their technological self-efficacy levels. Therefore, self-efficacy has a strong relationship with self-confidence, self-competence, self-esteem and self-worth (Miller & Moran, 2006). In the case of pre-service teachers, Bahr, Shaha, Farnsworth, Lewis and Benson (2004) examined the relationship between pre-service teachers' confidence in using digital technologies and their willingness to use them. This study demonstrated that being prepared to use technology increased their willingness to integrate this into their learning. Moreover, Compeau and Higgins (1995) and Webb (2006) explain a hesitation to use computer technologies by weak self-efficacy, which could be an obstacle to their performance. In relation to this, Webb (2006) emphasises, ‘if technology consumers have low computer self-efficacy, they generally find new technologies more difficult to use’ (p. 119).

The integrating of technology into pre-service teacher education courses has the potential for shaping pre-service teachers’ practices and beliefs as well as improving students’ self-efficacy towards the effective use of technology (Wang, Ertmer & Newby, 2004). Therefore, it is recommended that courses in pre-service teacher education that are related to technology integration should be designed to target and reduce computer technology anxiety and increase self-efficacy in teachers’ instruction environments (Brosnan & Thorpe, 2006). Maninger and Anderson (2007) highlight the importance of relationships between prospective teachers’ beliefs about technology integration and their possible implementation of technology in their classrooms. They found that ‘pre-service teachers’ beliefs regarding technology integration were significantly correlated with their intentions to use technology in their future classrooms. Their technological abilities were correlated with self-efficacy beliefs, but not with value beliefs or intentions’ (p. 122). Accordingly, they recommended that it is important to enhance pre-service teachers’ technological beliefs such as self-efficacy; develop strategies for overcoming potential obstacles to their future technology use; develop clear understanding of how technology can contribute to their teaching future approaches; and develop strategies for initiating with confidence technology activities that are fully integrated into the curriculum.

As such, Hakverdi et al. (2007) found that technology use, especially computers by Turkish pre-service teachers, is influenced by their perceived self-efficacy. Therefore, they recommended that teacher education programs should motivate their students to develop higher levels of self-efficacy. More Recently, Sang et al. (2010) show how important the self-efficacy is to the process of effective integration of technology. In the context of Chinese pre-service teacher education, Sang et al. (2010) used a survey technique to investigate the impact of pre-service teachers’ ‘gender, constructivist teaching beliefs, teaching self-efficacy, computer self-efficacy, and computer attitudes’ (p. 103) on their future use of digital technologies. They found that the pre-service teachers’ intention to integrate technology effectively is significantly correlated with all the previous variables except gender.

In summary, the effective integration of technology as a process must go beyond gaining technology-related skills to embrace the facilitation of positive attitudes, beliefs such as self-efficacy, and even emotions regarding the integration of technology in education (Vannatta, 2007). It is strongly suggested that teacher preparation programs, especially in terms of implementing digital technologies, should provide pre-service teachers 'with a conducive and non-threatening environment to experience success in using the computers' (Sang et al., 2010, p. 109). However, Judson (2006) states that research regarding the relationship between self-beliefs such as self-efficacy and technology integration in education is limited. Therefore, this issue needs to be further explored and investigated at a deeper level.

2.5.2 The pedagogical perspectives

It is assumed that effective curriculum design combined with efficient technology-based pedagogical practices can create a better opportunity, atmosphere and environment for the effective integration of digital technologies in education, including pre-service teacher preparation, as illustrated in Figure 2-2.

Figure 2-2: Pedagogical perspective of effective integration of technology

2.5.2.1 Curriculum design

As Altun (2007) described, it is a challenge to accommodate new technologies within the pre-service teacher education curriculum. The engagement of faculties with new technologies is one of the largest problems in the integration of technology into the pre-service teacher education curriculum (Reimer, 2005). Rogers (2007) emphasised that there is great pressure on pre-service teacher education institutions to integrate technology into their curriculum. This pressure can be greater in developing countries (Peeraer & Van Petegem, 2011). If we want teachers to integrate computer technologies in their teaching methods, computer technologies must be firstly integrated into their preparation curriculum (Reimer, 2005; Teo et al., 2008; Wetzel, 1999). Not only in their curriculum, but also in teaching and learning environments to support the adequate preparation of pre-service teachers in relation to technology (ISTE, 2007).

Despite the fact that technology should be embedded in the curriculum for effective integration, it cannot be integrated into educational programs and classrooms ‘overnight’ (Robertson et al., 2007, p. 115) and can be ‘a slow process’ (Peeraer & Van Petegem, 2011, p. 981). Accordingly, technology integration into the pre-service teacher education curriculum should be a systematic, collaborative approach between all related departments in pre-service teacher education to gain the benefits of integrating technology behind this process. To do this, it is necessary to establish cooperative partnerships between educational technology units and initial preparation programs (Shoffner, Dias & Thomas, 2001). Further, technology must be integrated into all facets of prospective teachers’ preparation programs (Anderson & Glenn, 2003; Rogers, 2007; Smolin & Lawless, 2007). Rogers (2007) explains this notion by articulating that pre-service teacher technological preparation is not limited to the college or faculty of education. Instead, every department at the university has to integrate technology effectively into its curriculum, ‘so that the pre-service teacher has seen it in use and therefore will be more likely to use it in their own classroom’ (p. 69).

It is important to consider the advantages of integrating technology into pre-service teacher education curriculum. Pre-service teachers must learn how to use technology in their own learning in order to be able to integrate technology effectively in their teaching approaches in the future. It was observed a long time ago that teachers usually tend to teach a curriculum and implement technology in the same way that they were taught themselves (Goldman, Barron & Witherspoon, 1991; Pellegrino, Goldman, Bertenthal & Lawless, 2007; Shelley et al., 2004). In relation to this, Opfer and Pedder (2001) confirm that ‘teachers bring both past experiences and beliefs to their teaching and learning’ (p. 387). Therefore, institutions that train pre-service teachers should assess the way they implement technology in their instruction in order to gain the full advantage of technology. Regarding this issue, ISTE (2007) defined technology-skilled teachers as teachers who are skilled in the use of technology for their own learning in pre-service. For that reason, faculties of education who train pre-service teachers should have the skills to provide them with the ability to integrate technology in their future classrooms (Teo et al., 2008; Willis & Raines, 2001).

Integrating technology into pre-service teacher education curriculum has many benefits, such as the exposure to new technology tools and applications (Abdal-Haqq, 1999). According to Roblyer and Edwards (2003), integrating technology into the pre-service teacher education curriculum increases university lecturers' productivity; allows them to have convenient access to resource databases and information; and decreases the time needed for lesson preparation and the organisation of materials for classes. Keiper et al. (2000) list five benefits of integrating technology into pre-service teacher education curriculum:

1. Data collection from a variety of available resources such as databases
2. Improving pre-service teachers' computer skills and productivity
3. Dynamic sound and images, making classes enjoyable and exciting, which may result in increased pre-service teacher participation and engagement
4. Instructional variety by using a variety of technology to achieve the lesson's goals
5. Communication tool, such as using e-mails, chat rooms, forums, online conferences and educational newsgroups.

Nonetheless, pre-service teacher education curriculum seems to be less influenced by current sociological trends, such as the wide expansion of technology. According to Abdal-Haqq (1999), the focus of the pre-service teacher education curriculum tends to provide prospective teachers with older and simpler instruction models such as implementing Computer Assisted Instruction and Word applications. Meanwhile, little use is documented of sophisticated and new digital technologies such as electronic networks, multimedia and problem-solving applications, which supports the development of pre-service teachers' higher-order thinking and problem solving (Abdal-Haqq, 1999). Pianfetti (2005) addressed the fact that although the need for a new curriculum that integrates digital technologies is evident, pre-service teacher education curriculum is still traditional and lacks effective integration of technology. Most recently, Peeraer and Petegem (2011) observed in the context of Vietnamese pre-service teacher education that despite the attitudes to adopt a constructivist approach, the implementation of technology in the curriculum remains traditional.

For this reason, the literature on integrating technology into the pre-service teacher education curriculum sustains the initiative for intensive curriculum-based technology training that teaches pre-service teachers how to integrate computer technologies into the curriculum rather than merely imparting basic computer skills (Baylor & Ritchie, 2002). This shows the importance of redesigning the curriculum in pre-service teacher education to integrate technology in all settings of related contexts rather than only settings of instruction courses (Abdal-Haqq, 1999; Shelley et al., 2004). Further, Shelley et al. (2004) recommended that courses offered in pre-service teacher education should be reformed and redesigned to integrate technology in relevant contexts rather than only methods and foundation courses. Technology-related courses need to be redesigned to be more beneficial in practice (Goktas, Yildirim & Yildirim, 2008). Further, all content offered in educational technology courses should be assessed using performance-based measures rather than using only content knowledge assessment (Willis & Raines, 2001). The meaning simply is that pre-service teachers should be provided with adequate and necessary technology literacy (Reimer, 2005; Teo et al., 2008; Wetzel, 1999). Mesut (2000) conducted a study regarding the issue of pre-service teacher preparation programs in the field of technology. He addressed the fact that these programs should provide three main aspects: basic computer literacy education, particular education on teaching methodologies with technology, and practical experiences through exposure, training and practice.

Previous studies indicated the necessary integration of digital technologies into all facets of pre-service teacher preparation. A study of pre-service teacher education initiated by the Moursund and Bielefeldt (1999) in the US and carried out by ISTE, suggested that pre-service teachers' programs should increase prospective teachers' exposure to appropriate educational technologies in terms of preparing them for today's classrooms as well as providing them with adequate skills to integrate technology in their future teaching approaches. Moreover, Maninger and Anderson (2007) found that the effective integration of technology into pre-service teacher education courses contributed positively to pre-service teachers' abilities, self-efficacy, value beliefs, and their intentions to integrate technology into their classrooms in the future. Chao's study (2003) revealed that, despite the lack of technology integration in pre-service teacher education in Taiwan, technology integration into the pre-service teacher education curriculum has positive impacts on pre-service teachers beyond the quality and quantity of information available in their textbooks. Further, Zeen (2007) recommended that new curriculum design for pre-service teacher education is needed to integrate technology effectively into their pedagogical practices.

2.5.2.2 Technology-based pedagogical practices

In addition to effective curriculum design, there is always the need for extensive practice to establish effective integration of technology. Townsend et al. (2007) stressed that ‘teacher preparation that emphasizes both strong content knowledge and extensive experiences working in schools in conjunction with academic courses will produce the highly qualified teachers we need to meet the challenges of today’s society’ (p. 283). Practical experiences in technology cannot occur without increasing pre-service teachers’ exposure to various technologies in their learning approaches. In this regard, Vannatta (2007) argues that ‘technology skills and fluency are essential to using technology; however, learning skills in isolation is not very exciting or motivating. Thus, all potential users should learn skills in the process of completing a task or project’ (p. 136).

Increased technology practice in pre-service teacher education offers great potential in enhancing communication and sharing pedagogical information that many specialists acknowledge can authentically innovate the nature of pre-service teacher education and training (Barnett, 2006). Fabry and Higgs (1997) stress that merely offering computer hardware and software in education does not mean effective integration. There must be a connection between technology and real pedagogical practice (Fabry & Higgs, 1997). Further, increased practice contributes to effective learning and reflects changed behaviour in the future (Robertson et al., 2007), as shown in Figure 2-3.

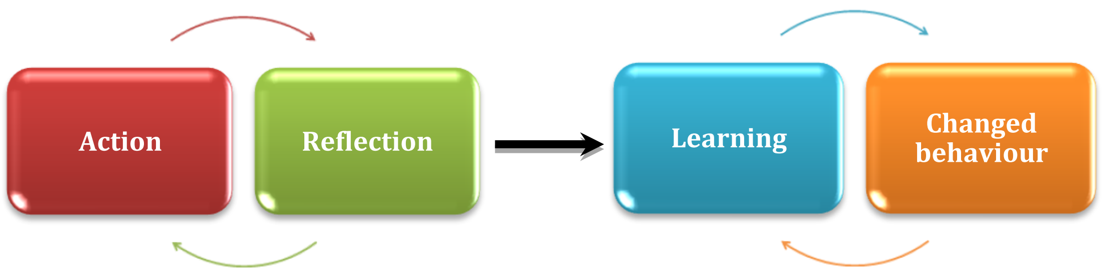

Figure 2-3: Learning through practice: Action and reflection (Robertson et al., 2007, p. 110)

Prospective teachers should practice using more technology during their field experience (Pellegrino et al., 2007; Zeen, 2007). In this regard, Barnett (2006) argues that enhancing pre-service teachers’ field experiences in technology through providing more and additional practice is ‘one possibility for improving pre-service teachers’ understanding of reform-based teaching practices’ (pp. 703–704). In addition, increasing the pre-service teachers’ training and exposure to technology has positively influenced both in-service and pre-service teachers' attitudes towards the integration of technology (Bahr et al., 2004). Accordingly, Bahr et al. (2004) state that it is widely acknowledged that increased skills and knowledge about technology through practice are interrelated with increased teacher motivation and willingness to use technology in pre-service and consequently in-service. Concerning motivation, Nkonge and Gueldenzoph (2006) similarly found that the level of motivation significantly affected the overall students' participation in online learning environments. In another study in the US, Moursund and Bielefeldt (1999) found that most pre-service teachers lack field experience in using technology as well as professional supervision of master teachers who can guide them. Due to these findings, Moursund and Bielefeldt (1999) suggested that pre-service teacher education institutions should increase the students' practice and exposure to appropriate technologies under professional supervision in a way that pre-service teachers can be more skilled and can integrate them into their future classrooms. Recently, Polly et al. (2010) observed that mentoring methods can increase the pre-service teachers' technological knowledge and use during field experiences.

It is essential for pre-service teachers to bond their technological knowledge with real practice and experience so they can connect theory to practice (Altun, 2007; Brush et al., 2003; Culp, Honey & Mandinach, 2005; Fabry & Higgs, 1997; Mesut, 2000; Moursund & Bielefeldt, 1999; Robertson et al., 2007; Sime & Priestley, 2005; Vannatta, 2007). In this regard, Mesut (2000) stresses that pre-service teacher education programs must combine training and practice in technology with basic computer literacy and teaching methodologies. Effective practice in technology needs to be supported by other key aspects such as leadership, pedagogy and the real demands of effective technology practices in classrooms (Culp et al., 2005). According to Altun (2007), these relationships should be supported with adequate technological infrastructure and supporting technological physical resources; there should be flexibility in curriculum design and policymaking; there should be support for training workshops; and finally, there should be integrated pedagogical training on various technologies.

To summarise, further research is needed to determine if there have been any changes in the curriculum, and the types and level of technology learning in pre-service teacher education (Smith & Kelley, 2007). Further, Altun (2007) mentioned three vital concerns: curriculum design and policymaking strategies; academic staff and instructor training; and instructive training on technology. These concerns should be examined in-depth by researchers interested in the area of technology integration into pre-service teacher education. As technology-based practices are significantly important to the pre-service teachers, they are also critical to their instructors. Yet, little research was conducted in this regard. Further research needs to be conducted in terms of the instructors' technology-based pedagogical practices and ways of improving this approach (Georgina & Hosford, 2009). As Georgina and Hosford (2009) found, the relationship between 'technology literacy and pedagogical practice' (p. 690) was significantly mutual. They recommended providing the instructors with more technology training that has purposes and goals and is faculty directed. Complementing this, 'professional development for educators is only successful if educators themselves drive the content' (Shepherd, Alpert & Koeller, 2007, p. 177).

2.5.3 The Administration perspectives

Leadership plays a key role in facilitating an increased use and implementation of technology into practice, including the provision of adequate infrastructure, training and professional and logistic support. When supported by proper and supportive polices that clarify the questions of what, when, how and why, this can create a better opportunity for the professional and effective use of technology. Figure 2-4 illustrates this concept.

Figure 2-4: The administration perspective of effective integration of technology

2.5.3.1 The role of effective leadership

Effective leadership contributes to the effective integration of technology into the pre-service teacher education curriculum (Altun, 2007; Culp et al., 2005; Fabry & Higgs, 1997; Lessen & Sorensen, 2006; Moyle, 2006; Robertson et al., 2007). In fact, 'leadership matters' (Moyle, 2006, p. 2). Due to the fact that technology tools are a part of everyday life, leadership is essential to address the issue of technology integration and it plays an extraordinary role in influencing educational institutions, including pre-service teacher education, to develop strategic plans for the integration of technology (Goktas et al., 2009; Pellegrino et al., 2007; Reimer, 2005). Reflecting on this, Robertson et al. (2007) argue 'the action that leads to constructive outcomes relies on good governance and enabling leadership ... Leaders can guide this process well but they need the structure and values in place to make it work' (p. 42).

To establish technology integration, effective leadership should consider this integration a priority in its pedagogical practices (Culp et al., 2005; Fabry & Higgs, 1997). Robertson et al. (2007) confirm that leadership should 'ensure that teachers' professional learning is regularly updated with practical applications within the situated context' (p. 56). In addition, leadership in educational organisations, including pre-service teacher education, must possess several important competencies to establish effective integration of technology. According to Anderson and Weert (2002), these competencies include 'critical thinking, generalist (broad) competencies, ICT competencies enabling expert work, decision-making, handling of dynamic situations, working as a member of a team, and communicating effectively' (p. 9). Practically, Lessen and Sorensen (2006) identified four important key actions in which leadership can play a part to promote the effective integration of technology. These four key actions include considering the use of technology as a priority, establishing an adequate technological infrastructure, maintain training and supporting opportunities for students and academic staff and focusing on development processes (Lessen & Sorensen, 2006).

In terms of the affordability of financial resources, especially in terms of expensive technologies, Smith and Kelley (2007) pointed out that the establishment of appropriate, adequate and different funding resources to assist the effective integration of digital technologies into pre-service teacher education is an important key action for leadership. Conversely, teacher preparation institutions need reliable and sufficient technology infrastructure as well as constant support to be able to integrate technology in their curriculum. Moursund and Bielefeldt (1999) emphasise the importance of establishing an adequate technological infrastructure to support the incorporation of technology tools into teaching and learning approaches in pre-service teacher education. Moursund and Bielefeldt (1999) also add that a written, funded, regularly updated technology plan is another key mission for leadership in pre-service teacher education. Moreover, Fabry and Higgs (1997) stress the importance of leadership in offering effective access to various digital technologies that requires ‘connectivity, ubiquity, and interconnectivity’ (p. 391). Altun (2007) considered appropriate infrastructure with tutorials and training for both academic staff and pre-service teachers as priorities that leadership should maintain carefully and accommodate into their mission.

2.5.3.2 The role of policy

Leadership and policy are inseparable. While effective leadership contributes to the effective integration of technology, policies play a major role in the enhancement of the process of technology integration, and have an enormous influence on how computer technologies can be implemented in education (Altun, 2007; Anderson & Glenn, 2003; Robertson et al., 2007; Smolin & Lawless, 2007). Anderson and Glenn (2003) describe the role of policymaking in pre-service teacher education as ‘an educational system with a set of policies and practices that govern teacher training, determine how schools and curriculum are organized, and shape teaching practices’ (p. 16).

Nevertheless, integrating technology in diverse educational settings remains a concern of both practitioners and policymakers (Altun, 2007; Anderson & Glenn, 2003; Culp et al., 2005; Sime & Priestley, 2005). According to Culp et al. (2005), the role of policies is to ‘describe matches between specific capabilities of various technologies and persistent challenges to the delivery, management, and support of effective teaching and learning experiences’ (p. 5). In this regard, ‘one of the challenges to integrate technology both in education and teacher education is how to decide priorities between aims and how to accommodate these new opportunities within a curriculum’ (Altun, 2007, p. 53). Bearing this in mind, Robertson et al. (2007) state that ‘purposes, policies and practices exist at, across and between all levels of any organization. Any system exists to help ensure the success of all its components, and thus the achievement of outcomes that match its goals and purposes’ (p. 72) (see Figure 2-5).

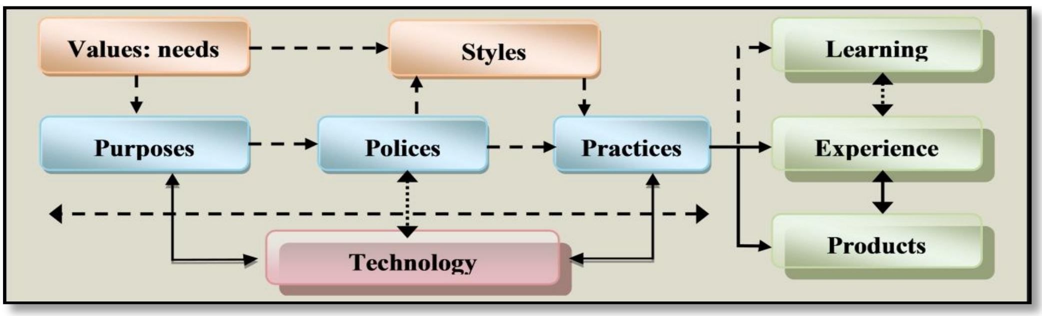

Figure 2-5: System alignment with technology (Robertson et al., 2007, p. 72)

Policies are important due their action in expressing the what, how and why of the educational institutions including pre-service teacher education and how they set their priorities in relation to pedagogical beliefs and practices (C. Taylor, 1997; S. Taylor, 1997). In addition, policymaking should reflect both the institution's educational philosophy and the pragmatic constraints, that is, which policies will be implemented (C. Taylor, 1997). According to Anderson and Glenn (2003), 'introducing change into a system is relatively easy; ensuring that change flows from policy to the classroom is a formidable challenge' (p. 19). Critical analysis of the current policymaking strategies in education deserves consideration to understand potentials and limitations of the educational change (Stevens, 2003). McDougall (2004) found that various policy documents in pre-service teacher education are observed as thoughts from a specific group of administrators rather than a counselling process advantage. Simply, this group of administrators or policymakers can be defined, according to Jhurree (2005), as 'people who are decision makers in education, such as school principals, education superintendents, regional education directors and district-level or state-level educational administrators' (p. 468). In this regard, Gale (2005) argues that a degree of cooperation is essentially required. The substance for this cooperation in policymaking is to establish an engagement of theory and practice of policy (Gale, 2005).

Conversely, in the technology era, while the role of policymaking in education should be stretched from local to global, evidence shows that educational polices retain their local focus (Lingard, Rawolle & Taylor, 2005). For instance, Sime and Priestley (2005) highlighted 'tensions between the idealised world of ICT use reflected in policy documents and the aspirations of teacher educators and students, and the harsher realities of schools, where ICT use is often more embryonic' (p. 24). Therefore, educational policies that are relevant to the implementation of technology should be revised and improved to facilitate its effective integration (Culp et al., 2005). In addition, improving the quality of policymaking in education has the potential to improve the effective integration of digital technologies into various educational settings, including pre-service teacher education. This process critically narrows the gap between technology integration in education and the way in which technology is implemented in educational settings (Anderson & Glenn, 2003; Culp et al., 2005; Jhurree, 2005; Sime & Priestley, 2005).

To improve the quality of policymaking in education, Culp et al. (2005) and Anderson and Glenn (2003) state that policymakers in education need to understand the relationship between the nature of required educational changes and the process of integrating technology in education. Further, they must understand the challenges of the twenty-first century and encourage all parties in education to communicate, access information, and learn how to implement emerging technologies effectively (Anderson & Glenn, 2003). In relation to this, Jhurree (2005) points out that effective integration of technology 'warrants careful planning and depends largely on how well policymakers understand and appreciate the dynamics of such integration' (p. 467). Although policies can effectively contribute to better technology integration, technology has the ability to support both curriculum development and policymaking strategies due to the mutual relationship between reform efforts and technology (Vrasidas & McIsaac, 2001). To enhance the quality of policymaking in pre-service teacher education that is concerned with the integration of technology, it should consider several important issues to undertake the transformation. Regarding this issue, Vrasidas and McIsaac (2001) argue that improvement efforts alone will not ground the required changes; rather changes in curriculum, educational and policymaking strategies are necessary to ensure the success of the reform efforts. Change efforts should consider teachers, teacher educators and policymakers working together to develop stronger and more effective frameworks and structures of education technology advocates (Goldmann, 2007; Somekh, Whitty & Coveney, 1997). Therefore, it is important and essential for policymakers who seek technology integration into pre-service teacher education to understand these issues as well as to enhance the quality of the change.

Hence, further research is needed to investigate the relationship between policies, policymaking and the integration of technology. According to Gale (2005), Altun (2007) and Enochsson and Rizza (2009), the need that recently emerged is to investigate in-depth and think in a different way concerning our engagement with policymaking, especially in higher education including pre-service teacher education.

2.6 Discussion

Looking back upon areas related to the integration of digital technologies into pre-service teacher education curriculum, gaps, problems and pressing issues can now be identified. These gaps help in shaping and motivating the current study. The following discussion deals with each issue from the macro (globally) to the micro (nationally).

2.6.1 The need for further studies on the integration of technology in teacher education

Technology integration into pre-service teacher education curriculum is challenging and a problematic issue globally (Bin-Taleb, 2005; Capper et al., 2007; Chao, 2003; Dawson, 2006; Leach & Moon, 2007; Otero et al., 2005; Rogers, 2007; Valli et al., 2007). This is because a new generation of children are extremely familiar with a variety of digital technologies in their daily lives (Prensky, 2001a, 2001b; Robertson et al., 2007; Valentine et al., 2002). Therefore, pre-service teacher education programs are now challenged to prepare teachers who can effectively understand, guide and teach these digitally competent children (Bagwell, 2008; Darling-Hammond, 2007; Robertson et al., 2007; Rogers, 2007; Smolin & Lawless, 2007; Zhao & Bryant, 2006).

Conversely, the dominant traditional styles of teaching, learning and thinking in pre-service teacher education need to be improved and innovated in light of the current technologically advanced demands and globalisation (e.g. Capper et al., 2007; Robertson et al., 2007). However, current efforts towards gaining full advantages of technology integration into pre-service teacher education curriculum seem to be unsatisfactory (Bagwell, 2008; Navarro & Natalicio, 1999; Reimer, 2005; Vannatta, 2007; Willumsen, 1998). Therefore, the issue of technology integration into pre-service teacher education curriculum needs to be more explored, described and investigated by a variety of comprehensive research and studies (Kay, 2006).

2.6.2 The case of Saudi pre-service teacher education

Although technology integration into pre-service teacher education curriculum is a problematic issue globally and this implies the need for further investigation, the case of Saudi pre-service teacher education seems to be more problematic. Developments in terms of the effective integration of technology in Saudi pre-service teacher education lag behind other developments in the country. There is a lack of teacher preparation and training in technology and thus it should be improved (Abu-Arrad & Fosaiel, 2006; Al-Asmari, 2008; Al-Debasi et al., 1999; Al-Haizan, 2008; Al-Jarf, 2003, 2006; Al-Miman, 2003; Al-Saleh, 1999, 2002, 2003; Al-Towjry, 2005; Bingimlas, 2010; Bin-Taleb, 2005). To do so, successful and global experiences should be taken into consideration (Al-Saleh, 1999, 2002, 2003).

2.6.3 Global perspective for technology integration in pre-service teacher education

Globally, the literature reveals that the effective integration of technology is problematic and challenging (Capper et al., 2007; Chao, 2003; Dawson, 2006; Gale, 2007; Leach & Moon, 2007; Otero et al., 2005; Peeraer & Van Petegem, 2011; Rogers, 2007; Smolin & Lawless, 2007; Valli et al., 2007). Hence, this issue has been explored extensively and will continue as a point of interest for decades to come. For example, Kay (2006) evaluated strategies used to integrate technology into pre-service teacher education curriculum through a review of 68 articles of current and refereed literature. He found that 10 key strategies emerged from this review including delivering a single technology course, offering workshops, integrating technology in all courses, modelling the use of technology, using multimedia, collaboration among pre-service teacher education sectors, mentoring teachers and faculties, technology practice in the field, focusing on education faculties, focusing on mentoring teachers, and improving access to technology and support. This evaluative study was based on computer attitude, ability and use. The findings revealed four used patterns:

1. Most of the conducted studies examined just one to three strategies.
2. The effect on pre-service teachers' use of computer appeared to be more pervasive in case of four used strategies or more.
3. Most of the conducted studies examined attitudes, ability or use, but rarely all three.
4. The most important pattern showed that the vast majority of the conducted studies had severe limitations in methods, poor instrumentation, were ambiguous or had small samples and program descriptions, or a lack of or weak in statistical analysis.

Therefore, Kay (2006) recommended that pre-service teacher education needs to be more explored, described and investigated by a variety of comprehensive research and studies in terms of developing a greater understanding and evaluation of key technology integration strategies into pre-service teacher education curriculum. In relation to this, current theoretical practices and trends emphasise three main perspectives. The first is the practitioners' perspective, which includes their perceived concept, technology awareness and self-efficacy. The second is the pedagogical perspective, which includes curriculum design and technology-based pedagogical practices. The third is the administration perspective, which focuses on key roles of leadership. However, to the best of the researcher’s knowledge, there has not been a major study that collectively addresses all three perspectives in one study.

2.6.3.1 The practitioners’ technological perspective

Understanding practitioners’ perceptions holds promises to improving pre-service teachers’ preparation and to improving university staff’s professional development as well as promoting the effective integration of technology into the curriculum (Vannatta, 2007; Wabuyele, 2003). Judson (2006) states that research regarding the relationship between self-beliefs and technology integration in education is limited. Therefore, this issue needs to be more explored and investigated in more depth. Roberts (2004) suggests studying three types of perceptions: perceived concept, perceived self-efficacy, and perceived awareness of technology importance and usefulness.

For perceived concept, this mind image in regard to technology can be shaped and constructed by many factors such as beliefs (Chai et al., 2009; Mumtaz, 2000); attitudes (Judson, 2006; Teo et al., 2008); and ability (Pianfetti, 2005). Regarding perceived awareness, the literature suggests that raising perceived awareness of usefulness contributes to the effective integration of technology into pre-service teacher education curriculum (Hall et al., 1975; Robertson et al., 2007; Smith & Kelley, 2007; Yuen & Ma, 2002). For self-efficacy, it is a strong component that comes from learners’ beliefs, which influences their capabilities and performance in certain tasks (Bong & Skaalvik, 2003; Chao, 2003; Driscoll, 2000; Maninger & Anderson, 2007; Sumner & Niederman, 2003; Webb, 2006).

In the Saudi context, essential changes are required in practitioners’ theoretical and philosophical perceptions about learning and teaching approaches with technology (Al-Saleh, 2002). In addition, increasing university staff, educators and policymakers’ level of technology awareness of usefulness is essential (Abu-Arrad & Fosaiel, 2006). However, the field of technology integration into Saudi pre-service teacher education curriculum lacks research in studying practitioners’ (i.e. policymakers, instructors and pre-service teachers) technology-related perceptions. Thus, such concepts need further investigation.

2.6.3.2 The pedagogical perspective

In pre-service teacher education, technology-based curriculum and technology practice cannot be separated in the process of promoting effective integration of technology in both pre-service as well as in-service. It was noted that teachers usually tend to teach curriculum and implement technology the same way that they were taught in pre-service (Goldman et al., 1991; Opfer & Pedder, 2011; Pellegrino et al., 2007; Shelley et al., 2004). Therefore, the literature suggests that technology must be integrated more systematically, effectively and cooperatively into all facets of pre-service teacher education curriculum (Anderson & Glenn, 2003; Culp et al., 2005; Rogers, 2007; Shoffner et al., 2001; Smolin & Lawless, 2007; Zeen, 2007). Accordingly, pre-service teacher education institutions should provide pre-service teachers with three main skills: basic computer literacy; specific knowledge in relation to teaching with technology; and practical experiences through increased exposure and practice (Mesut, 2000; ISTE, 2007; Reimer, 2005; Teo et al., 2008; Wetzel, 1999; Willis & Raines, 2001). The role of practice here is to connect technology and the real pedagogical approaches (Barnett, 2006; Brush et al., 2003; Fabry & Higgs, 1997; Mesut, 2000; Vannatta, 2007). Practice may contribute to effective learning and reflects on changed behaviour in the future (Robertson et al., 2007). It positively influences pre-service teachers' attitudes and motivation towards integrating technology in their approaches (Bahr et al., 2004).

Although the need for a new curriculum that integrates technology is evident globally, pre-service teacher education is undergoing dated standards in terms of curriculum development, which only offers pre-service teachers with older and simpler instruction methods (Abdal-Haqq, 1999; Peeraer & Van Petegem, 2011; Pianfetti, 2005). Therefore, the literature supports initiatives to develop intensive curriculum-based technology training rather than basic computer skills or literacy (Abdal-Haqq, 1999; Baylor & Ritchie, 2002; Shelley et al., 2004). Further, the existing literature acknowledged several vital concerns that should be examined more deeply regarding the field of technology integration into pre-service teacher education curriculum. These concerns include curriculum design, policymaking strategies and university instructor training in technology (Altun, 2007; Smith & Kelley, 2007).

Regarding the Saudi context, pre-service teacher education curriculum is still conditional upon the old vision of instruction and the integration of technology into curriculum such as online instruction, which is yet unknown (e.g. Al-Jarf, 2006). This is due to the ineffective curriculum design, which concentrates on quantity rather than quality and prevents pre-service teachers and instructors performing efficiently (Al-Asmari, 2008; Al-Miman, 2003; Zeen, 2007). Consequently, there is an agreement between Saudi scholars that the pre-service teacher education curriculum should be technologically and theoretically innovated in many areas such as improving the current teaching and learning methodologies with technology (Al-Asmari, 2008; Al-Debasi et al., 1999; Al-Nassar, 2002; Al-Saleh, 2002, 2003; Joaili, 2001).

2.6.3.3 The administration perspective

Effective leadership contributes to enhancing the effective integration of technology into pre-service teacher education (e.g. Altun, 2007; Culp et al., 2005; Fabry & Higgs, 1997; Lessen & Sorensen, 2006; Robertson et al., 2007). Theoretically, its role in this process can be demonstrated in proper guidance, enhancing values and developing strategic plans for the effective integration of technology (Culp et al., 2005; Fabry & Higgs, 1997; Goktas et al., 2009; Pellegrino et al., 2007; Reimer, 2005; Robertson et al., 2007). Practically, effective leadership has four key actions: considering the use of technology as a priority, establishing an adequate technological infrastructure, focusing on development processes, and maintaining training and supporting opportunities for students and academic staff (Altun, 2007; Fabry & Higgs, 1997; Lessen & Sorensen, 2006; Smith & Kelley, 2007).

An effective leadership role and view can be translated in the shape of educational policies that promote effective integration of technology into the pre-service teacher education curriculum. In relation to this, policymaking is important due to its investigation of the what, how and why of the educational institutions; how they set their priorities of pedagogical beliefs and practices (Altun, 2007; Culp et al., 2005; Gale, 2005; Robertson et al., 2007; C. Taylor, 1997; S. Taylor, 1997). Therefore, they should be revised and carefully improved (Culp et al., 2005), that is, to critically narrow the gap between the prospective of technology integration and the way that technology has been implemented (Anderson & Glenn, 2003; Culp et al., 2005; Jhurree, 2005). Hence, further research is needed to investigate this relationship between policymaking and technology integration (Altun, 2007; Gale, 2005).

Saudi pre-service teacher education is a centralised policy-driven context, in which there is a clear gap between educational policies and current practices of dominant leadership (Al-

Asmari, 2008; Al-Miman, 2003). This creates a dissociation between the educational institutes' functions and their concepts (Al-Miman, 2003; Al-Asmari, 2008). Therefore, Saudi educational policies that are concerned with technology implementation, especially in pre-service teacher education curriculum, should be revised, improved and supported (Al-Asmari, 2008; Al-Saleh, 2003).

2.7 Conclusion

The current study argues that the effective integration of technology, as a complex approach, occurs in the intersection between the practitioner, the pedagogical and the administration perspectives. Technology practitioners including policymakers, instructors and pre-service teachers should be technologically wise and positive. They should have a high level of pedagogical understanding of technology and its wide implications to the educational development in areas of administration, teaching and learning approaches. It is also fundamental to have an innovative technology-based curriculum that emphasises the effective pedagogical practice of technology into teaching and learning. In other words, curriculum design should be globalised to be able to comprise the massive and rapid development of digital technologies as well as to meet the needs of learners, societies and labour market in the twenty-first century. However, such theoretical assumptions need an umbrella of effective administration to be able to perform. Leadership has the core mission of translating theory into practice and ensuring the quality of planning, processes and outcomes in relation to technology. Part of this is the production of supportive policies that articulate a valid technological vision and ways of achieving it by the means of what, when, how and why.

In summary, the effective integration of technology in the pre-service teacher education curriculum refers to the intersection of the practitioner, the pedagogical and administration perspectives (see Figure 2-6).

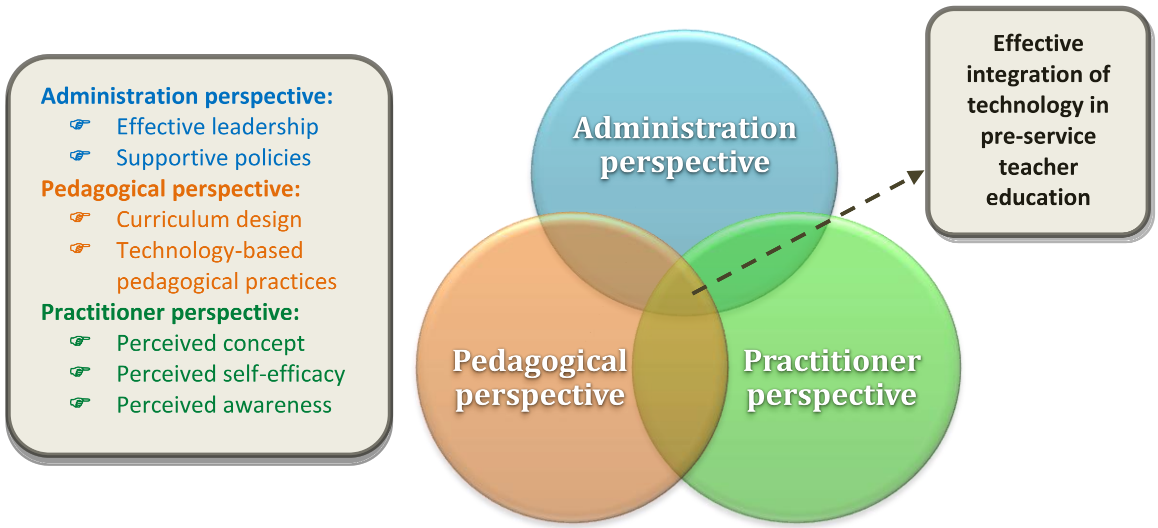

Figure 2-6: Effective integration of technology in pre-service teacher education curriculum

2.8 Summary

This chapter discussed relevant literature to the current study investigation. It firstly explored benefits of effective integration of technology in education. Then, it focused on the same process but in relation to pre-service teacher education curriculum. It discussed the two necessities for the better integration of digital technologies into pre-service teacher education preparation. Firstly, there is always a need for technology-qualified teachers who can effectively teach the current digital generation of learners. The other need is the necessary developments for pre-service teacher education curriculum, which is heavily dominated by traditional approaches of teaching and learning globally. A synthesis of challenges and obstacles to the effective integration of technology into pre-service teacher education curriculum was followed. Then, this chapter provided the theoretical background relevant to studying the effective integration of technology from the global perspective including a) the practitioners' perspective, b) the pedagogical perspective, and c) the administration perspective. Based on that, the questions that lead the enquiry were provided.

The following chapter describes the research methodology and methods for data collection. It illustrates the research design that presents the study procedures, aim and scope. Further, it explores and discusses issues relevant to the techniques used for the study participants. After that, frameworks and procedures for data analysis are provided.

Chapter 3 RESEARCH METHODOLOGY

3.1 Introduction

The review of literature relating to the integration of technology into pre-service teacher education from the global perspective suggested three main investigative perspectives: the practitioners' perspective, the pedagogical perspective, and the administration perspective.

Methodological issues and the research design adopted in the study to explore these three perspectives were based on Crotty's (1998) framework for developing a research process. The research paradigm consists of four core elements: the epistemology, theoretical background, methodology, and methods (Crotty, 1998). In the current study, the aim was to investigate possibilities of effective integration of digital technologies into Saudi pre-service teacher education curriculum. This involves understanding theory and practice as well as the nexus between them. Further, the study was concerned with the impact of outsider/external factors such as globalisation, including the impact of digital technologies on the current development, transformation and change process in Saudi Arabia. The purpose was to create meaningful constructions to be able to develop more relevant, practical and context-appropriate implications in terms of theory, policy and practice.

Hence, there was need for some pragmatism in the approach such as that offered in Crotty's (1998) design. Pragmatism usually 'seeks to clarify meanings and looks to consequences' (Cherryholmes, 1992, p. 13). Besides heavily questioning the notion of *truth*, pragmatism also aims at advocating human knowledge, progress and morality (Shook, 2000). Accordingly, it has gained the appreciation of scientific and educational circles to become 'an ideal philosophy for a *field* of theory and practice such as education' (Garrison & Neiman, 2007, p. 22). Learning, from the standpoint of pragmatism, is a mental activity that cannot be separated from the physiological component of learners such as feelings, desires, and interests (Garrison & Neiman, 2007). It reflects the view that learners are born with natural 'free will and rationality' (Garrison & Neiman, 2007, p. 22). Instead, learners' identity, learning and construction of knowledge are processes created by a complex social dialogue with the community (Garrison & Neiman, 2007). We need to view learning as a product of social interaction; knowledge and science can supply learners ‘with habits, rules for adjusting habits, and reflective inference for adjusting rules’ (Shook, 2000, p. 9).

In terms of research, researchers usually articulate the aim and the purpose of their inquiry. For pragmatists, the goal of inquiry is one important component of research to identify a legitimate epistemology (Garrison & Neiman, 2007). While the current study adopts a mixed-method approach, pragmatic principles can be also useful in all stages of the research design including data collection and analysis. Teddlie and Tashakkori (2003, 1998) proposed that pragmatism is the appropriate philosophical foundation to guide mixed-method research and can be considered its partner. Pragmatism, as a research philosophy, is based on the researcher’s values and principles, desired ends and method of implementation that may work best for solving the research problem rather than restricting the researcher’s choices (Cherryholmes, 1992; Johnson & Onwuegbuzie, 2004; Teddlie & Tashakkori, 2003). For pragmatists, a research problem and questions are more important than the methods they use or the worldview that underlines the use of these methods (Teddlie & Tashakkori, 1998). Pragmatic researchers also have several common characteristics that distinguish them from other researchers. Teddlie and Tashakkori (1998) and Cherryholmes (1992) characterised pragmatic researchers’ many traits, such as they study what they think is important. Usually topics they study match their value systems; therefore, they study variables and units of analysis that are the most appropriate to find answers for their questions. Interestingly, because they are guided by their own value systems, they carry out their studies in anticipation that the results will match their value systems.

3.2 Mixed methods of qualitative and quantitative approaches

As stated in Chapter 2, the effective integration of technology, particularly in pre-service teacher education, is remarkably challenging in the global context. In Saudi Arabia, the situation can be more challenging. The complexity of the Saudi context as a rapidly developing Islamic, Arabic, mono-cultural and conservative society (Al-Asmari, 2008; Al-Issa, 2009; Burkhart & Goodman, 1998; Onsman, 2011; Ramady, 2010; Saleh, 1987) represents a unique situation and context in which the future of technology integration, especially into pre-service teacher education curriculum deserves to be more deeply explored and investigated. Due to the paucity of studies conducted in the area of technology integration in Saudi pre-service teacher education curriculum, the aim of this study was to investigate the possibilities of the effective integration of technology into Saudi pre-service teacher education curriculum. To achieve this, a critical examination of the current situation of technology implementation in Saudi pre-service teacher education was conducted. This included the investigation of the effective integration of technology at the levels of national and curriculum policies as well as practice including teaching and learning approaches.

With the aim of investigating the status quo of technology implementation in Saudi pre-service teacher education curriculum, the major question of the current research study was:

- What are the possibilities for the effective integration of digital technologies into the Saudi pre-service teacher education curriculum?

The following research sub-questions were posed to guide the enquiry (see Table 3-1). In addition to the policy role, they reflect the three major perspectives of the investigation.

Table 3-1: Investigative perspectives, related questions and relevant data sources

Perspective	Issue	Questions	Data source
The policy Perspective	The place of technology in Saudi national policies	1. How do Saudi national policies view the role of digital technologies? 2. How does Saudi cultural-religious conservatism affect the role of digital technologies?	Policy document analysis: national & curriculum Interviews with policymakers
	The place of technology in pre-service teacher education policies	3. How do Saudi pre-service teacher education policies present and maintain effective integration of technology into the curriculum? 4. How does cultural-religious conservatism affect Saudi pre-service teacher education?	
Practitioner technological perspective	Technology expertise and familiarity	5. What kind of computer and technology expertise do participants have in terms of access at home and qualifications? 6. How much do participants practice technology in terms of computer and other technologies at home?	Survey: instructors and pre-service teachers Interviews: policymakers, instructors and pre-service teachers
	Perceived Concept	7. How do participants perceive the concept of technology integration?	
	Perceived awareness	8. How do participants perceive the importance and usefulness of technology integration into Saudi pre-service teacher education curriculum?	
	Perceived Self-efficacy	9. How do participants perceive their self-efficacy in regard of technology integration? (*Only instructors and pre-service teachers*)	
Practitioner pedagogical perspective	Curriculum design	10. How does Saudi pre-service teacher education curriculum present and maintain effective integration of technology according to the participants' views?	Survey: instructors and pre-service teachers Interviews: policymakers, instructors and pre-service teachers
	Technology practice at the university	11. How much do participants practice technology in terms of access, computer and other technologies use at the university?	
Practitioner administration perspective	Effective leadership	From the participants' views, how does senior management consider: 12. the importance of technology integration in Saudi pre-service teacher education curriculum? 13. the importance of technological infrastructure? 14. the importance of technology training and support? 15. the importance of building a resource base in terms of technology integration? *(Except pre-service teachers)*	Survey: instructors and pre-service teachers Interviews: policymakers, instructors and pre-service teachers

Understanding the complexity of the integration of technology into the pre-service teacher education curriculum from the global and local perspectives required an appropriate research methodology. The mixed-method approach adopted applied both qualitative and quantitative techniques to answer research questions in a single or a multiphase study (Mertens, 2005). Johnson and Onwuegbuzie (2004) stated that a mixed-method approach was the third paradigm in educational research that enables researchers to conduct research that is more effective. In addition to qualitative and quantitative paradigms, a mixed-method approach minimises the weaknesses of single paradigm studies (Johnson & Onwuegbuzie, 2004; Patton, 1990). Further, demands to use a mixed-method approach in educational research are rapidly growing due to the complex, dynamic and inter-disciplinary nature of the research world today (Johnson & Onwuegbuzie, 2004; Leech & Onwuegbuzie, 2009).

The adoption of mixed-method designs has been popular since the 1960s, and is considered the new 'movement' in research according to Leech and Onwuegbuzie (2009, p. 266). Although the implementation of mixed-method designs, especially in PhD studies, can be 'confusing to many researchers', it adds value and gives a deep understanding of the phenomenon being studied through triangulated data (Leech & Onwuegbuzie, 2009, p. 266). Regarding this, Mertens (2005) states 'the intent may be to seek a common understanding through triangulating data from multiple methods, or to use multiple lenses simultaneously to achieve alternative perspectives that are not reduced to a single understanding' (p. 293). Additional benefits of mixed-method designs are described by Greene, Caracelli and Graham (1989) including triangulation, complementarity, development, initiation and expansion (see Table 3-2).

Table 3-2: Characteristics of a mixed-method research (Adapted from Greene et al., 1989, p. 259)

Characteristics	Benefits
Triangulation	• Assist in establishing a broader, complementary view of a phenomenon or an activity. • Contribute to lessen methodological weaknesses in individual approaches.
Complementarity	• Contribute to clarify and demonstrate important processes in the study.
Development	• Findings from one paradigm contribute to other methods and succeeding theory development.
Initiation	• Assist in stimulating new study questions or in investigating emerging hypotheses.
Expansion	• Augment the extent of the study by increasing richness of data collection and analysis by exploring manifold aspects.

Another important reason behind adopting this approach is to solve a research problem in a complex educational and social context such as Saudi Arabia (Teddlie & Tashakkori, 2003). Researchers have used this approach to answer questions that could not be answered in other ways as well as to enrich their abilities to draw better and more solid conclusions (Mertens, 2005). Employing a mixed-method approach provides a richer, representative and more complete picture of the activity or phenomenon under investigation (Berg, 1989; Flick, 2005). According to Teddlie and Tashakkori (2003), this approach can be applied practically to identify the research problem; to collect research data; to analyse collected data, and to draw on final inferences.

Additionally, the common characteristics of mixed-method approaches should be carefully considered in carrying out educational research. Teddlie and Tashakkori (2003) stress two important common characteristics for mixed-method approaches: firstly, the incorporation of mixed-method approaches along with all stages of the research; and secondly, data transformation between research phases and stages. Hence, both characteristics were carefully considered in the current research. A good example for that in the current study is the use of sequential data collection, analysis and results presentation.

3.3 Research design

A mixed-method approach, using both qualitative and quantitative methodologies, was employed to gather research data as well as to ensure the triangulation, validity and reliability of the findings (Flick, 2005; Jick, 1979; Mertens, 2005). Researchers note that the main purpose behind triangulation in educational research is to seek convergence, corroboration, and correspondence of results across different paradigms (Caracelli & Greene, 1993). As Jick (1979) stated, ‘the effectiveness of triangulation rests on the premise that the weaknesses in each single method will be compensated by the counter-balancing strengths of another’ (p. 604). As Greene et al. (1989) summarise:

> The core premise of triangulation as a design strategy is that all methods have inherent biases and limitations, so use of only one method to assess a given phenomenon will inevitably yield biased and limited results. However, when two or more methods that have offsetting biases are used to assess a given phenomenon, and the results of these methods converge or corroborate one another, then the validity of inquiry findings is enhanced. (p. 256)

Data collection procedures in a mixed-method design are described by many researchers. For instance, Teddlie and Tashakkori (1998, 2003) and Leech and Onwuegbuzie (2009) indicated that data collection procedures in a mixed-method design could be in parallel, in which quantitative and qualitative data are collected and analysed in parallel; or sequential, in which quantitative or qualitative data are collected and analysed to provide the basis for another type of data collection. Based on this definition, the current study design can be classified as a sequential form of data collection. The qualitative inquiry included the analysis of relevant documents and in-depth (follow-up) semi-structured interviews and the quantitative inquiry included the distribution of survey questionnaires. This can be summarised as:

- Firstly, the issues surrounding the effective integration of digital technologies into the Saudi pre-service teacher education curriculum and policies were qualitatively explored through document analysis. The analysed documents included national policies and pre-service teacher education policies, structure and guidelines. Document analysis was followed by semi-structured interviews with the policymakers. This was to provide a solid basis for the current investigation as well as to uncover contextual and motivational factors affecting the effective integration of digital technologies from a policy perspective. Extracted themes and findings provided a progressive focus for the following phases of the investigation.
- Secondly, survey questionnaires containing both open and close-ended questions were used to broadly understand the participants' attitudes and perceptions towards the effective integration of digital technologies into the Saudi pre-service teacher education curriculum. Participants involved in this phase included academic instructors and pre-service teachers. This phase in addition to the following phase carefully took into consideration the instructors' practice and pre-service teachers' learning activities.
- Thirdly, semi-structured interviews were employed to deeply investigate and understand the emerging issues, findings and themes. Further, this phase was conducted to confirm assumptions that progressively emerged from other sources of data as well as to address other uncovered issues. It also assumed to provide richness and comprehensiveness to the established findings.

Figure 3-1 illustrates the mixed-method design adapted from Johnson and Onwuegbuzie (2004, p. 23) and used in the present study.

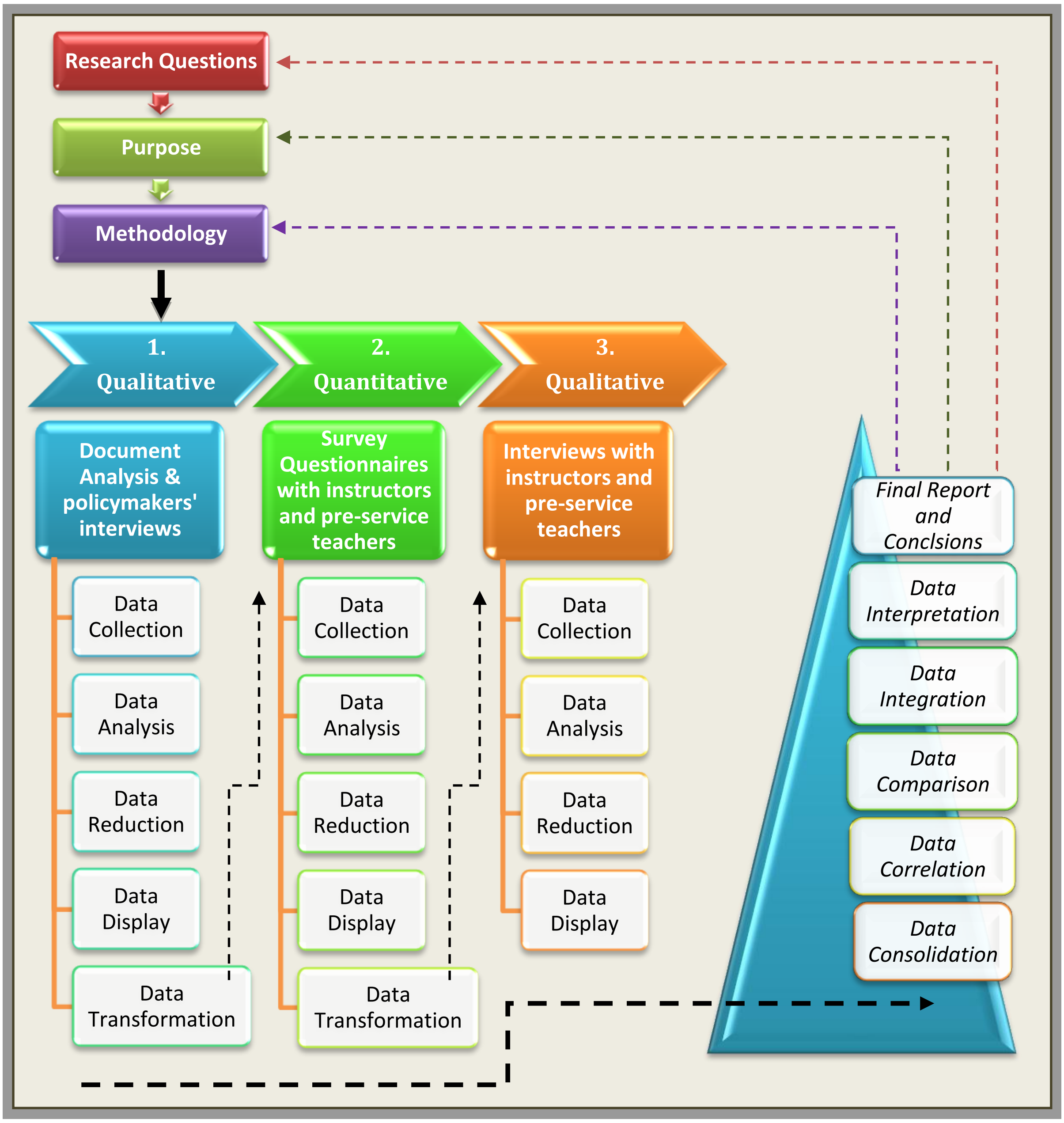

Figure 3-1: The current study research design (based on Johnson & Onwuegbuzie, 2004, p. 23)

The participants of this study were divided into three categories: policymakers, academic instructors and pre-service teachers. The effective integration of digital technologies into Saudi pre-service teacher education curriculum was investigated on two main levels:

1. The integration of technology in Saudi pre-service teacher education policy
2. The integration of technology in the academic instructors and pre-service teachers' practices.

To better understand the current research context, design and scope, see Figure 3-2.

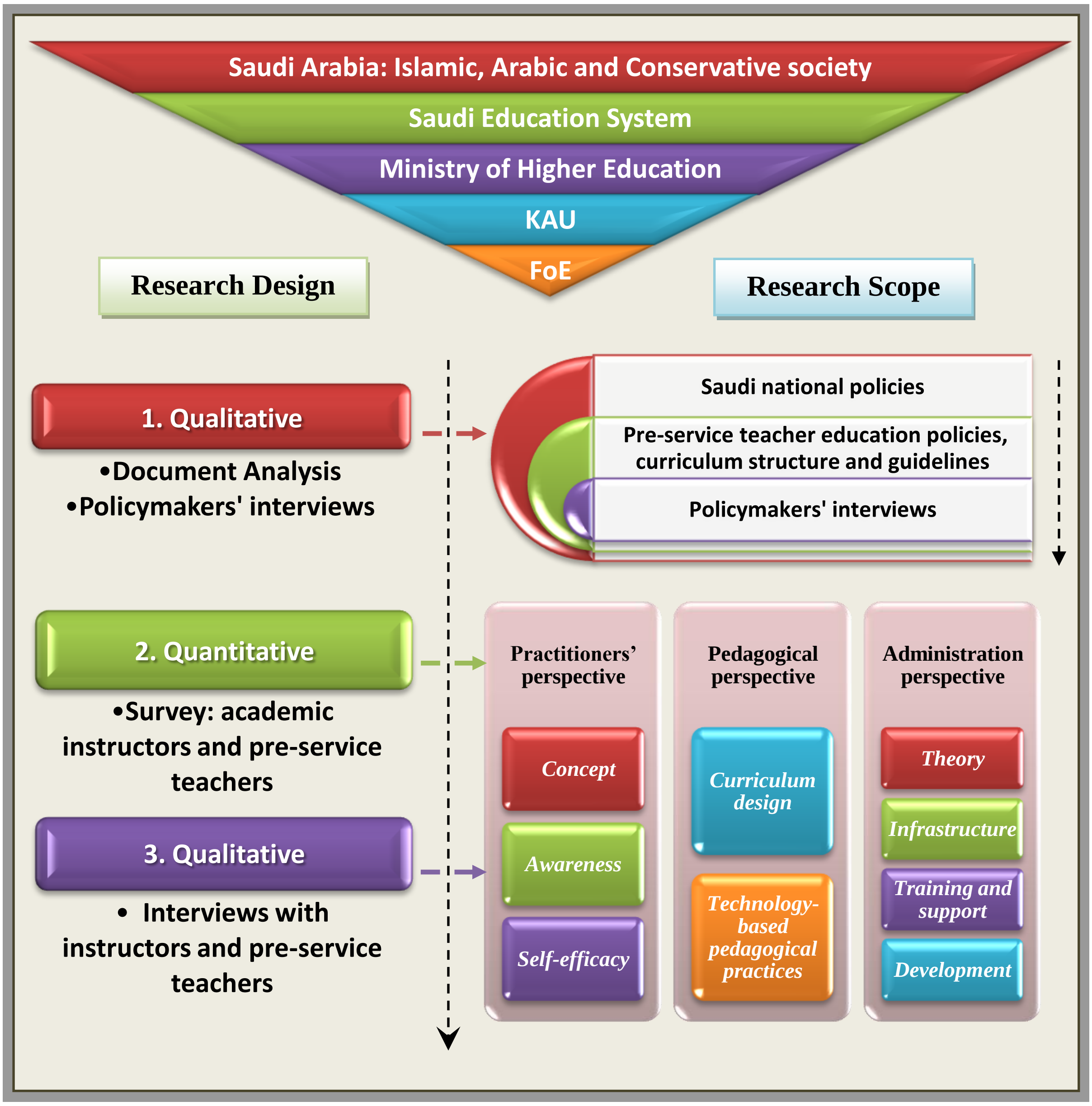

Figure 3-2: The current research context, design and scope

3.4 Sampling strategies and participants of the study

Researchers usually start their work with a conceptual definition of their study participants and their particular sampling strategies (Mertens, 2005). According to Mertens (2005), sampling strategies refer to methods used to select a specific number/s of participants or things from the population related to the study. She also adds that sampling strategies influence the quality of data collection and consequently influence inferences that can be made from it. Therefore, researchers usually follow two main sampling strategies. The first strategy is probable sampling in which there is a possibility for every member of the population to be included in the sample (Mertens, 2005; Patton, 1990). The second strategy of sampling is non-probable sampling or theoretical purposive sampling, which aims at eliciting a smaller population that is more indicative of the phenomenon under investigation (Mertens, 2005; Patton, 1990; Teddlie & Tashakkori, 1998). While a probable sampling strategy aims at allowing a random, but convenience sample to participate, samples that are chosen on purpose (purposive) assist in an in-depth investigation of a small section of the population and in emphasising the richness of information in relation to the phenomenon (Erlandson, Harris, Skipper & Allen, 1993; Mertens, 2005; Patton, 1990).

As the current study adopted a mixed-method approach with a pragmatic philosophy as its partner, the sampling strategy varied with the course of the current research phases. Table 3-3 presents sampling strategies with each phase.

Table 3-3: Theoretical sampling strategies in the current study

Phase	Sampling Strategy	Rationale	Characteristics
Document analysis	Purposive sampling	Purposive for both national and curriculum policy documents	Relevance, availability, eligibility, validity, reliability and convenience
Survey questionnaires	Probable sampling using a snowball technique with instructors and pre-service teachers	To give every member of the population a voluntary and equal chance to participate	Relevance, convenience and willingness to participate
Semi-structured interviews	Purposive sampling with policymakers	To in-depth investigate and emphasise rich-information of the phenomenon	Relevance, willingness and personal connections
	Probable sampling with instructors and pre-service teachers	To provide them with a voluntary and equal chance to participate	Relevance, convenience and willingness

The context was King Abdulaziz University, which was established in 1967 as the first Saudi private higher education institution with only 98 students (68 male and 30 female) (Abd-Al-Jawad, 2008; Al-Aqeel, 2005; Al-Hamed, 2007). Until the Saudi Council of Ministers issued a resolution turning it into a free public university in 1971, this university obtained financial support from some wealthy locals (Abd-Al-Jawad, 2008; Al-Aqeel, 2005; Al-Hamed, 2007). Converting the university to a public institution extended opportunities for undergraduate and postgraduate education; special care for Islamic studies; competitive teacher education as well as contributing to human knowledge by encouraging and conducting research. As well, the university encouraged participating in various cultural, social, scientific and sporting activities (Abd-Al-Jawad, 2008).

The adoption of this young university by the government had a clear impact on its transition to a modern institution. The university grants diploma, bachelor, master and doctoral degrees in many scientific and pure literature disciplines (King Abdulaziz University, 2010). It occupies a privileged position among Saudi higher education institutions and has now more than 82,000 male and female students officially enrolled in more than 33 faculties, including the Faculty of Education (King Abdulaziz University, 2010). In parallel with the traditional tertiary education, the university is considered the leading Saudi university in terms of online instruction and distance education since 1974 (Abd-Al-Jawad, 2008; Al-Aqeel, 2005; King Abdulaziz University, 2010). The university vision published on its official website (King Abdulaziz University, 2007) claims to be a:

- ‘Beacon of knowledge: Islamic values, old college traditions
- Integration in : occupational professionalism, exceptional skills
- Increase in development: Innovation and superiority, diverse and continuous academic research in serving the society.’ (para. 1)

In addition, the university plans to achieve the following long-term goals by the end 2018 (King Abdulaziz University, 2007):

- ‘Developing and approving performance standards that measure the student’s academic levels and skills
- Superiority in research and developmental programs
- Cultural contributions
- Gain society’s and corporations trust in its outcome
- Optimal investment of university resources and abilities.’ (para. 2)

Accordingly, King Abdulaziz University has become one of the most prominent Saudi universities in terms of the complexity, multiplicity, uniqueness and exclusiveness of some disciplines and colleges such as Oceanography, Meteorology, Earth Sciences, Nuclear Engineering, Aviation, Mining, and Medical Engineering (Al-Aqeel, 2005; King Abdulaziz University, 2010). Based on Islamic principles, the university has two separate campuses, one for male and the other for female students to ensure segregated education. Each campus is equipped with all academic, cultural, sports and entertainment facilities in addition to the central library that is well equipped with the latest technology to serve students and faculty members (King Abdulaziz University, 2010).

Participants in this study were all associated with King Abdulaziz University. They were categorised into three groups: policymakers, academic instructors, and pre-service teachers. All were males. Therefore, the gender imbalance in the current study occurs because of the Saudi education system’s regulations that do not permit males to conduct research in sites of women’s education, especially when it comes to conducting face-to-face interviews. Accessibility is an essential factor that significantly contributes to making decisions about sampling from proposed populations (Mertens, 2005; Teddlie & Tashakkori, 1998). Consequently, the current study is conducted in the male section only of Saudi pre-service teacher education. Figure 3-3 shows the derivation of the study participation from the broad contexts of the Islamic, Arabic, and conservative world.

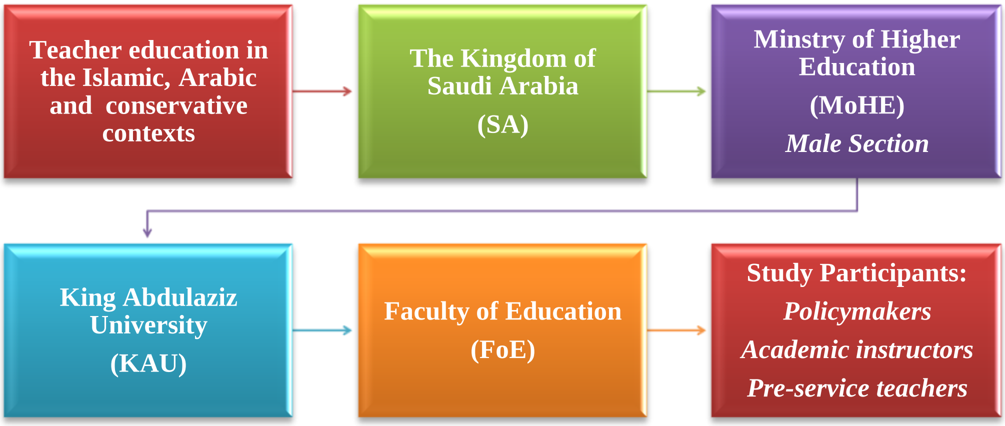

Figure 3-3: Derivation of study participants

A detailed description of each group of the participants in the current study is following.

3.4.1 Policymakers

The purpose of conducting interviews with policymakers in the current study was because Saudi Arabia is a centralised and highly policy-driven context. The role of policymakers with their underpinning fundamentals, views and attitudes are very important at any stage of educational development. In actual terms, interviews with policymakers provided many services to the current research study. Most importantly, the interviews uncovered views, attitudes and factors affecting the integration of technology in Saudi education through a so-called governmental or quasi-governmental voice. The policymakers in the current study provided logistic support and facilitated access to different research sites, databases, media, laboratory facilities and private working places. They facilitated cooperation within the organisation in which thankfully they enabled effective communication and created a connection with the other involved participants such as instructors and pre-service teachers.

Three key policymakers were interviewed. The selection criteria were position, authority and relevance to Saudi pre-service teacher education. The three interviewees were key officials of Saudi pre-service teacher education in the MoHE. They all hold a PhD in Education and showed great willingness to participate in the current study. Due to their high-level position, their cooperation and participation were facilitated through personal correspondence. All interviews were conducted in their work offices in previously scheduled and suitable appointments. Table 3-4 provides a brief overview of the interviewees' profiles. Their real names have been replaced with fictitious names due to confidentiality issues. Further, information in terms of their relevance and position is also kept confidential to protect their identity.

Table 3-4: Overview of the policymakers' profiles

Policymaker	Age	Education	Relevance & Position	Site	Duration	Time
Ali	50s	PhD in Education Curriculum and Teaching Methodologies	Full professor, Key policymaker in Saudi pre-service teacher education	Ali's office	14.48 min	11:30 AM
Saeed	40s	PhD in Education Islamic Studies	PhD, Key policymaker in Saudi pre-service teacher education	Saeed's office	25.48 min	1:30 PM
Hamad	50s	PhD in Education Curriculum and Teaching Methodologies	PhD, Key policymaker in Saudi pre-service teacher education	Hamad's office	39.24 min	2:00 PM

3.4.2 Academic instructors

The academic instructors' perspectives in the current study were critical due to their important role in pre-service teacher preparation. The academic instructors are deemed the link between the administration and pre-service teachers, especially in top-down systems such as in Saudi Arabia. Taking into consideration their background as teachers, they have the ability, authority and capacity to execute pedagogy in the classroom.

Their participation was sought to uncover issues related to the effective integration of digital technologies in pre-service teacher education curriculum. The investigation mainly focused on their pedagogical practices, views, attitudes and perceptions. They were also asked to discuss the key roles of leadership in this process. Their participation was in two substantial phases. The first phase was to complete the survey questionnaires. The second phase involved semi-structured interviews.

Firstly, in the survey phase, more than 100 instructors showed willingness to participate in the current study using a snowball technique (Mertens, 2005). After the deadline to fill in questionnaires, 76 copies were collected and checked. After excluding incomplete surveys on more than 85 per cent of the data, the final number of useable surveys was 50 copies, yielding a 50 per cent return rate. This rate also represents about 19 per cent of the instructors' total population in the Faculty of Education at King Abdulaziz University (see Table 3-5).

Table 3-5: The survey round with instructors: Population, distribution and respondents

Population	Distributed	Collected	Excluded	Final	% of distributed	% of population
265	100	76	16	50	50	18.86

The instructors' demographic information including position, current activities and teaching load is shown Table 3-6.

Table 3-6: Instructors' participation: Demographic descriptive statistics

Variable	Groups	N (50)	%
Position	Teaching assistant (Bachelor degree)	11	22
	Lecturer (Master degree)	11	22
	Professor (PhD)	28	56
Activities	Teaching responsibilities only	31	62
	Teaching with a faculty role	19	38
Teaching Load	Less than 8 h/w	11	22
	From 8 to less than 14 h/w	24	48
	From 14 to less than 18 h/w	12	24
	More than 18 h/w	3	6

In terms of position, 56 per cent were professors (n = 23), followed by lecturers and teaching assistants, each representing 22 per cent of the sample. Further, instructors were classified into two groups according to their current activities. Thirty-one instructors (62 per cent) had only teaching responsibilities. The other 19 instructors (38 per cent) had a faculty role in addition to their teaching responsibilities. In relation to teaching loads, 11 instructors (22 per cent) taught less than eight hours per week, 24 instructors (48 per cent) taught between eight and 14 hours per week, 12 instructors (24 per cent) taught between 14 and 18 hours per week and three instructors (six per cent) taught more than 18 hours per week.

Secondly, for the semi-structured interview phase, instructors who indicated their willingness to participate in the follow-up interviews were contacted to arrange an interview time. Of the 50 instructors who participated in the survey, eight academic instructors were interviewed, all of whom held a PhD in either Education, Art or Social Sciences. Table 3-7 provides an overview of their participation and profile. The real names have been replaced with false names to protect the participants' identity. In addition, information that may lead to their identification was made confidential. The interview times, venues, and duration were in accordance with the academic instructors' preferences.

Table 3-7: Overview of the academic instructors' profiles and interviews

Instructor	Age	Education	Experience	Duration	Site	Time
Faris	38	PhD, Education	Teaching and directing an educational unit	53.51 min	Work office	11:25 AM
Ahmed	40	PhD, Art	Teaching only	18.54 min	Work office	10:00 AM
Rashid	46	PhD, Art	Teaching only	18.59 min	Work office	12:00 PM
Sami	38	PhD, Social Studies	Teaching and directing a scientific mission	37.08 min	Work office	1:30 PM
Hisham	38	PhD, Education	Teaching and directing an educational centre	40.47 min	Meeting Room	1:00 PM
Emad	43	PhD, Education	Teaching with administrative load	54.50 min	Meeting Room	1:00 PM
Ayman	60	PhD, Education	Teaching with previous administrative load	34.46 min	Private Home	7:00 PM
Omar	58	PhD, Education	Teaching only	30.40 min	Work office	10:20 AM

3.4.3 Pre-service teachers

The research initially was aimed at the improved preparation of pre-service teachers, especially in terms of the use technology. Therefore, it seems impossible to conduct the current study without faithfully investigating their views, attitudes, perceptions and preferences as well as the learning activities in which they participated. They were also asked to respond to several research questions regarding the mission of leadership in their preparation. To gain informative responses, they were asked about issues in which they were most directly involved. Similar to the academic instructors, the pre-service teachers participated in two different ways, by responding to survey questionnaires and participating in semi-structured interviews.

For the survey round, more than 500 copies of the questionnaire were distributed to pre-service teachers based on their willingness to participate. Out of these 500 distributed copies, the total number of useable surveys was 325. This number indicates a 65 per cent return rate with 19.13 per cent of the pre-service teachers' total population (see Table 3-8).

Table 3-8: The survey round with pre-service teachers: Population, distribution and respondents

Population	Distributed	Collected	Excluded	Final	% of distributed	% of population
1699	500	382	57	325	65	19.13

Table 3-9 provides details of the demographic information on the pre-service teachers obtained from the surveys and details their current activities and course load.

Table 3-9: Pre-service teachers' participation: demographic and descriptive statistics

Variable	Groups	N (325)	%
Activities	Study only	257	79.1
	Study and work	62	19.1
	Study with a faculty role	6	1.8
Course Load	Less than 8 h/w	34	10.5
	From 8 to less than 14 h/w	49	15.1
	From 14 to less than 18 h/w	79	24.3
	More than 18 h/w	158	48.6

As shown in Table 3-9, the pre-service teachers participated in the survey were categorised into the following three groups: 257 participants (79.1 per cent) only engaged in study; 62 participants (19.1 per cent) both studied and had a part-time job and six participants (1.8 per cent) studied and held a faculty role. In relation to the pre-service teachers' course load, 34 (10.5 per cent) had a load of less than eight hours per week, 49 (15.1 per cent), had a load from eight to less than 14 hours per week, 79 (24.3 per cent) had a load of 14 to 18 hours per week, and finally, 158 (48.6 per cent) had a heavy load of more than 18 hours per week. Five pre-service teachers (1.5 per cent) preferred not to respond to this question.

Once the survey phase was completed, the semi-structured interview phase started. Of the 325 pre-service teachers who participated in the survey, 13 indicated their willingness to be interviewed. All were completing a Bachelor in Education to become teachers in various disciplines. Table 3-10 provides details of their profiles and participation (the participants' real names have not been used).

Table 3-10: Overview of the pre-service teachers' profiles and participation in the interviews

Student	Age	Discipline	Level	Duration	Site	Time
Ammar	21	Quran Studies	5	21.25 min	Meeting Room	11:10 AM
Haitham	21	Special Education	5	29.04 min	Meeting Room	11:40 AM
Salman	21	Mathematics	5	16.02 min	Meeting Room	12:15 PM
Samer	21	Special Education	5	20.23 min	Meeting Room	11:30 AM
Kmal	21	Quran Studies	5	20.07 min	Meeting Room	11:04 AM
Osama	21	Quran Studies	5	21.29 min	Meeting Room	10:30 AM
Waleed	21	Mathematics	5	14.40 min	Meeting Room	12:00 PM
Murad	21	Quran Studies	5	37.37 min	Meeting Room	01:30 PM
Abbas	20	Special Education	5	32.18 min	Meeting Room	02:00 PM
Azzam	21	Quran Studies	5	26.17 min	Meeting Room	01:20 PM
Yasser	22	Computer Science	8	30.08 min	A faculty Office	12:00 PM
Majed	21	Mathematics	5	20.29 min	Meeting Room	01:20 PM
Nadeem	21	Mathematics	6	19.11 min	Meeting Room	01:55 PM

3.5 Methods, approaches and instrumentation

Research methods are the actual procedures set for the purpose of data collection and analyses (Crotty, 1998). This section describes the methods used and the instruments relevant to each method including the design of each instrument.

3.5.1 Document analysis

Researchers can collect useful data by examining policy documents. According to Merriam (1988), the concept documents in research refer to 'a wide range of written, visual, and physical materials ... Documents of all types can help the researcher uncover meaning, develop understanding, and discover insight relevant to the research problem' (pp. 109–118). Therefore, document analysis can be very rich and useful source of data. In relation to this, Atkinson and Coffey (2004) state that:

> Our recognition of their existence (i.e. text documents) as social facts (on constructions) alerts us to the necessity to treat them very seriously indeed. We have to approach documents for what they are used to accomplish. The document analysis method is explained as various procedures involved in analysing and interpreting data generated from the examination of documents and records relevant to a particular study. (p. 58)

The current study begins with a review and analysis of the most relevant documents in the first stage. Document analysis provided helpful insights prior to commencing the subsequent phases. In addition, it provided a critical progressive focus for the interviews with the policymakers. To ensure the quality analysis of documents, each document was properly tagged, described and summarised in a document protocol (see Appendix 1). The analysed documents were classified into two main categories:

1. National policy documents: National policies that are relevant to the effective integration of technology and govern the practices of the whole community and provide the country's general framework. Examples of these documents are the Educational Policy in the Saudi Arabian Kingdom (EPSA), the Ten-Year Plan of the MoE and the SAHCI. Detailed information on the selected national policies is provided in Appendix 2.

2. Curriculum documents: Pre-service teacher education curriculum structure, goals, objectives and guidelines. Curriculum documents were specifically designed for pre-service teachers' preparation. The selected curriculum documents are described in Table 3-11.

Table 3-11: Selected curriculum documents

No.	Policy/Document	Structure/Description	Source
1	Main goals of Saudi teacher preparation	The general framework for teacher preparation in Saudi Arabia	MoE (1980)
2	Main goals of the DET, Faculty of Education, King Abdulaziz University	Teachers' technological preparation according to the DET	DET (2010a)
3	The Educational Technology Preparation Module	This module consist of 4 units that are compulsory for graduation: - Introduction to Educational Technology - Production of Instructional Means - Using Instructional Means - Design and Production of Educational Computer Programs	DET (2010b)

As the Arabic language is the original language of many documents reviewed in the current study, translation into English was important. The researcher firstly translated significant parts of the documents that were presented in the study. According to Mertens (2005), translation relies heavily on collaboration with native speakers. Therefore, specialists and Arabic native speakers who were familiar with Saudi pre-service teacher education as well as varied forms of technology implementation reviewed the translations to ensure its validity and accuracy.

3.5.2 Questionnaires

Survey questionnaires were distributed to academic staff and pre-service teachers to gain a wide and a general picture of their practices before commencing the in-depth investigation via the follow-up interviews (Mertens, 2005; Rubin & Rubin, 1995).

The survey questions used in the current study were designed based on the literature review and what has been done previously concerning the study topic, as well as the document analysis (Mertens, 2005). Accordingly, the survey was divided to four main parts as shown in Table 3-12.

Table 3-12: Main parts of the survey design

Part	Content	Purpose	Group
A	General information	To study the participants' general information	Instructors & Pre-service teachers
B	Relevant perceptions and technology expertise and familiarity	To study the participants' technological perspective: - Technology expertise and familiarity - Perceived concept - Perceived awareness - Perceived self-efficacy	Instructors & Pre-service teachers
C	Curriculum design and technology practice inside the university	To study the participants' pedagogical perspective: - Technology practice - Curriculum design	Instructors & Pre-service teachers
D	Technology integration and leadership	To study the participants' administration perspective in terms of how leadership considers: - the importance of technology integration - the importance of infrastructure - consider the importance of training and support - the importance of building a technology resource base	Instructors & Pre-service teachers (*except the last aspect*)

According to Mertens (2005) and Teddlie and Tashakkori (1998), the type of questions used in the survey can be categorised into two main types: closed questions in which participants choose from a list of possible answers or options such as multiple choice, true or false and checklist questions; and open questions in which participants can respond to the question in their own words. In the present study, a mixture of closed and open questions was used as appropriate to the issues investigated. In designing new survey questionnaires, Mertens (2005, pp. 179–181) suggests a framework that posits general directions and specific suggestions regarding the design of new surveys. This framework and its implications are presented in Appendix 3.

The vast majority of the participants speak the Arabic language. Therefore, questionnaires were first developed in English and subsequently translated into Arabic before distribution. It is important to ensure that the participants feel very comfortable in reading and responding to the questions in order to obtain comprehensive answers from them. Accordingly, the participants also were given an option to choose their preferred language of use; that is Arabic or English. As the Arabic language is the researcher's mother tongue, the researcher translated the questionnaire to ensure its accuracy. According to Mertens (2005), 'because survey research uses decontextualized words through its very nature, the researcher must be careful to interpret the words in light of the particular cultural circumstances' (p. 185). Hence, three specialists and Arabic native speakers reviewed the translations to ensure its validity, accuracy and clarity. The final versions of distributed survey questionnaires are presented in Appendices 4 and 5.

3.5.3 Interviews

In-depth (follow-up) semi-structured interviews were conducted with the policymakers, instructors and pre-service teachers based on the findings obtained from the preceeding phases, which are the document analysis and the survey questionnaires. The design of the interview questions considered the following.

An interview can be a powerful tool for data collection (Teddlie & Tashakkori, 1998). Interviews, as a part of a research study, can be defined as the process of investigating in-depth what participants feel, experience, believe and think about certain issues (Rubin & Rubin, 1995). Berg (1989) simply defines an interview as a 'conversation with a purpose. Specifically, the purpose referred to is to gather information' (p. 13). The responses that participants give reflect their understanding of the phenomenon or the issues that they were interviewed about (Rubin & Rubin, 1995). Therefore, it is important for the researcher to be a good listener, rather than being only a good conversationalist (Rubin & Rubin, 1995). Participants should be knowledgeable of the topic under investigation and they should also show a willingness to participate and share their experience (Rubin & Rubin, 1995).

Research questions can be either quantitative or qualitative in nature. In a qualitative approach, questions asked are open for the participant to respond to in his or her own way, while in a quantitative approach, participants are offered a range of answers and they must choose one (Gillham, 2005). As Rubin and Rubin (1995) note, in qualitative interviews, participants are usually treated as 'partners' rather than being 'objects' of the research (p. 10). Interviews allow greater opportunities between the researcher and the participant for clarification, modification, explanation and investigation (Gillham, 2005; Teddlie & Tashakkori, 1998).

In the current study, it was felt that the most appropriate type of interview was the semi-structured interview, which offers flexibility, balance, structure and data of high quality (Gillham, 2005). As Berg (1989) observes, there are three types of interviews. The first type is the structured interview, which is based on fixed questions similar to the questionnaire surveys. The second type is the semi-structured interview that can be used when a researcher has specific written questions as a guideline. In this case, both the researcher and the participant still have the space to probe and query more information. The third type is the unstructured interview that is more similar to a daily conversation.

Interviews can be conducted either one-on-one or with a group (Berg, 1989; Teddlie & Tashakkori, 1998). In the former, the interview is conducted with only one participant at a time. This format, according to Rubin and Rubin (1995) is 'to find out what happened and why, in rich and individualistic terms' (p. 11). Three versions of the interview questions were developed for the three groups of participants (policymakers, academic instructors and pre-service teachers) in order to investigate their attitudes and views of the effective integration technology into the pre-service teacher education curriculum. These different versions were also developed to canvass different topics according to the participants' background, experience and their expected contribution to the focus of the research, as well as to obtain a more in-depth description of each group practices. However, several questions in the three versions of the interviews overlap, as they cover attitudes and views on similar issues.

The conduct of interviews with policymakers and academic instructors required a nuanced appeal. Deemed as 'elites', it is believed that people in positions of authority can be uniquely helpful (Gillham, 2005, p. 54). However, it is critical to provide a convincing presentation of the topic questions, especially to the key figures, to attract their interest in the research. Gillham (2005) argues that such people are likely to be sophisticated subjects to interview. They are more knowledgeable in the dimensions of the topic, but also because they will be aware of the implications of the questions and their answers. In this way, interview participants become more likely to respond better to questions in their sphere of interest, which makes categorical analysis easier because there will be a clear distinction in terms of the content of responses to different questions (Gillham, 2005).

Interview participants were contacted based on their willingness to participate in the audio-recorded interviews. Voice recording the interviews ensured that the collected data are kept in an 'accurate' and 'retrievable' form (Rubin & Rubin, 1995, p. 126). In addition, the recording of the interviews presented ways to improve and enhance the interviewing strategies for further interviews after listening to the previous ones (Erlandson et al., 1993). Therefore, two digital voice-recording devices were used. One was a specialised digital audio and notes recorder called the Smartpen. Smartpen links the recorded digital audio to the handwritten notes. By tapping on the written notes at a specific place, the device digitally replays the recording from the exact same time. The pen provided enormous help and was considered a time and effort saver. It also allows for online backup through its website. For a general backup, another digital recording device was used. The digital handwritten notes were used for any extra observations during the interviews (Merriam, 1988) and to provide a source of high quality and reliable data (Erlandson et al., 1993) (see Appendix 6 for a sample of the digital handwritten notes). The recording devices and their batteries were checked thoroughly before each interview (Rubin & Rubin, 1995). Every interview's audio digital file was tagged with relevant information about the participant, location, date and time (Rubin & Rubin, 1995). In addition, this information was provided as a verbal recorded title for each interview.

Regarding the design of the interview questions, Merriam's (1988) guidelines were mainly followed such as using understandable questions with familiar language. Berg (1989) stresses this issue by stating that interview questions must be at the 'level of language' of participants (p. 23). The interview should be conducted in a way that 'presupposes that the respondent has something to contribute, has had an experience worth talking about, and has an opinion of interest to the researcher' (Merriam, 1988, p. 79).

Despite the fact that interviews in this study were semi-structured, some structured questions were asked to obtain necessary demographic information of the participants. Probing was one of the main strategies used in the semi-structured interview questions. According to Gillham (2005), Rubin and Rubin (1995) and Berg (1989), probing ensures the interview has more depth. Gillham (2005) describes ‘prompts’ and ‘probes’ as supplementary questions or ‘modes of exploration’ (p. 24), which are necessary in semi-structured interviews. Accordingly, the interview questions were used as tools to encourage participants to reflect on the issue under investigation (see Appendix 7 for interviews protocols).

Being mindful of the moods and setting of the participants during the interviews was a very important aspect (Erlandson et al., 1993; Rubin & Rubin, 1995). An important technique was followed to relax each interview participant. This technique is to start with ‘pleasantries and icebreakers’, which means starting with broad and non-threatening or direct questions and topics (Erlandson et al., 1993, p. 92). In addition, to create a more comfortable environment, through each interview introduction, participants were ‘convinced’ that their contribution is very important and valuable to the research (Berg, 1989, p. 39). Following suggestions made by Gillham (2005), Erlandson et al. (1993), and Berg (1989), participants were offered anonymity, and a chance to review, alter and edit transcripts of the interviews. An agreement on ethical issues such as destroying the original recording once it has been transcribed was offered.

Since the vast majority of participants speak the Arabic language, this can be a barrier to interviews conducted in English (Mertens, 2005). Therefore, they were given the option to use the language they preferred (Arabic or English). Hence, the data obtained from the participants were firstly transcribed in Arabic then carefully revised to ensure that the transcription was accurate and has no missing points. In order to avoid misinterpretation of the interviews, some participants were contacted to clarify the point they had made. As a large amount of data was gathered, only significant comments were translated into English (see Appendix 8 for an example of the interview database). The translation to the original language of the source documents was to preserve the original intent (Mertens, 2005). Finally, three Arabic native speakers were contacted and asked to review the translation to ensure its validity and accuracy. To ensure confidentiality, data placed for review were in shape of plain text that has no reference or indication to the participants' identities. Also, those helped to enhance the quality of the translation were re a warned on the importance and the need for confidentiality of the data.

3.6 Data management and procedures for analysis

This section presents the position of the researcher, a general overview of the data collection process and the ethical issues relating to this study. In addition, the procedures that were undertaken to manage, present, and analyse the research data are detailed thoroughly.

3.6.1 The position of the researcher

My position as a practicing instructor (lecturer) in Saudi pre-service teacher education at King Abdulaziz University was initially critical to the process of investigating the status quo of the level of technology implementation in the Saudi pre-service teacher education curriculum. From an 'emic' perspective (Hodder, 1998, p. 110), my position is further enhanced by being an insider researcher as a former Saudi student from primary school up to my postgraduate studies and as a current educational technology practitioner and stakeholder who has had a direct involvement with varieties of technology implementation in teaching and learning environments, as well as the curriculum. Regarding this issue, Berg (1989) states that 'knowledge about the people being studied and familiarity with their routines facilitate entry as well as rapport once entry has been gained' (p. 58). This knowledge and familiarity puts the researcher in an advantageous position to examine the unique study context critically.

However, 'conducting insider research is like wielding a double-edged sword' (Mercer, 2007: 14). The main issue that may interfere with the credibility of insider researchers is the researchers' bias. In the current research, the implementation of a mixed-methods approach in addition to the continuous data collection over an enough period of time may minimise this challenge. Despite that, Mercer argues that 'insider researchers usually have considerable credibility and rapport with the subjects of their studies' (p. 13).

3.6.2 Gaining access and ethical issues

First, approval from the University Human Ethics Committee (UHEC) at La Trobe University was obtained on 28 July 2008 (# 08-077) (see Appendix 9). In order to secure UHEC approval, a letter from the Dean of the Faculty of Education giving permission to access the faculty was needed. In order to ensure the Dean and the Saudi officials at MoHE were fully informed of the proposed research, a brief overview of the project including details on the researcher, the supervisor, the methodology to be used and the expected benefits to participants is formed (see Appendix 10). Accordingly, the approval to conduct the research was received (see Appendix 11).

For the survey questionnaires and the semi-structured interviews, participants were provided with information sheets, which made them aware of the many issues surrounding the current investigation. These issues include the research purposes, and the risks and benefits associated with their participation in this study. The information sheets were available in both Arabic and English (see Appendix 12). In addition to this, participants were given consent forms to read and sign (see Appendix 13). The participants were assured that their identities would be kept confidential and that false names would be used to protect their identities. Further, ethical procedures to ensure the confidentiality of the collected data were followed, such as ensuring that data were placed in a locked cabinet and computer files were password protected.

3.6.3 Computer implications

In this study, SPSS version 16 software was used to input, process and analyse the quantitative data, including the data from the survey questionnaires of the instructors and pre-service teachers. The focus of the analysis was on providing a rich description of the participants' backgrounds and practices, as well as their views and attitudes towards the topic being investigated. SPSS was used to also compare and find significant differences between the instructors and pre-service teachers in terms of their views, attitudes and current practices. Moreover, the impact of their demographic and background information on each group's practices, their views and attitudes was investigated using SPSS.

For the qualitative data, interviews needed to be transcribed and translated before analysis (Miles & Huberman, 1994). Consequently, interviews were transcribed immediately after each interview to sustain the thread of emerging themes. Emerging themes were tagged appropriately, and the use of Microsoft Word features such as 'hyperlinks' and 'find' greatly assisted the navigation through documents and themes (see Appendix 8).

3.6.4 Procedures for data analysis

Considering the size of the database, it was important to follow well-accepted strategies. According to Johnson and Onwuegbuzie (2004), the steps in the analysis of data in a mixed-method approach are as follows: data collection, data analysis, data reduction, data display, and then data transformation to other rounds. After this, Johnson and Onwuegbuzie (2004) recommend performing the following steps in the order described: data consolidation, data correlation, data comparison, data integration, data interpretation, data legitimation, and drawing conclusions and producing a final report.

The reduction of collected data is often a difficult task. Miles and Huberman (1994) suggested the following steps in reducing the amount of data, especially for qualitative data: simplifying collected data, selecting the focus of the relevant data through the main themes identified, and eliminating irrelevant data through transformation. Further, Erlandson et al. (1993) emphasised the importance of the mutual interaction between data collection and data analysis. In their view, data analysis should engage two procedural approaches that include data analysis at the research locations throughout the data collection period, and data analysis away from the research locations after the data collection period. Therefore, data analysis commenced at the research locations in Saudi Arabia and continued in the research locations in Australia. To summarise the data analysis process in the current study, Table 3-13 describes the associated framework.

Table 3-13: Guidelines used for data analysis (Johnson & Onwuegbuzie, 2004)

Procedure	Phase	Study Round	Purpose
Data collection	One	1, 2 & 3	Checking potentials and describing the situation
Data analysis	One	1, 2 & 3	Analysing data collected for each round
Data reduction	One	1, 2 & 3	To reduce the amount of data collected
Data display	One	1, 2 & 3	To clearly show findings from each round
Data transformation	One	1, 2 & 3	To ensure transformability of data between rounds
Data consolidation	Two	1, 2 & 3	To consolidate findings from all rounds
Data correlation	Two	1, 2 & 3	To find out correlations between the rounds
Data comparison	Two	1, 2 & 3	To compare between the rounds' findings
Data integration	Two	1, 2 & 3	To draw solid, correlated and triangulated findings
Data interpretation	Two	1, 2 & 3	To interpret the final obtained findings
Data legitimation	Two	1, 2 & 3	To review, revise and validate obtained findings
Drawing conclusions	Three	Recommendations' development	Final recommendations and implications

(1 = Document analysis, 2 = Survey questionnaires, 3 = Semi-structured interviews)

3.6.5 Validity and reliability

The use of triangulation through complementary methods enabled the consideration of many facets of the problem (Flick, 2005; Johnson & Onwuegbuzie, 2004; Mertens, 2005). Triangulation increases the validity and reliability of the data (Caracelli & Greene, 1993; Creswell & Miller 2000; Greene et al., 1989; Jick, 1979; Johnson & Onwuegbuzie, 2004; Mathison, 1988). In relation to this, Creswell and Miller (2000) stated that 'triangulation is a validity procedure where researchers search for convergence among multiple and different sources of information to form themes or categories in a study' (p. 126). Triangulation can be more than a scale for validity and reliability. Jick (1979) argues that, 'triangulation, however, can be something other than scaling, reliability, and convergent validation. It can also capture a more complete, holistic, and contextual portrayal of the unit(s) under study' (p. 603). Based on the work of Fraenkel and Wallen (2003), techniques to enhance validity such as continuing the data collection over a sufficiently long period and collecting data in as many contexts and situations as possible will ensure a comprehensive picture of the phenomenon.

3.7 Summary

This chapter provided a comprehensive picture of the research methodology. In particular, it discussed the philosophical foundations and methodological issues associated with the pragmatism of mixed-method research design. The specific mixed-method procedures that this study has adopted were presented and explained. This was followed by a detailed description of the data management and procedures of analysis including relevant frameworks.

The following chapter provides a discussion of findings at the policy level. It includes the analysis of the results of the data obtained through document analysis in which the current global and national factors and curriculum policies related to the integration of digital technologies in pre-service teacher education were investigated. Based on that, semi-structured interviews with policymakers were conducted and analysed.

Chapter 4 PRE-SERVICE EDUCATION POLICY

4.1 Introduction

The previous two chapters situated the current research. Chapter 2 provided a review of literature in relation to the effective integration of technology from the global perspective. Chapter 3 discussed the appropriate research methodology in which a mixed-method design was adopted to solve the research problem. Chapter 4 reports the results regarding issues surrounding the effective integration of technology at the policy level. Investigating the role of policy is of particular importance, especially in highly policy-driven contexts such as Saudi Arabia. Therefore, this chapter is divided into two main sections: the analysis of relevant policy documents; and the analysis of the policymakers' semi-structured interviews.

4.2 Document analysis

Relevant policy documents are thematically analysed and presented in the following two sub-sections. The first sub-section concerns Saudi national policy documents, and the second sub-section focuses on curriculum documents such as goals, objectives, structure and guidelines.

4.2.1 National policy documents

Taking into consideration the fact that Saudi Arabia is a highly policy-driven context, national policies are expected to play a major role in the establishment of educational and pedagogical practices. This includes the process of effective integration of technology, especially in pre-service teacher education. Thematic analysis unveiled two major themes that are most relevant to the current study: the important position of technology in Saudi national policies; and the fundamentalism of Islam and mono-cultural domination.

4.2.1.1 The important position of technology in Saudi national policies

The emphasis given to technology in Saudi national policies is not a new idea; rather, it took a significant place when the early Saudi planners realised its importance. For instance, the EPSA, third edition (MoE, 1980), which was released in the early 1970s, acknowledged the crucial role of technology in the advancement of the country in coordination with science. The importance of the EPSA is that it has been issued by the Supreme Committee for Education Policy in Saudi Arabia and headed by His Majesty the Saudi King. This top policy document covers 'the various fields and stages of Saudi education, the programs and the curricula, the means of education, the administrative systems, the organs in charge of education and all other related subjects' (MoE, 1980, p. 5).

After critically reviewing the EPSA, explicit references to technology were found. For example, in the first part that concerns the most important principles, it explains the importance of the 'harmonious coordination with science and technology, being the most important means of cultural, social, economic and physical development, to raise the standard of our country and nation and to fulfil our role in world cultural progress' (MoE, 1980, p. 7). In addition, one objective of Saudi higher education is to 'perform a positive role in the field of scientific research which contributes to world progress in arts, sciences and inventions, and finding sound solutions for the requirement of developed life and technological trends' (MoE, 1980, pp. 21–22).

With regard to digital technology implementation in Saudi public education, 'concerned educational authorities provide schools with necessary audio-visual means of explanation' (MoE, 1980, p. 37). In addition, an important task for all public information media is to 'take part in public awakening which paves the way for the realization of educational objectives and overcoming all obstacles in the way' (MoE, 1980, p. 41). Further, the information media 'shall participate in the public education campaign to complete the student's education' (MoE, 1980, p. 41). No explicit references to technology were found with respect to higher education and teacher preparation except 'special care shall be given to libraries and laboratories to provide a means of research for higher education' (MoE, 1980, p. 25).

As another example, the MoEP announced an important policy document, which is the EDP (2005–2009). In the EDP, great emphasis is placed on several priorities including technology as a promising area (p. 3). Further, the EDP ‘focuses on the development of the science and technology system and of informatics, on the support and promotion of scientific research, and on the drive for a knowledge-based economy’ (p. 3). It also ‘highlights the challenges that, faced with unrelenting globalization, the development process may encounter in the coming phase’ (p. 4). Therefore, technology has established a considerable position in which the EDP stresses four important demands: the improvement and expansion of the current technology infrastructure; the expansion of Arabic online content; bridging the digital gap between all segments of the nation; and the application of electronic government (e-government) that grants digital interaction between the government and citizens (pp. 499–501). To achieve this, the EDP articulates 12 relevant policy statements in Chapter 22. These statements include encouraging and supporting technology-based research and activities, intensifying the use of technology and e-government in all governmental sectors, meeting the public demands for technology services and expanding the use of the Internet and broadband, providing the required technology training and support to all segments of society and prepare the necessary manpower in the field of technology through special programs including the initiation of specialised institutions and colleges (translated into English, pp. 504–506). The targets of these policies sustain the initiation of the gate of the e-government and e-correspondence systems, the continued the use of widely providing and expanding the DSL and the ISDN service, the achievement of the rate of 20 computers and 20 Internet users per 100 inhabitants of the population and training of at least one million Saudi citizens (translated into English, pp. 506–507).

In addition, the MCIT took the initiative of formulating and implementing the NCITP in 2007. This plan sets out a long-term vision for transforming Saudi Arabia into an information society, increasing productivity through providing technology services for all sectors and parties of the Saudi community (MCIT, 2007). As one implication of this plan, the CITC started sponsoring the SaHCI. This initiative has the core mission of enabling all Saudi families to obtain personal computers through an easy and affordable instalment plan (CITC, 2010). With the cooperation of the private sector, the CITC mission is also able to provide support and supervision to ensure that this initiative fulfils the long-term vision of the NCITP (CITC, 2010).

With regard to the Saudi educational sector, MoE released its Ten-Year Plan 2004–2014, which ‘takes into consideration factors that reflect society’s present and future needs, and it aims at ensuring the continuation of the past successful path towards excellence' (p. 2). One of these most important factors is 'the industrial and technological changes that have resulted in the transformation of society's needs and the nature of the labour market' (p. 2). In this regard, this plan determined that 'the effects of international fluctuating changes are reflected in all aspects of the economic, social, technological, and educational life of the Kingdom, and they impose various challenges on the educational system in order to successfully face international competition' (p. 5). To achieve this, the plan acknowledges 'the knowledge blast' (p. 5) as a result of the wide and rapid developments of technology, which requires 'the improvement of the educational system to meet its challenges' (p. 5). Therefore, 'it has become imperative to revise the existing syllabi, and to organize knowledge, experiences, and skills to prepare learners for the successful application of technology. Thus, the educational system should be developed to face technological challenges, and to implement it in various aspects of education' (pp. 5–6). In practical terms, this plan articulates the MoE technology view for the preparation of students who 'will be able to apply advanced technologies with efficiency and flexibility and to deal with international competition in scientific and practical fields' (p. 12). To fulfil this view, relevant goals and objectives are set out including developing 'the required infrastructure for technology to be better implemented in education' (p. 16); establishing an 'integrated system' for the application of both information and communication technologies in schools (p. 16), and enhancing 'the integration between machine and human knowledge' (p. 16).

In summary, the unique position of and explicit references to technology in Saudi national policies since the early 1970s show the high degree to which the policymakers believe that technology will benefit Saudi education at all levels and settings including pre-service teacher education (see Table 4-1).

Table 4-1: Key characteristics and implications associated with the high place of technology in Saudi national policies

Key characteristics	Implications
• The importance of technology has been realised since the early 1970s • Considering the global developments of technology • Adopting and developing electronic systems such as e-government gates • The importance of spreading technology tools and resources • Maintaining affordability and accessibility to technology infrastructure, resources, tools and facilitations • The importance of spreading computer literacy widely • Supporting the effective use and the integration between man and machine	➢ Technology becomes a global pressure and power ➢ Global pressure of technology has a positive impact on the general implementation of technology in education ➢ The certain need for effective integration of technology in education including pre-service teacher preparation ➢ The need to examine the current technology-based pedagogical practices ➢ The need to examine the implementation of current policies and curriculum design ➢ The need to examine technology policies at local and sub-levels such as universities

Although technology has established a high position in the Saudi national policies, its role can be minimised due to the strong tendency towards conservatism. Evidence in relation to the fundamentalism of Islam and mono-cultural domination is presented in the following.

4.2.1.2 Fundamentalism of Islam and mono-cultural domination

All Saudi national policies are substantially concerned with strengthening the Islamic ideology that should govern all aspects and facets of Saudi life including organisations, individuals and the mutual relationship between them. For example, the fundamental goal of the EPSA policy is to draw the Saudi education system's 'broadlines on which rest the educational process in fulfilling the duty of religion, in fulfilment of the society's needs and in achievement of the nation's overall objectives' (MoE, 1980, p. 5). The first part of the EPSA (MoE, 1980, pp. 6–9) focuses on the main 27 Saudi education principles. Interestingly, 20 principles out of these 27 principles explicitly refer to Islamic fundamentalism. These were presented in the EPSA to strengthen the uniqueness of the Islamic entity in the Saudi society as well as at all levels and stages of the Saudi education system. In addition, the Islamic principles are mentioned in many other places in the EPSA (MoE, 1980); for example, 'religious education is the basic element' (p. 7); the 'Islamic orientation' (p. 7); the 'Islamic solidarity' (p. 8); the 'absolute faith in the fundamentals of the Islamic nation' (p. 11); 'establishing in the individuals the systematic Islamic thought' (p. 11), which provides Saudi individuals with a 'uniform concept of all things related to the universe, man, life and all their branches' (p. 11); the 'Islamic idea' (p. 41); the 'Islamic objectives' (p. 44); and the 'provisions of Islam' (p. 44).

The influence of EPSA on other Saudi national educational policies is evident. For instance, the MoE, in its Ten-Year Plan 2004–2014, articulated clearly the vision of ‘the graduation of male and female students with Islamic values and the appropriate knowledge and practice’ (p. 14). In addition, this plan considers ‘Islamic religious basics and society’s original values’ (p. 7) as the first point of its basics and determinants. Moreover, one of its methodology matters is ‘Saudi society’s distinguished nature and its Islamic and social privacy’ (p. 9). Its ninth goal is a practical one, that is, ‘to develop syllabi based on Islamic values’ (p. 15). This goal’s relevant objectives includes ‘to develop syllabi that will ensure the development of the Muslim learner’s personality to make him proud of his faith and to be loyal to his country in practice and conduct’ (p. 15) and ‘to develop syllabi in accordance with contemporary international trends according to the Islamic values’ (p. 15).

Further, it can be noticed that there is a strong tendency towards preserving Saudi cultural values including Islamic notions, values and identity. As a prime example, the first part of the EPSA (MoE, 1980, pp. 6–9) focuses on the 27 general Saudi education principles. These general principles are presented to explain the source of knowledge and the purpose of education. They also emphasises the preservation of Saudi culture with respect to other cultures including the solidarity of the Saudi family and society. Many critical principles in the EPSA state the importance of strengthening and preserving Saudi cultural principles, language and religious principles that is essentially created by the Islamic ideology. According to the EPSA, all can be achieved by strengthening the solidarity of Saudi cultural principles in terms of ‘the student’s feelings about the cultural, economic and social problems of his society’ (MoE, 1980, p. 11). Conversely, in the EPSA, there is a strong tendency to preserve the Arabic language, which is an inseparable part of the Saudi culture. In this regard, the EPSA strongly states that ‘Arabic is the language of education in all its items and stages unless need dictates otherwise’ (MoE, 1980, p. 9).

As stated, the EPSA also reflects the need for reforms in Saudi education. In the first part of the EPSA, principle number 13 (MoE, 1980, p. 7) states at ‘profiting from all kinds of useful human knowledge’ is the crucial key to raise the nation’s standard. In addition, principle number 232 (MoE, 1980, p. 44) in the ninth part of the EPSA, which focuses on the ‘education endeavours’ in Saudi Arabia explains that all education endeavours should be devoted towards reforming ‘the individuals and developing the society morally, intellectually, socially and economically’ (MoE, 1980, p. 44). However, it is important to consider that proposed education reform endeavours and efforts in Saudi Arabia must be ‘subject to the requirements and provisions of Islam’ (MoE, 1980, p. 44). In addition, education affairs in all their forms and levels including pre-service teacher education are supervised by the Saudi Higher Education Board (MoE, 1980, p. 44).

The Islamic ideology presented in the EPSA is a framework to deal and interact with other cultures and knowledge such as through ‘prudent interaction’ (MoE, 1980, p. 8). Prudent interaction can be explained in terms of rejecting conflicts from other related cultural principles. This role can be fulfilled by a centralised system of authority. For example, the government is in charge of censoring books: ‘only books that are compatible with the nation’s faith, intellectual tendencies and educational objectives are allowed in’ (MoE, 1980, p. 40). Further, the information media shall ‘raise the cultural standards of the nation’ (MoE, 1980, p. 41). Moreover, all ‘governmental or private cultural clubs and centres’ must be under the control of the Saudi authority (MoE, 1980, p. 41). However, the EPSA stresses respect for other cultures, the ‘interaction with the development of other civilizations’ (MoE, 1980, p. 8), and to follow up ‘world achievements in the field of science, literature and liberal arts’ (MoE, 1980, p. 12) to build a ‘constructive civilization’ (MoE, 1980, p. 6). In addition, this document emphasises the preservation of the ‘human dignities’ of others and to respect their human ‘general rights’ (MoE, 1980, p. 6).

In summary, the EPSA provides clear evidence that education in Saudi Arabia is an Islamic, mono-cultural and highly policy-driven system. Opportunities for flexibility for sub-systems or sub-educational authorities in initiating new policies, changes and improvements can be very limited, especially in relation to sensitive issues such as religion and/or culture (see Table 4-2).

Table 4-2: Key characteristics and implications derived from Saudi national policy documents in relation to fundamentalism of Islam

Key characteristics	Implications
• Solely Islamic and mono-cultural orientation and preparation including the curriculum, system and administration • Solidarity of community, based on Islamic and cultural foundations • Preserving religious and cultural values such as identity and Arabic language • Examining other cultural values before adoption • Centralisation and policy-driven planning • Censorship strategies for change agents such as books and media	➢ Change resistance and slowness in accepting the change, especially with respect to sensitive issues such as culture and/or religion ➢ The need to examine the individuals’ beliefs, attitudes and perceptions of technology in terms of better understanding and enhancing the process of effective integration of technology ➢ The need to examine policies at sub-levels such as universities

The following is a summary of the implications of Saudi national policies.

4.2.1.3 Summary and implications of Saudi national policies

Implications of such policies hold a great deal of importance for the current study in two aspects: firstly, the existence of technology awareness at the highest levels of the Kingdom's national policymaking strategies and plans that influence the practices of sub-levels such as universities and educational institutions. This, in turn, inspired the current study to examine the status quo of technology integration into Saudi pre-service teacher education curriculum to determine whether gaps exist between policy and practice. In addition, these implications show the great impact of technology on Saudi Arabia that may be considered a global pressure to use technology effectively to cope with globalisation and the current international trends towards digital technologies. Secondly, understanding that Saudi Arabia is a mono-cultural and religious context demonstrates that Saudi national policies are essentially concerned with maintaining and sustaining the country's cultural-religious fundamentals. While technology can be considered a tool for cultural invasion, cultural-religious conservatism may limit effective integration of technology into Saudi education, especially pre-service teachers' preparation and training.

The following sub-section provides a thematic analysis of curriculum policy documents that include goals, guidelines as well as curriculum structure related to pre-service teacher education.

4.2.2 Curriculum documents

Saudi pre-service teachers must undertake an intensive eight-level course over a minimum of four years to be awarded a Bachelor in Education. This certificate is in a specific discipline of teaching that includes Islamic studies, Arabic language, Social Studies, English Language, Natural Sciences such as Biology, Chemistry, and Physics, Geometrics and Maths, Computer Science, Special Education, and male Physical Education. Due to the importance of teacher education in Saudi Arabia, the main goals of their preparation fall under special provisions in the EPSA (MoE, 1980). These goals provide the general framework for Saudi teacher preparation and training (see Appendix 14).

Structurally, the Saudi pre-service teacher education curriculum can be classified into four main modules: basic discipline preparation module, advanced-discipline preparation module (both 70 units), multi-disciplinary preparation module (70 units), and educational preparation module (16 units), which includes the educational technology preparation units. The total number of accredited units can reach 156. Appendix 15 gives a brief description of these modules. The focus of the current study is on the educational technology preparation units (see Figure 4-1).

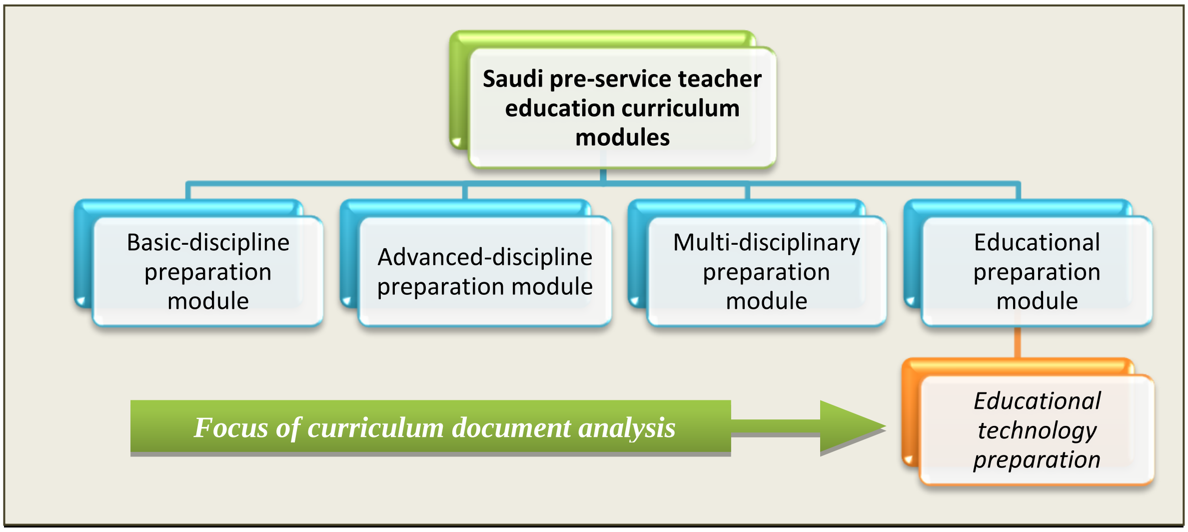

Figure 4-1: Focus of the curriculum document analysis

For most of the teaching disciplines, pre-service teachers study four specific units/levels in the educational technology preparation. According to the Faculty of Education at King Abdulaziz University, the vision of the Department of Educational Technology (DET) is:

> To design, develop and use educational technology effectively and efficiently at all levels of theory, practice and management of human interaction with the variety of learning resources, materials, devices and machineries. In addition, to follow the progressive developments in the field of educational technology and effectively participate in research activities and community service at both local and global levels. Furthermore, to graduate scientific and professional leaders contribute to solving problems of education and training in a systematic way. (DET, 2010)

Since the Faculty of Education does not offer a bachelor degree in the field of educational technology, the DET is regarded as a supportive department that conveys the message of:

> Supporting the provision of rich learning environments through strategic planning for continuous assessment and development of its academic and research activities and services to the community. Also, stressing the quality assurance in performance through the possession of human resources and infrastructure according to acceptable local and international standards. Further, providing opportunities for professional growth and development for its staff to enhance teaching and learning processes. (DET, 2010)

To demonstrate that vision, the main goals of the DET (2010) mainly focus on providing pre-service teachers with compulsory courses and higher degree programs in the field of educational technology; providing training programs for in-service teachers and providing technical assistance and support to faculty members. For the full version of these goals, see Appendix 16.

Regarding the structure of the educational technology preparation, there are four units/levels making seven accredited units. Table 4-3 summarises the status of these units/levels.

Table 4-3: Educational Technology units/levels

Level	Unit title	Unit code	Accredited units	Type	Prerequisite code
1	Introduction to Educational Technology	TTEC 100	One Unit	Theoretical	N/A
2	Production of Instructional Means	TTEC 200	Two Units	Theoretical & Practical	TTEC 100
3	Using Instructional Means	TTEC 201	Two Units	Theoretical & Practical	TTEC 100
4	Design and Production of Educational Computer Programs	TTEC 300	Two Units	Theoretical & Practical	TTEC 100

Each unit/level has its own set of objectives in terms of theory and practice. Appendix 17 details the objectives of each unit.

After reviewing the policies goals, guidelines as well as curriculum structure in Saudi pre-service teacher education, the following themes emerged.

4.2.2.1 Islamic principle-guided goals, policies and curriculum structure

Saudi pre-service teacher education must reflect Islamic values and morality. As stated in the EPSA (1980), the first goal is that teacher preparation ‘shall be in line with the nation’s basic objective in rearing up a Muslim generation which understands the Islamic creed and law’ (MoE, 1980, p. 30). The aim is also to preserve cultural aspects such as the Arabic language and the total reliance on it as the solo language of education. This is ‘to enable graduates to teach with a high Islamic spirit and correct Arabic language’ (MoE, 1980, p. 30). A case in point is that the process of recruiting administrative and teaching staff in pre-service teacher education is mainly dependent on ‘Islamic morality’ in addition to ‘scientific standards and educational competence’ (MoE, 1980, p. 30). In relation to the current theme, Table 4-4 provides key characteristics and implications derived from the curriculum structure, policies and guidelines.

Table 4-4: Key characteristics and implications derived from the curriculum policies

Key characteristics	Implications
• Saudi teacher preparation must be in light of Islamic values and morality • Preserving cultural values such as the Arabic language • The recruitment process of the administrative and teaching staff is highly dependent on Islamic principles	➢ Change resistance and slowness in accepting the change, especially with respect to sensitive issues such as culture and/or religion ➢ The need to examine the individuals' beliefs, attitudes and perceptions of technology in terms of better understanding and enhancing the process of its effective integration

As Saudi pre-service teacher preparation is mainly religious, the chance for change is very limited. There is need to examine the individuals' beliefs, perceptions and attitudes, particularly related to technology, which may be considered a threat to the local culture.

4.2.2.2 Technology integration-free policies, curriculum structure, goals and objectives

It can be argued that, firstly, the goals of Saudi pre-service teacher education as well as the overall goals of the curriculum and the units that pre-service teachers must take in terms of educational technology preparation do not contain any explicit reference to 'technology integration'. Rather, the educational technology preparation goals and objectives only describe the scope of educational technology learning and training in terms of the pre-service teachers' proficiency and their professional capability to use some educational technologies in general. The focus is on understanding theories, concepts and knowledge with less emphasis on the practical side.

In addition, the overall goals and objectives of the educational technology preparation show a clear absence of any performance standards in the related teaching and the required technology skills that pre-service teachers should be able to demonstrate. These goals do not mention the necessary skills of being able to research the Internet, for example, through web 2.0 tools or even web 1.0. Rather, the documents briefly state the overall goals of the educational technology unit in pre-service teacher education programs in terms of only what pre-service teachers should be able to accomplish after completing the program, rather than what they should be able to do in their future classrooms. Key characteristics and implications relevant to this theme are provided in Table 4-5.

Table 4-5: Implications derived from curriculum policies and guidelines in relation to technology integration-free curriculum

Key characteristics	Implications
• The focus is too much on the theoretical side of the curriculum with less attention given to the practical side of the curriculum • No explicit reference to 'technology integration' • Curriculum goals and objectives only describe the scope of educational technology learning and training in terms of the pre-service teachers' proficiency and capability to use educational technologies • Curriculum goals objectives show a clear absence of performance standards in the related teaching and required technology skills that pre-service teachers should be able to demonstrate • Curriculum goals and objectives focus only on what pre-service teachers should be able to accomplish after completing the program rather than what they should be able to do in their classrooms in the future	➢ The need to examine curriculum effectiveness in general ➢ The need to examine the curriculum effectiveness specifically in terms of educational technology preparation ➢ The need to examine the current technology-based pedagogical practices ➢ The need to examine the implementation of current policies and guidelines

As a result, technology preparation is mainly traditional. This implies a need to examine the curriculum efficiency, especially with regard to technology and its implementation.

4.2.2.3 Summary and implications of the Saudi pre-service teacher curriculum and policies

Saudi pre-service teacher education is a multi-disciplinary preparation that reflects the Islamic cultural conservative view and orientation. The curriculum structure focuses on the production of multi-disciplinary teachers who can teach a variety of subjects in public schools. Apparently, the notion of quantity of teachers versus quality is still dominant to address the problem of the shortage of teachers in Saudi general education. The approach of quantity versus quality was largely adopted in the early stages of developing Saudi education to meet the demand of adequate number of teachers and spread education across the state.

In terms of pre-service teachers' preparation in relation to educational technology, the focus is too much on the theoretical side of the curriculum with less attention given to the practical side. It also lacks a connection to current learning approaches or to future teaching approaches. In other words, the educational technology preparation does not contain any practical objectives that are relevant to current learning approaches, preferences, styles and general performance as current learners and/or prospective teachers.

It can be concluded that the implications of such polices, guidelines and curriculum structure is that the pre-service teachers' preparation lacks efficiency, especially with regard to educational technology. It may also result in pre-service teachers having a low degree of motivation due to the heaviness and multi-disciplinarily aspects of the curriculum as well as its lack of connection to their real current or prospected technology-based pedagogical practices.

4.2.3 Conclusion of document analysis

The importance of technology is evident in Saudi national policies. The focus is on the effective implementation of technology in the development and the advancement of the various sectors of the country including both organisations and individuals. To achieve this, Saudi national policies with regard to technology stress the importance of quality of infrastructure, affordability and accessibility to technology resources such as the Internet, ensuring technology is widespread and offering the necessary training and professional support. However, the implementation of such policies seems to face some sensitive and conservative cultural-religious limitations in terms of change resistance and slowness in accepting the change. These cultural-religious limitations (i.e. factors) are also evident in Saudi national policies.

At the application level, particularly in the pre-service teacher education curriculum, the importance of technology in Saudi national policies has not been fully transferred or translated into effective application including curriculum goals and objectives. The evidence shows that there is a clear gap between macro and micro levels of polices (national and curriculum). In other words, the overall goals, objectives and guidelines of pre-service teacher education, including educational technology preparation, severely lacks the effective integration of the technology-related vision, goals and objectives. Traditional pedagogical approaches are still dominant in the pre-service teacher education curriculum in which technology learning and practice are offered through traditional courses that are studied in isolation and have no connection to the pre-service teachers' learning styles and preferences. The goals and objectives of the pre-service teacher education curriculum with regard to technology focus on what only pre-service teachers should be able to accomplish after completing the program rather than what they should be able to do in their future classrooms. Further, pre-service teacher education is strongly influenced by the conservative cultural-religious aspects in terms of the overall goals and objectives that are consistent and coherent with Saudi national policies in this regard.

In general, Saudi national policies demonstrate the country's keenness to take serious steps towards the effective use of technology in general to cope with the massive and advanced developments of technology globally. However, these steps do not derail the country's general fundamentals such as beliefs, religion and culture. Accordingly, pre-service teacher education is strongly dominated by these general fundamentals; however, there is no evidence yet that the country's technology national policies have been transferred into practice. Thus, it has become important to investigate and document the possibility of the effective integration of technology in pre-service teacher education policies. To do this, the emerging themes and questions are essential to the investigation at the individual level of policymakers. Table 4-6 focuses on the subsequent interviews with the policymakers.

Table 4-6: Document analysis: Major themes, findings and policymakers' interviews

<table>
<tr><th rowspan="2">Documents' Class</th><th colspan="2">Document Analysis</th><th>Policymakers' Interviews</th></tr>
<tr><th>Major themes</th><th>Key findings</th><th>Subsequent focus</th></tr>
<tr><td rowspan="2">National Policy Documents

(Saudi national policies, plans and strategies)</td><td>The importance of technology in Saudi national development</td><td>• The realisation of technology's role in the advancement of the country:
- Technology has become an unavoidable global power
- That implies a pressure on society and the system including pre-service teacher education</td><td rowspan="4">There is a need to examine:
➢ the impact of the global pressure of technological developments on the effective integration of technology
➢ the impact of cultural-religious conservatism on the effective integration of technology
➢ the policymakers' perceptions and awareness of the effective integration of technology
➢ the policymakers' concepts of the globalised curriculum as well as the quality versus quantity curriculum
➢ the leadership vision, practices and challenges to integrate technology effectively</td></tr>
<tr><td>Fundamentalism of Islam and mono-cultural domination</td><td>• Creates conservatism, centralisation and change resistance
• This may hinder taking full advantages of technology as an outside agent of change</td></tr>
<tr><td rowspan="2">Curriculum Documents

(curriculum structure, guidelines, goals and objectives)</td><td>Islamic principle-guided goals, policies and curriculum structure</td><td>• While the focus is on Islamic orientation and multi-disciplinary preparation, curriculum becomes heavy and may minimise the effective use of technology</td></tr>
<tr><td>Technology integration-free policies, curriculum structure, goals and objectives</td><td>• A gap is existed between national and curriculum policies with regard to technology integration
• Technology-based pedagogical practices may be minimised in the curriculum</td></tr>
</table>

The following section presents the policymakers' responses to the follow-up interviews.

4.3 Policymakers' interviews

Based on the major themes and key findings obtained in the previous section (the analysis of both national and curriculum documents), this section investigates the policymakers' perspective as technology practitioners including factors affecting the integration of technology into the pre-service teacher education curriculum and their pedagogical perspective and administration perspective. Table 4-7 presents key issues, questions and focus for the major themes.

Table 4-7: Key issues, questions and focus of policymakers' interviews

<table>
<tr><th>Major Themes</th><th>Key Issues</th><th>Interview Questions</th><th>Rationale</th></tr>
<tr><td rowspan="4">Policymakers' perspective as technology practitioners

(including factors impacting on the integration of technology into the pre-service teacher education curriculum)</td><td>• The impact of global technological developments on effective technology integration</td><td>➢ What is the impact of the global pressure of technological developments on the integration of technology into pre-service teacher education?</td><td rowspan="2">Investigating factors impacting the policymakers' perceptions, attitudes, views and awareness with regard to the integration of technology into the pre-service teacher education curriculum</td></tr>
<tr><td>• The impact of cultural-religious conservatism on effective technology integration</td><td>➢ What is the impact of cultural-religious conservatism on the integration of technology into pre-service teacher education?</td></tr>
<tr><td>• The policymakers' perceptions of effective technology integration</td><td>➢ How do policymakers perceive the concept of effective technology integration into pre-service teacher education?</td><td rowspan="2">Investigating the policymakers' personal perspectives as technology practitioners as well as the impact of the two factors on their perceptions and awareness</td></tr>
<tr><td>• Their awareness of the importance and usefulness of effective technology integration</td><td>➢ To what extent are the policymakers aware of the importance and the usefulness of effective integration of technology into pre-service teacher education?</td></tr>
<tr><td rowspan="2">Policymakers' pedagogical perspective</td><td>• The policymakers' conceptualisation of a globalised curriculum</td><td>➢ How do the policymakers conceptualise the globalised curriculum?</td><td rowspan="2">Investigating the policymakers' concepts of the globalised curriculum and the quality v. quantity curriculum</td></tr>
<tr><td>• Their views of the quality v. quantity curriculum</td><td>➢ How do the policymakers view the quality v. quantity curriculum?</td></tr>
<tr><td rowspan="3">Policymakers' administration perspective</td><td>• Leadership vision of effective integration of technology</td><td>➢ What is the current leadership view of effective integration of technology into pre-service teacher education?</td><td rowspan="3">Investigating the policymakers' vision, current practices, and challenges and obstacles to arrive at the effective integration of technology</td></tr>
<tr><td>• Current leadership practices to integrate technology effectively</td><td>➢ What are the leadership current practices to integrate technology effectively into pre-service teacher education?</td></tr>
<tr><td>• Challenges facing leadership to integrate technology effectively</td><td>➢ What are the challenges and obstacles to the effective integration of technology into pre-service teacher education?</td></tr>
</table>

The following sub-sections provide answers for the questions presented in the table above.

4.3.1 Policymakers' technological perspective

The policymakers' technological perspective includes factors affecting the integration of technology. It also discusses their perceived concept of the effective integration of technology as well as their level of perceived technology awareness.

4.3.1.1 Factors affecting the integration of technology

Factors that affect the policymakers' perceptions, awareness and attitudes towards the effective integration of technology were investigated. These factors contribute to their decision-making strategies and plans to undertake further steps with regard to this issue. These factors included the impact of the global pressure of technological developments and the impact of cultural-religious conservatism.

First, the impact of the global pressure of technological developments was examined. The global pressure of technology refers to the pressure generated by the massive, rapid and global developments of technology on any society, which evokes a technological transformation. All interviewed policymakers admitted that the global pressure of technological developments has been a strong and positive influential factor impacting on their perceptions and consequently on their decisions to undertake further steps towards the effective integration of technology into Saudi pre-service teacher education. The global pressure of technological developments was mentioned in many places during the interviews and was expressed in several forms such as *global village, technology era, technology revolution* and the *digital generation*. This result is consistent with the results from the analysis of the Saudi national polices in which technology took an important place and position in the advancement of the country as well as to cope with these massive and rapid developments of technology around the globe. Ali, a previous senior policymaker in the MoE and a current high-level official in the MoHE, simply connected globalisation with technology developments:

> *The world has become a small village. Now, it is possible to obtain information in any place and at any time.* (Int. 4, p. 1, Line 5)

Further, Ali asserted that this global village has contributed to the creation of new digital-generations, who are extremely familiar with technology. The existence of new digital-generations implies the revision of current educational models as well as keen follow-up of technological developments around the globe:

> *Our children now can be considered as a digital generation. Thus, we have to effectively use technology in our educational system. We also constantly must follow-up what is happening in this field.* (Int. 4, p. 2, Line 49–51)

For further assurance, Ali confirmed that despite the attitudes in Saudi Arabia towards technology, there is no choice in the matter and it is necessary to implement measures to cope with technology. This in particular may reflect on the policymakers' awareness and decisions to integrate technology into pre-service teacher education. Ali said:

> *Technology has become a must and cannot be avoided or ignored whether we like it or not.* (Int. 4, p. 2, Line 73)

Consequently, the Saudi context cannot be excluded from the global developments of technology, which has created a community that is increasingly using technology as a daily lifestyle. As one of the results of the increased use and familiarisation with technology, confidence and ability to overcome many obstacles associated with the use of technology has dramatically increased. With regard to this issue, Saeed, a new-generation policymaker, revealed that:

> *Faculty members and students increasingly practice technology at home, work and cars... These uses have generally improved society's ability to overcome the obstacles of technology and its associated financial constraints. Also, it helps introduce more technology in education.* (Int. 5, p. 3, Line 87–90)

Hamad, an old-generation policymaker, who has held multiple positions in the MoHE, elaborated on the global pressure of technology by positing that:

> *Most global trends are now about technology. Therefore, efforts in Saudi Arabia are directed towards the creation of an e-Kingdom, e-ministry and e-university.* (Int. 24, p. 7, Line 252–253)

In addition, Ali confirmed that the existence of the global pressure of technological developments has necessitated the need for coping with globalisation to establish beneficial, helpful and useful expertise through technology:

> *We must get out of being local to global. We should get out of the box and take advantage of the global expertise and modern developments in technology.* (Int. 4, p. 2, Line 43)

Ali, in the previous statement, showed awareness of the fact that Saudi Arabia is a mono-cultural and conservative society. In addition, he directed the focus towards the role of cultural-religious conservatism that could be a factor in enabling or inhibiting the effective integration of technology in education including pre-service teacher preparation. The next sub-section focuses on the role that cultural-religious conservatism may play in this regard.

Second, the impact of cultural-religious conservatism was examined. Cultural-religious conservatism appears in the policymakers' responses as an important issue that affects their perceptions with regard to technology and its effective integration. With respect to globalisation and the spread of inappropriate online materials such as pornography, nudity and violence, unconscious attitudes towards protecting Saudi community from the invasion of other incompatible cultural values emerged. This result confirms the findings from the previous thematic document analysis, which shows a strong tendency towards protecting Saudi cultural-religious identity. Hamad confirmed that many Saudi families have fears of inappropriate online content and the way that this has been controlled and blocked by the Saudi authorities. Hamad believed that blocking can be easily bypassed:

> *Many families still fear for their children when using the Internet because of the inappropriate materials such as pornography. It is true that the government properly controls, filters and blocks a lot of such content, but there are people who can easily bypass that.* (Int. 24, p. 8, Line 322–323)

Such conservative views resulted in more calls for extra censorship techniques and strategies to help protect the native culture of the community, especially children from being exposed to inappropriate online materials. In this regard, Ali clearly stated that:

> *We are afraid of the inappropriate or harmful use of technology. Therefore, we must impose new kinds of censorship in order to effectively use it.* (Int. 4, p. 2, Line 61–62)

From another perspective, the policymakers see that a comparison between Saudi Arabia and many other contexts whether developed and/or developing countries is logically unfair. The relatively new establishment of Saudi Arabia and the new age of its developments, in addition to its strong tendency towards conservatism justify this. Saeed argued that:

> *When we start comparing the development and civilization that are currently taking place in Saudi Arabia with other contexts, we should ask: how old is technology and the modern culture in Saudi Arabia? I think that the comparison between us and other contexts is totally injustice.* (Int. 5, p. 5, Line 176–178)

I prompted a discussion regarding the issue of the availability of massive funding due to the current Saudi financial boom, which many other countries may lacked. Saeed replied that Saudi Arabia needs time to evoke and introduce any cultural, social and/or technological changes:

> *Saudi society needs time for change to occur, whether socially or technologically. Therefore, we should be fair. It is true that the financial capabilities of Saudi Arabia are significantly substantial and supposedly we should race against time with it, but the fact remains that the time available to do this was not enough.* (Int. 5, p. 5, Line 179–180)

As such, Hamad explicitly conveyed:

> *We are still in the beginning, but hopefully we will evolve. Some groups in the society still have a limited outlook with respect to technology and its role in the development of students, families and the societies. However, we need more time to change that perspective...* (Int. 24, p. 8, Line 318–324)

However, there is no doubt that societies change with time. In mono-cultural and conservative societies such as Saudi Arabia, it can be argued that cultural changes are relatively slow in comparison with other multi-cultural societies such as most of the developed world. In terms of the role of technology, the rapid and wide spread of technology may enhance the augmentation of cultural change. Saeed emphasised that:

> *Change used to be quite slow in the last few years, but now I think it has become much faster.* (Int. 5, p. 5, Line 180)

Ali agreed with Saeed's view and confirmed that despite Saudi cultural-religious conservatism:

> *Saudi technological transformation is certainly and only a matter of time.* (Int. 4, p. 2, Line 77)

4.3.1.2 Policymakers' perceived concept

During the interviews with the policymakers, they lack clear-cut responses about what effective integration of technology into pre-service teacher education curriculum means. Although that they were fully aware of the research topic with its associated issues and thankfully showed a great willingness to participate, they seemed to be surprised by direct questions that aimed to understand their perceptions of what effective integration of technology means. Consequently, they tried, perhaps unconsciously, to shift the focus to talking about technology and its importance in a general sense. Therefore, I attempted to gain satisfactory answers to this issue by posing the question indirectly several times during the interviews. Accordingly, the overall perceptions of the policymakers on the effective integration of technology into pre-service teacher education were found to focus on three main general aspects: teachers' technological preparation, technology introduction, and technology understanding. Of the three policymakers, Ali provided the most significant response. To Ali, the effective integration of technology into pre-service teacher education meant the technology-oriented preparation that combines technological knowledge with practice. He overlapped this concept by the awareness of the global pressure of technological developments stating that:

> *Teachers' technological preparation in terms of knowledge and practice is very important in the current era. That is to reach the stage of effective integration of technology in education.* (Int. 4, p. 1, Line 5–6)

Hamad defined the effective integration of technology into pre-service teacher education by the essential understanding of technology and its important role in education by pre-service teachers. Hamad also reflected his awareness of the global pressure of technology by positing that technology is teachers' current weapons that they should master. He tied this understanding of technology with both pre-service teachers' success during their preparation phase as well as in-service. Highlighting this issue, he defined skilled teachers as those whom are technologically well prepared:

> *It means to ensure that pre-service teachers understand technology as their tools and weapons, which they must muster and master. If this happens, they will be successful students and skilful teachers.* (Int. 24, p. 6, Line 227–228)

Saeed seemed to be puzzled by the request to give a clear definition of the integration of technology into pre-service teacher education. He stated his view of this concept by saying:

> *Technology integration means the introduction of technology in education.* (Int. 5, p. 3, Line 89)

4.3.1.3 Policymakers' perceived awareness of the importance and usefulness of technology

The policymakers were found to be aware of the importance and the usefulness of technology and its effective integration. Their perceptions centred on the enhancement of pedagogical activities by creating more technology-rich learning environments. Their responses revealed their concepts of the usefulness of digital technology integration such as enhancing effective interaction and communication, aiding management and facilitating 24/7 access. Although the policymakers showed an acceptable level of awareness with regard to the importance and usefulness of technology, they were highly affected by the two factors mentioned previously: the global pressure of technological developments and the cultural-religious conservatism. However, the policymakers' responses discussed the usefulness of technology and its effective integration in two main dimensions: the usefulness of technology integration to the current pedagogical practices, and its usefulness to the administration and leadership in general.

Although the policymakers' comments overlapped with their views on technology integration as one of their very important administrative priorities, this is outside the focus of this sub-section. The importance of technology integration as an administrative priority is discussed in the forthcoming section regarding the administration perspective. This section only focuses on the policymakers' perceptions about the usefulness of technology integration to the current pedagogical practices and to the administration. In relation to pedagogical practices, Ali seemed very confident when he revealed that the integration of technology into pre-service teacher education is a time saver:

> *What concerns us here is the integration of technology into our educational systems, especially pre-service teachers' preparation and training… This is due to its role in reducing time and effort.* (Int.4, p. 1, Line 3–4)

Saeed confirmed that administration is certainly convinced about the importance and the usefulness of technology integration. Saeed also revealed that teacher preparation in Saudi Arabia lags behind that of other developed countries with regard to this issue. Being in this position suggests new demands and requirements for the leadership to meet. The new demands successful interaction with the outside world to take advantage of their development and expertise. The global pressure of technological developments and the tendency towards conservatism are noticeable in Saeed's statement:

> *We are aware of the usefulness of technology being integrated into the pre-service teacher curriculum, but we are still behind the developed countries with respect to this issue. Therefore, it is necessary for us to benefit from the others' experiences and expertise, especially with regard to technology.* (Int. 5, p. 3, Line 114–115)

Ali elaborated on this issue using a simple comparison between the past and the present. He showed that the global developments of technology have initiated the need to expand the current pedagogical approaches to take advantage of the usefulness of technology. Ali said:

Computers, the Internet and networks provide more interaction, mutuality as well as organised, richer and faster two-way communication. In fact, technology has become indispensable. We no longer have options apart from using and expanding the use of technology. (Int. 4, p. 1, Line 23–27)

Hamad shared Ali's view of the improvements that were needed in the current pedagogical approaches in Saudi pre-service teacher education that could be achieved by utilising new technological approaches due to their certainty and usefulness:

Multimedia is now almost overwhelming because of the technology revolution. We now have computers, data projectors, e-learning, and mobile learning. We must use and take advantages of them in the process of pre-service teacher preparation. (Int. 24, p. 6, Line 218–219)

In response to this awareness, current practices of leadership focus on ways of implementing more technology into the existing pedagogical approaches. Ali showed an encouraging stance of leadership in utilising all available resources that the global developments of technology have provided, such as online and distance learning. He also described some of the benefits that the effective integration of technology may bring such as interaction, 24/7 access and educational content management:

We are trying to take advantage of all available resources, whether online, papers or textbooks. Teaching methods must be supported by appropriate educational aids that suits the current era. Further, most of the courses should be online so pre-service teachers can access their contents at any time and from anywhere. Also, students should be able to modify, add, manage and comment on these contents. (Int. 4, p. 1, Line 33–36)

Ali was concerned about the current teaching methodologies, which should be improved in light of the current implications of global technological developments:

Faculty members must be aware that their lectures are interactive. They must benefit from the efforts of others such as presenting relevant videos, clips or photos. By using such technologies, education becomes continuous and even from a distance. (Int. 4, p. 1, Line 37–39)

The policymakers were also aware of the difference between the old teaching methods and the new ones, which use technology in enhancing attention. For example, Hamad said:

By the use of technology, pre-service teachers can access information in a way that attracts their attention. (Int. 24, p. 6, Line 224–226)

Not only does the integration of technology into the pre-service teacher education curriculum enhance their learning and training, it also provides them with the capacity to integrate technology in their future classrooms. Further, this may contribute to the prevention of traditionalism being transmitted between generations. According to Hamad:

> *When faculty members teach their students in a traditional way and do not use technology, the students will continue using the traditional way and will not be able to effectively use technology in their future classrooms.* (Int. 24, p. 9, Line 334–335)

With regard to the usefulness of technology to the administration, the policymakers showed that they have started to expand their current practices by implementing technological applications into their mission. For example, the current administration have initiated the Electronic Correspondence System project, which allows communication via e-mail between the administration and the various departments of the Faculty of Education. Both Ali and Hamad seemed enthusiastic about this project:

> *We have initiated the Electronic Correspondence System, which allows e-mail communication between faculty members, departments and different divisions of the Faculty. The idea of this project is to reduce the accumulation of paperwork. This project is a very good idea, but it needs some time to efficiently function.* (Ali, Int. 4, p. 1, Line 13–15)

> *As evidence of the current developments is the shift from paper to electronic correspondence, where we stressed that paperwork must be forgotten.* (Hamad, Int. 24, p. 6, Line 235)

In addition to the fact that the Electronic Correspondence System may effectively enhance the administration mission, Ali elaborated on the usefulness of implementing this project to both faculty members and pre-service teachers as well:

> *It provides an atmosphere of flexibility and a virtual interactive environment between instructors and pre-service teachers as well. Now, they are able to exchange messages, lesson plans and tasks, which can be electronically corrected and returned. Therefore, many faculty members have started to activate e-mail services and receive assignments from students. Further, some instructors have prepared online tests. In my opinion, this is a quantum leap.* (Int. 4, p. 1, Line 19–22)

4.3.1.4 Summary of the policymakers' technological perspective

Two main factors were found in the policymakers' responses that have an impact on their perceptions and consequently on their decisions to undertake any action towards the effective integration of technology into Saudi pre-service teacher education. Policymakers were found to be aware of the global pressure of technology and its massive development, which has sparked the need for change to meet the implications of this global pressure. Conversely, the view of cultural-religious conservatism and resistance to the new was also evident. Both results were consistent with the findings from the document analysis phase in which technology took an important place in Saudi national development-related policies, but in a cultural-religious conservative manner. Taking a position in the middle between those two contrary influential factors, policymakers admitted that the certainty of the global pressure of technology has left no other options but to cope and take advantage of such developments. However, substantial time is needed for change and transformation to occur and take place.

The policymakers seemed to be puzzled and to some extent lack satisfactory concepts of effective integration of technology. In essence, their overall perceptions are about introducing, understanding, enhancing and utilising more technology into pre-service teacher education. Despite cultural-religious conservatism, the global pressure of technology has created a high level of awareness that the integration of technology is certain and unavoidable. The policymakers were found to be aware of the importance and the usefulness of effective integration of technology to both pedagogy and administration. It enhances more technology-based pedagogical practices such as online learning, distance education, effective interaction and fast two-way communication.

4.3.2 Policymakers' pedagogical perspective

The pedagogical perspective refers to the curriculum design and its associated technology-based pedagogical practices. The factors that affect the policymakers' perceptions about the integration of technology into Saudi pre-service teacher education are also found to influence their pedagogical perspective. Thus, the policymakers' responses were categorised into two main sub-themes: the policymakers' conceptualisation of the globalised curriculum; and the impact of centralisation on pre-service teacher education curriculum.

4.3.2.1 Globalised versus traditional curriculum

Both the global pressure of technology and cultural-religious conservatism influence the policymakers' views with regard to the necessary curriculum developments. For instance, Ali articulated that the global development of technology implies new dimensions with wider options:

> *We now have more choices in education in the presence of modern technology, which becomes a global language. Therefore, we must abandon our old teaching methodologies and adopt new ideas including the integration of digital technologies.* (Int. 4, p. 1, Line 28–29)

Moreover, Ali stressed that improvements should be made to the existing curriculum that benefit from globalisation and developed countries' expertise. Ali said:

> *While the world became a global village, each faculty member must implement the potential of local and global environment in his/her teaching.* (Int. 4, p. 2, Line 44)

Ali in the previous statement showed that the improvement of the current pre-service teacher education curriculum is the instructors' responsibility. Ali's assumption conveys new role for instructors to fulfil, which Saeed explained by stating:

> *Faculty members are in charge of transforming the curriculum to an electronic format. Now, approximately fifteen courses have been transformed.* (Int. 5, p. 4, Line 128)

However, this transformation seems to be more concerned with the curriculum format not with its content. Saeed, with a more restricted view, showed that reforming the current curriculum is conditional due its sensitivity. In spite of the necessity to cope with globalisation and implementing new technologies in education, Saeed seemed to be more concerned with sustaining the values and principles of the native culture. He stressed with confidence that:

> *We completely differentiate between importing curriculum and importing only curriculum styles and approaches. Specifically, we emphasise the originality of the curriculum, but we wish to benefit to the maximum possible extent from the scientific and technological aspects.* (Int. 5, p. 3, Line 116–118)

Hamad's view is in line with that of the other policymakers with regard to global curriculum developments. However, he admitted that development in Saudi pre-service teacher education curriculum is still in the beginning phase:

> *We recognise the fault with the current curriculum and we seek to develop. Now, we have access to many programs offered by Arab, Gulf and various foreign universities.* (Int. 24, p. 7, Line 269–270)

Ali supported Hamad's view. He proudly said:

> *I think we are currently experiencing a quantum leap and I hope we can keep it up.* (Int. 4, p. 2, Line 47)

Nevertheless, some developments have recently started to take place in the introduction of more technology into the pre-service teacher education curriculum. For example, Hamad revealed that the university has equipped each classroom with a data projector to facilitate and enhance the use of technology:

> *The university has provided all classrooms with data projectors to ensure modern, effective and fast delivery of information.* (Int. 24, p. 6, Line 220–221)

Although it is the role of the Faculty of Education to prepare pre-service teachers, Ali explicitly stated that leadership has positioned the instructors in the centre of their approaches towards improving the current pedagogical model, especially in terms of technology. Ali’s declaration conveys that teacher-centred education is dominant. Since pre-service teachers are more familiar with technology than their educators are, they can be considered only receivers. Ali stated that:

> *Faculty members are the foundation due to the fact that they are the senders of the message while pre-service teachers are only receivers. In addition, I think that there is no problem with the receivers whom are fully aware of the use of technology. So, we must prepare the senders more than the receivers.* (Int. 4, p. 2, Line 56–57)

4.3.2.2 Quantity versus quality curriculum

Having discussed the two phases of the development of Saudi teacher preparation in the literature review (see Chapter 2) and the shift towards quality teachers rather than quantity, Saudi teacher education seems, thus far, to be struggling to understand and fulfil the conceptualisation of developing quality teachers. Saudi teacher preparation has focused for decades on the preparation of an adequate number of teachers who can cover the shortfall of teachers in general education. Although this was arguably appropriate in the beginning to meet the massive and rapid expansion of Saudi education, especially in primary education, the notion of quantity over quality has dominated for a long time and seems to continue. Even after the termination of Saudi Teachers’ Colleges and the transfer of supervision of them from the MoE to the MoHE, the plan that teachers’ colleges are to prepare teachers for primary education has remained. This may affect the development and the preparation of quality teachers who are more suitable for the current technological era. With this in mind, Hamad confirmed that teacher preparation remains under the influence of the old vision of quantity teachers. Saudi teacher preparation aims at preparing multi-disciplinary teachers rather than producing specific-discipline and/or specialised skilful teachers. Hamad pointed out that:

> *Our graduating teachers will be directed to primary education. The desire of the Ministry of Education is that graduated teachers should be multi-disciplinary so that they can easily teach any subject.* (Int. 24, p. 7, Line 259–262)

In order to understand this issue, it is important to understand the system of Saudi higher education. Saudi universities usually follow two main approaches or systems. The first is the Sequential Approach, in which students study sequential courses. For this system, courses in the first year are requirements for the second year and so on. The focus of this approach is on specialised courses related to a specific discipline. Many faculties in the university, especially pure sciences disciplines, have adopted this system. The other approach is the Integral Approach, which is commonly adopted by Saudi faculties of education. According to Hamad,

> *The focus for teacher preparation at the University is on the Integral Approach, which means that pre-service teachers must study courses in mathematics, science and Arabic as well as many other disciplines. This approach may bridge the gap in schools and can be more useful to the Ministry of Education.* (Int. 24, p. 7, Line 265–267)

Therefore, the Saudi pre-service teacher education curriculum, which adopts the Integral Approach, consists of two main components to meet this requirement. Ali declared that the Saudi pre-service teacher education curriculum contains *Essentials* and *Supplementaries*:

> *Essentials are based on previous studies and what has been done in the area... Supplementaries concern the practical facet of the curriculum.* (Int. 4, p. 1, Line 32 & Line 39)

The consequence of the above statement is that the Saudi pre-service teacher education curriculum is still dominated by the traditional pedagogical model. Ali confirmed that the curriculum focuses on theories rather than effective learning through practical knowledge. In addition, there is a sense of teacher-centred education in which the curriculum is standardised regardless of the learners' learning needs, preferences and learning styles. Yet, the current developments with regard to the Saudi pre-service teacher education curriculum have stressed the importance of transferring the existing curricular subjects from standard textbooks to electronic formats to cope with the global development of technology. Thus far, any development with regard to the basic elements of the curricular subjects and their content must pass a series of administrative and academic approvals. This series of approvals starts with a committee of the academic departments. Then, a hierarchy or ascending form of approvals including various committees from the faculty and the university must be given. Hence, it can be argued that these kinds of time-consuming and complex policymaking procedures and routines to adopt new ideas, especially those relating to sensitive issues such as curriculum development in a conservative context can easily be an obstacle. For example, Saeed demonstrated that curriculum developments are required; however, these developments must be approved:

Our overall advice for the faculty members is that they should update topics and subjects relating to their courses. We have called many times for out-dated courses to be updated. Proposed updates shall follow formal procedures for academic adoption that starts from the academic departments. (Int. 5, p. 4, Line 134–135)

4.3.2.3 Summary of the policymakers' pedagogical perspective

Global pressure and the religious-cultural conservatism affect the policymakers' views and attitudes towards the pre-service teacher education curriculum. While they were fervently aware of the benefits of technology to the current pedagogical approaches in the curriculum, they had a strong desire to preserve the curriculum's traditional religious and cultural fundamentals. Nevertheless, Saudi pre-service teacher education is more concerned with quantity preparation rather than quality. In addition, the curriculum is still dominated by traditional pedagogical approaches such as teacher-centred education, centralisation and policy-driven schemes. This in particular may decrease the willingness and motivation for change and the adoption of new pedagogical approaches with digital technologies. The following section presents the policymakers' administration perspective in terms of their current efforts towards effectively implementing and utilising technology into Saudi pre-service teacher education curriculum.

4.3.3 Policymakers' administration perspective

This section presents an analysis of the policymakers' responses to the interview questions that were designed to identify their administration perspective. The following sub-themes are discussed: leadership vision of the effective integration of technology; from theory to practice; and challenges to technology effective integration.

Leadership vision and theory of effective integration of technology

To start with, the interviewed policymakers considered the integration of technology as a priority in their pedagogical and administration practices:

The integration of technology is one of the very, very, very important issues that we have. (Ali, Int. 4, p. 1, Line 3)

The Faculty is keen to develop and activate educational technology... Actually, plans are many and ongoing. (Hamad, Int. 24, p. 7, Line 250–251)

The increased importance of technology in Saudi is due to the global development of technology in general. Its elevated importance can be seen in its frequent appearance in

Saudi national policy documents. Therefore, the technological transformation of Saudi is in response to a national desire to achieve modernisation. Ali states:

> *Development happening in the field of technology, in my view, is one of the good ideas and really needed in the market. Simply, it has become a modern necessity.* (Int. 4, p. 1, Line 23)

Modernisation requires a concerted effort to integrate technology in all facets of Saudi daily life including pre-service teacher education. Hamad pointed out that:

> *Not only teachers, all individuals in the community must use modern technology. In this way, development is accelerated and we can have access to what developed countries have reached... While technology has countless benefits, the enforcement of e-government is very important for Saudi society.* (Int. 24, p. 7, Line 255–256 & p. 8, Line 317)

Therefore, the overall vision of the policymakers with regard to effective integration of technology into Saudi pre-service teacher education is positive and very promising. Their views consist of Saudi national plans for society's technological transformation as well as the consideration of technology as a global power.

4.3.3.1 Theory into practice: current technological practices and facilitations

As a start, Ali demonstrated that the leadership has a vision, which it had attempted to execute. This vision includes an affordable and accessible technology-rich environment:

> *We have been trying to provide educational atmosphere that suit the effective integration of technology.* (Int. 4, p. 1, Line 9)

This positive vision of leadership has resulted in remarkable progress including the development and provision of greater access to technology-related resources and facilities. Ali continued that:

> *We have a modern Educational Resources Centre that is fully equipped with modern technology. Further, each faculty member, in his office, has a very fast and open internet connection. Moreover, most classrooms and theatres are fully equipped with data projectors.* (Int. 4, p. 1, Line 10–12)

In addition, Saeed showed that the Faculty of Education has also provided other types of technology-related resources and facilities:

> *The Faculty of Education has established two micro-teaching centres and improved the Educational Resources Centre. There are digital laboratories for Mathematics and Arts. We also have audio laboratories for the English language and Quran*

> *studies. Also, there are more than 20 classrooms equipped with data projectors and are ready for use.* (Int. 5, p. 4, Line 144–145)

Despite the above positive signs, some challenges have been reported. These challenges are discussed in the following sub-section.

4.3.3.2 Challenges and obstacles to the effective integration of technology

The policymakers' responses and comments with regard to this theme were categorised into three issues: financial resources; difficulties with training and support; and domination of traditionalism.

In terms of financial resources, when Saeed was asked to comment whether the affordability of technological resources is an issue to the current administration, he simply replied that:

> *In financial terms, the provision of modern technology is really exhausting.* (Int. 5, p. 4, Line 143)

Ali also admitted that:

> *It is difficult to provide every single technology available, but what we try to provide as much as we can.* (Int. 4, p. 2, Line 65)

Saeed mentioned the need to find a balance between educational requirements including technology and limitations of financial resources. According to him:

> *The administration remains between the awareness of the substantial role of technology in education on the one hand, and the financial resources on the other hand… Therefore, we try to match between requirements and available financial resources.* (Int. 5, p. 3, Line 93–96)

In response to the lack of financial resources, the policymakers tried to find alternatives to support potential technology-related developments. The faculty tried to take advantage of its internal resources such as the faculty members' expertise. Another alternative is cooperation with the private sector. With respect to these issues, Ali declared that cooperation with the private sector is not only weak, but considerably absent and has been paid very little attention:

> *We have been trying to take advantage of our resources within the Faculty, especially with regard to technology. For instance, we have our specialists in the field of computers and programming. There is little cooperation with the private sector. Actually, we have not cooperated with any external party so far.* (Int. 4, p. 2, Line 70–71)

Saeed confirmed that the faculty is financially independent:

> *The Faculty of Education seeks to cover its financial requirements through the income generated by its training centres.* (Int. 5, p. 3, Line 97)

For difficulties associated with training and support, the policymakers in general showed that training and support in terms of new technologies are problematic issues. Ali said:

> *With regard to the difficulties, we have some problems in matters of training on the use of technology.* (Int. 4, p. 1, Line 18)

Hamad stated that the faculty has offered many training courses on the use of technology in education. However, he expressed that the instructors' willingness to attend such courses was generally weak and inconsistent with what has been offered:

> *We have offered many training courses, but our problem was the attendance that was weak in general… However, attendance was only from those wished to attend.* (Int. 24, p. 9, Line 351–354)

Finally, the policymakers seemed to be disappointed with the current instructors' teaching approaches. The policymakers emphasised that traditional teaching approaches are still dominating the instructors' practices. This includes a lack of technology implementation as well as a lack of the effective use of available technological resources and facilities. Hamad attributed the instructors' tendency towards utilising the traditional pedagogical approaches to the traditional curriculum and the lack of knowledge about the real duty of educational technology:

> *Instructors are accustomed to the same traditional courses of the curriculum, so they continue teaching them in the same traditional way. In addition, they do not have a full picture of what educational technology really means.* (Int. 24, p. 8, Line 312)

From Hamad's response, it can be seen that the current curriculum needs to be innovated to boost the instructors' motivation to use technology effectively. He draws attention to raising awareness of educational technology and its core mission. Saeed agreed with Hamad upon the instructors' dependence on traditional pedagogical approaches. Saeed confidently attributed this to the total absence of competition between faculty members:

> *While there is no competition between faculty members, traditional patterns of teaching remain much easier. If there is a group of instructors competing in this area and highlighting their efforts in one way or another, I expect that the remaining instructors will feel they are behind. This may lead them to use technology effectively!* (Int. 5, p. 4, Line 150–152)

While Hamad and Saeed admitted that the instructors still use traditional pedagogical approaches, Saeed was disappointed when he revealed that the instructors also rarely used the currently existed technological resources and facilities:

> *Our biggest problem is that the use of affordable technological resources and facilities by faculty members is very weak.* (Int. 5, p. 4, Line 145–146)

This has caused the administration to feel quite frustrated. About this, Saeed continued:

> *We have been trying to provide appropriate infrastructure, but it has not been effectively used. Some data projectors in the classrooms have not been used at all... This is really frustrating.* (Int. 5, p. 4, Line 146–148)

In addition, Saeed gave another reason that caused instructors to continue to implement traditional teaching approaches. According to him, some instructors perceive the use of technology as an extra load in their busy teaching schedules, which may be in vain because they do not believe in the importance of technology. Saeed stated that:

> *Some faculty members tend to continue to teach in a traditional way because they think that the use of technology is an extra effort that has no significant impact and may be in vain.* (Int. 5, p. 4, Line 160–161)

4.3.3.3 Summary of the policymakers' administration perspective

The policymakers' responses with regard to the administration perspective reflect a positive vision for the effective integration of technology into Saudi pre-service teacher education. As they revealed, it is one of their key missions and in fact, is a priority. This positive vision has resulted in many ongoing efforts towards the creation of affordable and accessible technology-rich educational environments. However, challenges and obstacles were found to hinder the effective integration of technology into the curriculum. These obstacles and challenges as demonstrated by the policymakers include financial issues, difficulties with training and support and the domination of traditionalism in thinking and pedagogical approaches.

4.4 Conclusions and subsequent focus

Saudi national policies reveal two major themes. The first theme is the importance of technology in Saudi national policies. This theme in particular reflects the global pressure of technology development and implies a certain need for the effective integration of technology into education including the pre-service teacher education curriculum. On the contrary, the overall curriculum structure, guidelines, goals and objectives of the Saudi pre-service teacher education curriculum severely lack the vision to integrate technology effectively. In other words, the importance of technology in Saudi national policies has not been yet translated into related or explicit practical goals and objectives in the curriculum. This result is clear evidence of the gap between national and curriculum policies. In addition, pre-service teachers' educational technology preparation is provided through traditional technology-related courses that have no connection with their current or future pedagogical approaches. These traditional courses only focus on learning technology per se rather than the pedagogical implications of technology.

The second theme is the domination of cultural-religious conservatism, which is strongly concerned with strengthening Islamic fundamentals and ideology as well as Saudi cultural values. This issue has been confirmed through the analysis of curriculum documents in which all facets of Saudi pre-service teachers' preparation must be in light of Islamic fundamentals and cultural values; for example, the total reliance on the Arabic language as the only approved teaching language. The strong inclinations of conservatism may limit taking full advantage of technology, which can have extraneous cultural-religious values.

In light of the themes that emerged from the thematic analysis of the national and curriculum policies, the interviews with the policymakers focused firstly on the factors affecting their perceptions, attitudes and consequently their decisions to act towards the effective integration of technology into the curriculum. Although the policymakers were keenly aware of the global pressure of technology, the notion of cultural-religious conservatism created resistance in accepting new changes. However, due to the certainty of the global impact of technology, cultural-religious conservatism struggles to robust. In addition, time is considerably needed for change to occur.

The overall concept of the effective integration of technology from the policymakers' perspective was relatively weak. The focus of their responses was generally on the introduction, the understanding, and the use of more technology. The policymakers' intention was to cope up with global technology developments and the demands of society. Despite this, the policymakers' responses revealed a high level of awareness of the importance and the usefulness of the effective integration of technology into both pedagogy and administration. The policymakers mentioned some of its advantages, such as online learning, distance education, interactivity and fast two-way communication. Table 4-8 provides a summary of the policymakers' technological perspective and the subsequent focus derived from their responses.

Table 4-8: Summary of the policymakers' technological perspective

Major themes	Policy: (Document analysis & interviews with policymakers)		Practice: (Instructors & pre-service teachers)
	Sub-themes	**Key findings**	**Subsequent focus**
The policymakers' perspective as technology practitioners	The global pressure of technology	• The importance of technology in Saudi national polices • The curriculum lacks the vision of effective integration of technology • A gap exists between the national and curriculum policies	➢ What kind of computer and technology expertise do practitioners have in terms of qualifications? ➢ How much do practitioners practice technology in terms of computer use and other digital technologies at home? ➢ How do practitioners perceive the concept of effective integration of technology into Saudi pre-service teacher education curriculum? ➢ To what extent are practitioners aware of the importance and the usefulness of the effective integration of technology in their pedagogical practices? ➢ How do practitioners perceive their self-efficacy to integrate technology effectively into their pedagogical practices? ➢ Do practitioners differ in terms of concept, awareness and self-efficacy?
	Domination of cultural-religious conservatism	• The strong inclinations of cultural-religious conservatism may limit the effective integration of technology	
	Perceived concept	• Unclear conceptualisation of effective technology integration • Mistranslation of educational technology	
	Perceived awareness	• Strong awareness of the importance and the usefulness of technology	

With regard to the policymakers' pedagogical perspective, they have strong attitudes towards preserving the traditional cultural-religious fundamentals of the curriculum. Traditional pedagogical approaches such as teacher-centred education, centralisation and policy-driven schemes still prevail. In such a context, willingness and motivation for curriculum change and innovation, especially with digital technologies, can be reduced. The summary and the subsequent focus is provided in Table 4-9.

Table 4-9: Summary of the policymakers' pedagogical perspective

Major themes	Policy: Sub-themes	Policy: Key findings	Practice: Subsequent focus
The policymakers' pedagogical perspective	Globalised v. traditional curriculum	• Strong attitudes towards preserving the traditional religious and cultural fundamentals of the curriculum	➢ How does the Saudi pre-service teacher education curriculum implement and maintain the effective integration of technology according to the practitioners' views? ➢ How much do practitioners practice technology in terms of computer use and other technologies at the university? ➢ Do practitioners differ in their views of the current curriculum design? ➢ Do practitioners differ in terms of their technology practices at the university?
	Quantity v. quality curriculum	• The focus is on quantity rather than quality • Curriculum is dominated by traditionalism • Motivation for change is reduced	

Finally, due to the global pressure of technological development, the policymakers' administration perspective indicated that the effective integration of technology was a high priority in their mission. Accordingly, this positive vision caused the current administration to undertake many innovative technology-related developments. Nevertheless, these developments faced many challenges and obstacles including financial issues, difficulties with training, support and traditionalism in thinking and pedagogy. Yet, these challenges and obstacles may contribute to the less effective integration of technology in the Saudi pre-service teacher education curriculum (see Table 4-10).

Table 4-10: Summary of the policymakers' administration perspective

Major themes	Policy: Sub-themes	Policy: Key findings	Practice: Subsequent focus
The policymakers' administration perspective	Leadership vision and theory	• Effective integration of technology is established as a high priority in their mission	➢ How does senior management view the importance of technology integration into the Saudi pre-service teacher education curriculum from the practitioners' view? ➢ How does senior management view the importance of infrastructure from the practitioners' view? ➢ How does senior management view the importance of training and support from the practitioners' view? ➢ How does senior management view the importance of building a resource base in terms of technology integration from the academic instructors' view? ➢ Do practitioners differ in their views regarding leadership practices?
	Theory into practice	• Many enthusiastic and ongoing technology-related developments	
	Challenges and obstacles	• Financial resource issues • Independence: lack of cooperation with the private sector • Difficulties with training and support • The domination of traditionalism may lessen the effective integration of technology	

As shown in the previous three tables, this chapter also provides a progressive focus on issues that require further investigation such as the instructors and pre-service teachers' practices, views and attitudes. The instructors and pre-service teachers' responses, together with the results from the policy investigation, are expected to provide wider insights to make final conclusions.

4.5 Summary

This chapter was concerned with the integration of technology in Saudi pre-service teacher education policies. It conducted a thematic analysis of both Saudi national policies and documents relating to the pre-service teacher education curriculum. In particular, this thematic analysis provides the major themes, key characteristics and progressive focus for the subsequent interviews with the policymakers. Drawing on the focus provided through the thematic analysis, the chapter then explained that the policymakers' interviews were conducted to investigate, enrich and confirm the major issues and findings, which emerged from the thematic document analysis. The analysis of the policymakers' responses to the interview questions was categorised into three major perspectives (themes): the policymakers' perspective as technology practitioners, their pedagogical perspective and their administration perspective.

The following chapter investigates the instructors and pre-service teachers' practices as well as views and attitudes towards the effective integration of digital technologies.

Chapter 5 TEACHING AND LEARNING PRACTICES

5.1 Introduction

Chapter 4 presented an analysis of national and curriculum policies that are relevant to pre-service teacher education. Relevant policy documents, both national and curriculum, were analysed to extract themes for conducting interviews with policymakers. The policymakers' views and attitudes in terms of technological, pedagogical and administration perspectives were studied. This chapter reports both the instructors and pre-service teachers' views and attitudes towards the effective integration of digital technologies into the curriculum. The findings are based on survey questionnaires and semi-structured interviews to better understand their perspectives, which are:

- The technological perspective: the focus is on their technological expertise, familiarity, perceived concepts, awareness and self-efficacy.
- The pedagogical perspective: this includes their views and attitudes towards the curriculum design and associated technology-based pedagogical practices.
- The administration perspective: this includes their views and attitudes towards the main roles and practices of the current administration towards effective integration of technology.

5.2 Survey questionnaire results

5.2.1 The technological perspective

Understanding the instructors and pre-service teachers' technological perspective included their technological expertise, familiarity and their technology perceived concept, perceived awareness and perceived self-efficacy.

Firstly, the investigation of the instructors and pre-service teachers' familiarity and technology-related expertise included computer qualifications, access to a computer at home, the use of computers and other digital technologies at home. As shown in Table 5-1, 88 per cent of instructors (n = 44) had computer qualifications compared with 34 per cent of pre-service teachers (n = 113). Both instructors and pre-service teachers have high levels of access to computers at home (96 per cent and 92 per cent, respectively).

Table 5-1: Computer qualifications and home access

Aspect	**Group**	**N** (yes)	**%**
Computer qualifications	Instructors	44	88
	Pre-service teachers	113	34
Access to computer at home	Instructors	48	96
	Pre-service teachers	299	92

With respect to computer use at home, both instructors and pre-service teachers were given nine items to respond to in terms of online hours spent on an average day (h/d). For other digital technologies use at home, they were given four items to respond to on a similar scale. The scale adopted for both computer and other digital technologies use at home include, six degrees of responses (1 = Nothing, 2 = Less than one h/d, 3 = from 1 to less than 2 h/d, 4 = from 2 to less than 3 h/d, 5 = from 3 to less than 4 h/d, 6 = more than 4 h/d). In terms of internal consistency, Table 5-2 shows that both instructors and pre-service teachers' scales in terms of computer use at home have very good internal consistencies. In contrast, Cronbach's alpha coefficients for digital technologies use at home were less than the conventional alpha level of .7.

Table 5-2: Cronbach's alpha coefficients for technology use at home

Type	**Instructors**		**Pre-service teachers**	
	α	N	α	N
Computer use at home	.86	9	.81	9
Digital technologies use at home	.59	4	.60	4

According to Pallant (2007), this is common with short scales of less than 10 items. Alternatively, she points out that reporting the mean inter-item correlation can be more appropriate. The optimal value for the mean inter-item correlation can range from .2 to .4 (Briggs & Cheek, 1986). Fortunately, the mean inter-item correlations for both instructors and pre-service teachers' scales for digital technologies use at home were acceptable at .24 and .28 respectively. Having the data eligible for analysis, means and standard deviations are reported in Table 5-3.

Table 5-3: Use of digital technologies at home

Computer use	Instructors			Pre-service teachers		
	N	*M*	*SD*	N	*M*	*SD*
1. Wikipedia	49	2.70	1.14	320	1.90	1.08
2. E-mail	50	2.60	1.12	324	2.56	1.50
3. News	49	2.37	1.01	323	2.10	1.07
4. Forums	50	2.14	1.00	323	2.45	1.43
5. Blogs	49	1.90	1.10	317	1.83	1.01
6. Video sharing	48	1.79	1.13	323	2.42	1.45
7. Social networks (e.g. Facebook)	48	1.79	1.10	321	2.16	1.37
8. Banking	47	1.62	1.00	323	1.37	0.72
9. Gaming	48	1.19	0.53	323	2.28	1.49
Other digital technologies use	N	*M*	*SD*	N	*M*	*SD*
1. Television	50	3.58	1.09	323	3.84	1.41
2. Mobile phone	50	2.82	1.32	319	3.33	1.60
3. DVD players	49	1.96	1.00	321	2.24	1.43
4. Video games (e.g. PlayStation)	48	1.25	0.67	320	2.81	1.62

Table 5-3 shows that the amount of time that instructors used computers at home was generally less than two hours per day with the range of (M = 2.70) to (M = 1.19). Their highest use was accessing Wikipedia and e-mail, which was for less than two hours per day. They spent a moderate amount of time per day (less than one hour per day) accessing news, forums, blogs, video sharing, social networks, and finally, banking. There was virtually no time spent on online games. The pre-service teachers also reported that they used computers at home for less than two hours per day, their responses ranging from (M = 2.56) to (M = 1.37). The highest use that tends to be less than two hours per day was only for e-mail. The rest of their uses came were in the range of one hour per day except banking that almost scored no use (M = 1.37).

Regarding the instructors' use of other digital technologies at home, the most used was television, which was reported to be used less than three hours per day, followed by mobile phones, with less than two hours per day, DVD players with less than one hour per day, and virtually no reported use of video games such as PlayStation. Pre-service teachers watched television also for less than three hours per day; mobile phones and video games tended to be used for about two hours per day, and finally, DVD players were used by pre-service teachers for less than one hour per day.

Secondly, to investigate the instructors and pre-service teachers' perceived concepts, they were asked to respond to four items with either (Yes = 1 or No = 0). They were also able to respond with more than one answer. Accordingly, the suitable statistical formula is the sum, which is the total number of participants agreeing on each item. This is supported by the percentage of responses and the rank order. See Table 5-4.

Table 5-4: Perceived concepts

Concept	Instructors (n = 50)			Pre-service Teachers (n = 319)		
	Sum	%	Rank	Sum	%	Rank
1. Implementing technology in education effectively	30	60	**1**	96	30.09	**3**
2. To be a normal part of the class and to be used effectively	25	50	**2**	130	40.75	**1**
3. Using technology in education generally	16	32	**3**	101	31.66	**2**
4. To be a normal part of the class	9	18	**4**	51	15.99	**4**

Table 5-4 shows that 33 instructors (60 per cent) perceive technology integration as the effective implementation of technology in education, 25 (50 per cent) perceive it as to be a normal part of the class and should be used effectively, 16 instructors (32 per cent) have the perception of using technology in education generally, and lastly, nine instructors (18 per cent) perceive technology integration in education as a normal part of the class. Conversely, 130 of the pre-service teachers (40.75 per cent) perceived the effective integration of technology to be a normal part of the class to be used effectively; 101 (31.66 per cent) perceived the concept as using technology in education generally; 96 pre-service teachers (30.09 per cent) had the perception of implementing technology in education effectively; and lastly, 51 (16 per cent) perceived it as to be a normal part of the class.

To investigate the instructors and pre-service teachers' perceived awareness of technology importance and usefulness, they were given seven items to respond to in a five-point Likert scale (5 = Strongly agree to 1 = Strongly disagree) (see Table 5-5). Both instructors and pre-service teachers' scales have high internal consistency values; Cronbach's alpha coefficient scored .91 and .87 respectively.

For both groups, Table 5-5 shows that the scores for all items came between (5 = strongly agree and 4 = agree). For instructors, the range was narrow from (M = 4.20) to (M = 4.61). For pre-service teachers, the calculated means were also narrowly ranging from (M = 4.20) to (M = 4.44).

Table 5-5: Perceived awareness

Items	Instructors			Pre-service Teachers		
	N	*M*	*SD*	N	*M*	*SD*
1. It helps me prepare for my (lectures/classes)	49	4.61	0.61	318	4.26	0.79
2. It is important in improving my (teaching/learning) approaches	50	4.60	0.61	320	4.44	0.67
3. It helps me to act effectively in my (lectures/classes)	50	4.60	0.64	315	4.27	0.85
4. It gives me the opportunity to prepare (my students/myself) for the technology era	50	4.48	0.68	319	4.31	0.87
5. It helps me in (delivering information/understanding more) in my (lectures/classes)	50	4.42	0.67	318	4.20	0.89
6. It is important in establishing my (work/learning) satisfaction	50	4.40	0.61	318	4.23	0.79
7. It contributes in increasing (my students'/my) academic performance	50	4.20	0.88	317	4.23	0.87

Finally, the instructors and pre-service teachers' perceived self-efficacy was investigated. They were provided with six statements to respond to in terms of their perceived self-efficacy. The scale included five degrees of responses (5 = Strongly agree to 1 = Strongly disagree). Both instructors and pre-service teachers' scales have high internal consistencies; Cronbach's alpha coefficients scored .91 and .87 respectively. For the instructors, the scores for all the six statements came between (5 = strongly agree and 4 = agree). The mean scores for their responses were narrowly ranged from (M = 4.54) to (M = 4.22). With regard to the pre-service teachers, mean scores were also narrowly ranged between (M = 4.08) and (M = 3.76). The means and standard deviations are shown in Table 5-6.

Table 5-6: Perceived general self-efficacy

Items	Instructors			Pre-service Teachers		
	N	*M*	*SD*	N	*M*	*SD*
1. Enjoy implementing technology in my (teaching/learning) approaches	50	4.54	0.58	319	3.97	1.02
2. Feel confident when I implement technology in my (teaching/learning) approaches	50	4.54	0.65	318	4.06	0.91
3. Look forward to integrating technology in my (teaching/learning) approaches	50	4.50	0.74	318	4.08	0.96
4. Feel satisfied in implementing technology in my (teaching/learning) approaches	50	4.48	0.71	316	4.00	0.98
5. Interested in integrating technology in my (teaching/learning) approaches	50	4.40	0.76	315	3.98	0.97
6. Sure that I can integrate technology in my (teaching/learning) approaches	50	4.22	0.82	318	3.76	0.95

In summary, both instructors and pre-service teachers seem to have a good grasp of technology and its value for teaching and learning. The results show that technology being only a normal part of the classroom gained the less agreement from both groups. The results also suggest that both groups are aware of technology and its importance and usefulness to their approaches including teaching and learning. They have positive attitudes towards implementing more technology in pre-service teacher preparation. Moreover, results show that both groups have high levels of self-efficacy and greatly trust their abilities to integrate technology into their pedagogical approaches.

5.2.2 The pedagogical perspective

In terms of curriculum design, the instructors and pre-service teachers were provided with five items to respond to on a five-point Likert scale (5 = Strongly agree to 1 = Strongly disagree). This scale has very good internal consistency scores; Cronbach's alpha coefficient for instructor's scale scored .96. Pre-service teachers' scale scored .82. Means and standard deviation were calculated and the items are shown in Table 5-7.

Table 5-7: Views of the curriculum design

Items	**Instructors**			**Pre-service teachers**		
	N	*M*	*SD*	N	*M*	*SD*
1. It presents technology integration as an important issue to improve pre-service teachers' teaching approaches in the future	50	3.98	1.02	320	4.34	0.76
2. It provides pre-service teachers with adequate training and skills to integrate technology in their classrooms in the future	50	3.92	1.00	320	4.23	0.83
3. It explains how to integrate technology in the pre-service teachers' classrooms in the future	50	3.84	1.09	320	4.12	0.84
4. It presents technology integration as a serious demand for the society's technological transformation	50	3.82	1.04	317	4.17	0.76
5. Technology integration goals and objectives in the curriculum are clearly explained	50	3.54	1.18	317	3.87	0.97

The mean scores of the instructors' responses, especially for the first four items, generally tended towards agree (i.e. 4) and ranged from (M = 3.98) to (M = 3.42). The fifth statement had the lowest mean score with (M = 3.54). The pre-service teachers' mean scores for the five statements came in the range of agree between (M = 4.34) and (M = 3.87).

There was general agreement among the instructors on the suitability of the current curriculum design for the effective integration of technology. Most of the instructors agreed that the current curriculum presents technology integration as an important issue to pre-service teachers' training as well as to the society's technological transformation. In addition, curriculum subjects explain how to integrate technology and provide pre-service teachers with adequate training and technological skills. Only the last statement concerning the clarity of the goals and objectives of technology integration into the curriculum can be considered an issue for the instructors. In contrast, pre-service teachers see that their curriculum appropriately presents the importance of technology integration to their prospective teaching approaches and to society's technological transformation, providing adequate training and explaining how to integrate technology. Goals and objectives of technology integration came last, but largely tend to be satisfying, clear and explained in the curriculum.

With respect to computer access at the university, instructors and pre-service teachers' responses are shown in Table 5-8. Interestingly, 45 instructors (90 per cent) have computers in their offices. In the case of the instructors who have computers, 68 per cent of them (n = 34) used their own personal computer or laptops. Seven other instructors (14 per cent) mentioned that the departments they belong to offered them computers. Three instructors (6 per cent) were offered computers by the university. Only one instructor mentioned that the faculty offered him a computer. Conversely, of those five instructors who do not have personal computers in their offices, four (8 per cent) mentioned that they can access a computer through their head of department offices. Only one instructor said that he could access a computer through the Educational Resources Centre.

Table 5-8: Computer access at the university

Instructors			**Pre-service Teachers**		
Access at Office	N	%	**Access at the University**	N	%
Yes	45	90	Yes	180	55.4
If Yes (*Where?*) **n = 45**			**If yes** *(where?)* **n = 180**		
Personal	34	68	University Coffee Shops	89	27.4
The department	7	14	Personal	39	12
The University	3	6.0	Library	21	6.5
The College (JTC)	1	2.0	Others	21	6.5
If No (*Where?*) **n = 5**			In Classes	17	5.2
Educational Resources Centre	1	2.0	Educational Technology Labs	15	4.6
The head of department office	4	8.0	Educational Resources Centre	12	3.7
			Your Department	10	3.1

The 180 (55.4 per cent) pre-service teachers who had access to a computer at the university were asked to specify their source of computer access. Most pre-service students (n = 89 or 27.4 per cent) accessed a computer in university's coffee shops and restaurants; 39 pre-service teachers (12 per cent), indicated that they brought their personal computers with them; 21 (6.5 per cent) accessed a computer in the university's library and other places; 17 pre-service teachers (5.2 per cent) accessed a computer in their classrooms; 15 pre-service teachers (4.6 per cent) accessed a computer in the Educational Technology Laboratories; 12 pre-service teachers (3.7 per cent) accessed a computer in the Educational Resources Centre; and 10 pre-service teachers (3.1 per cent) said that they could access a computer through the departments to which they belonged.

In relation to the instructors and pre-service teachers' use of computer at the university, they were asked to respond to nine items regarding the average number of online hours spent per working day (h/d). This was using a six-point scale (1 = Nothing, 2 = Less than one h/d, 3 = From 1 to less than 2 h/d, 4 = From 2 to less than 3 h/d, 5 = From 3 to less than 4 h/d, 6 = More than 4 h/d). The instructors and pre-service teachers' scales have very good internal consistency values; the Cronbach's alpha coefficient were .90 and .93 respectively. The items and values of means and standard deviations are shown in Table 5-9.

Table 5-9: Use of computer at the university

Computer use	**Instructors**			**Pre-service teachers**		
	N	*M*	*SD*	N	*M*	*SD*
1. E-mail	49	2.24	1.03	325	1.33	0.76
2. Wikipedia	47	2.19	1.17	324	1.34	0.70
3. Databases	49	2.18	1.09	325	1.27	0.61
4. University website	48	2.10	0.63	324	1.54	0.82
5. Educational forums	49	1.88	0.81	324	1.34	0.75
6. News	49	1.86	0.96	325	1.35	0.66
7. Social networks (e.g. Facebook)	48	1.83	0.97	323	1.40	0.84
8. Blogs	48	1.58	0.79	325	1.25	0.63
9. Video sharing	45	1.27	0.69	322	1.25	0.72

The majority of instructors indicated that they used a computer at the university less than one hour per working day, their responses ranging from (M = 2.24) to (M = 1.27). The highest uses were for e-mail (M = 2.24, SD = 1.03), Wikipedia (M = 2.19, SD = 1.17), research databases (M = 2.18, SD = 1.09), and the official university website (M = 2.10, SD = 0.63), followed by educational forums (M = 1.88, SD = 0.81), news (M = 1.9, SD =

0.96), personal sites such as Facebook (*M* = 1.83, *SD* = 0.97) and blogs (*M* = 1.58, *SD* = 0.79). There was almost no reported use (1 = Nothing) of video sharing sites such as YouTube (*M* = 1.27, *SD* = 0.69). The pre-service teachers indicated that their online use was very low, the mean range being very narrow (from *M* = 1.54 to *M* = 1.25). The only online activity in which the pre-service teachers engaged for a period between 1 = Nothing and 2 = Less than one h/d was surfing the official university website) with (*M* = 1.54, *SD* = 1.17). They did not engage in any other online activities.

Concerning the instructors and pre-service teachers' use of other digital technologies at the university, they were asked to respond using a four-point scale (4 = Always, 3 = Usually, 2 = Rarely, 1 = Never) regarding the average number of hours per working day (h/d) that they used other technologies at the university. The scales have acceptable internal consistencies; Cronbach's alpha coefficients were .68 for instructors and .79 for pre-service teachers. The means and standard deviations are shown in Table 5-10.

Table 5-10: Use of other digital technologies at the university

Other digital technologies use	**Instructors**			**Pre-service teachers**		
	N	*M*	*SD*	N	*M*	*SD*
1. Data projector	46	2.65	1.02	311	1.78	0.83
2. Document projector	45	1.91	0.87	311	1.59	0.81
3. DVD players	45	1.87	0.87	310	1.51	0.78
4. Smart board	46	1.74	0.88	310	1.55	0.75

The instructors indicated that the equipment they most used in their teaching were data projectors (*M* = 2.65, *SD* = 1.02). Document projectors, DVD players and smart boards were rarely used (i.e. 2). The responses from the pre-service teachers indicated that they used this type of equipment in their learning activities even less, with their responses being between (2 = Rarely and 1 = Never). The highest score was for the data projectors (*M* = 1.78, *SD* = 0.83), then document projectors (*M* = 1.59, *SD* = 0.81), smart boards (*M* = 1.55, *SD* = 0.75), and finally DVD players (*M* = 1.51, *SD* = 0.78).

In summary, the majority of instructors had high access to computers at work for educational purposes, despite the source of the access. However, their responses indicated that their computer use was less than two hours per day. The instructors' use of other technologies in their educational activities was low, with only data projectors being used regularly in meetings and for teaching activities. The pre-service teachers' use of other technologies at the university was even lower, their responses indicating they utilised almost no technology at the university, including engaging in online activities and using technology such as data projectors. The majority reported that they could access a computer at the university, but this was most commonly from the university's coffee shops and restaurants, or it was their own personal laptop. Their responses indicated that other sources of computer access such as the university's library, classrooms and computer laboratories did not provide adequate access.

5.2.3 The administration perspective

In relation to actual technology implementation, four key roles of leadership were investigated including the importance of technology integration, the importance of infrastructure, the importance of training and support, and the importance of building a technology resource base. The last key role was only investigated from the instructors' point of view.

The instructors were asked to respond to 19 items on the aforementioned four key roles of leadership, using a five-point scale (5 = High Priority, 4 = Priority, 3 = Relatively Low Priority, 2 = Low Priority, 1 = No Priority), whereas the pre-service teachers were asked to respond to 15 items using the same scale on the first three key roles of leadership. Both scales in general have high internal consistencies; Cronbach's alpha coefficient was .98 for instructors and .97 for pre-service teachers (see Table 5-11).

Table 5-11: Reliability statistics for the leadership sub-scales (Cronbach's alpha)

Sub-Scale	**Instructors**		**Pre-service Teachers**	
	α	N	α	N
The importance of technology integration	.97	5	.94	5
The importance of technological infrastructure	.94	6	.96	6
The importance of technology training and support	.92	4	.94	4
The importance of building a technology resource base	.96	4	---	---
Total	**.98**	**19**	**.97**	15

A preliminary inspection of the mean scores and standard deviation for the items included under each sub-scale shows that responses usually fell in the middle range with no apparent extremes (4 = Priority and 3 = Relatively Low Priority). For the instructors, the calculated mean ranged from (M = 3.35) to (M = 3.96). In contrast, the pre-service teachers' mean scores ranged from (M = 3.15) to (M = 3.62). Most importantly, standard deviation scores reveal a spread of responses for both groups across the scale. For relevant descriptive statistics such as mean, standard deviation and frequencies, see Appendix 18.

To establish the general picture of each group's responses in accordance with Pallant (2007), the total mean scores (the sum divided by the number of items) for each sub-scale were calculated as shown in Table 5-12.

Table 5-12: Total mean scores for leadership key roles

Sub-Scale	Instructors		Pre-service Teachers	
	M	*SD*	*M*	*SD*
The importance of technology integration	3.73	1.19	3.41	1.18
The importance of technological infrastructure	3.73	1.04	3.33	1.29
The importance of technology training and support	3.57	1.14	3.36	1.35
The importance of building a technology resource base	3.46	1.32	---	---

In Table 5-12, the total mean scores for the instructors regarding the first three key leadership roles tended to be in the range of priority (i.e. 4). The importance of building a technology resource base came last with a tendency towards relatively low priority (i.e. 3). In contrast, the pre-service teachers were less optimistic. The total mean scores for their responses with regard to the first three key roles of leadership fell in the range of relatively low priority (i.e. 3).

5.2.4 Differences between instructors and pre-service teachers

A one-way between-groups multivariate analysis of variance (MANOVA) was performed to investigate differences between instructors and pre-service teachers in terms of their technological, pedagogical and administration perspectives. Preliminary assumption testing was conducted to check the sample distribution, linearity and normality, with some violations noted. The data violate the assumption of homogeneity of variance (Box's M value < .001). In addition, as indicated in Table 5-13, Levene's Test showed that some variables violated the assumption of equality of variance (Sig < .05).

Table 5-13: Differences between instructors and pre-service teachers (Levene's Test)

Variable	Sig.
Digital technologies use at Home	.000
Views of the curriculum design	.004
Computer qualifications	.000
Computer access at the university	.000
The concept of: To be a normal part of the class	.023
The concept of: Implementing technology in education effectively	.013

Consequently, a restricted Bonferroni adjusted alpha level of .003 was used rather than the conventional one of .05 in accordance with Pallant (2007). Further, Pillai's Trace is reported since it is more robust than Wilks' Lambda as well as being strongly recommended in cases of unequal sample size and/or violation of assumptions (Pallant, 2007).

For differences between the instructors and pre-service teachers' technological expertise as well as familiarity with technology, group (instructors and pre-service teachers) was the independent variable. Computer qualifications, access and use of computers and digital technologies at home were the dependent variables. As Table 5-14 shows, there was a statistical difference between instructors and pre-service teachers on the combined dependent variables [F (15, 266) = 9, p = .000; Pillai's Trace = .662; partial eta squared = .338].

Table 5-14: Differences between instructors and pre-service teachers (MANOVA)

Perspective	Dependent Variable	Group	*M*	*F*	η^2
Technological Perspective: *Technology expertise and familiarity*	Computer qualifications	Instructors Pre-service teachers	0.84 0.36	**34.80*** **	**.111**
	The use of digital technologies at home	Instructors Pre-service teachers	2.31 3.03	**18.20*** **	**.061**
	Access to computers at home	Instructors Pre-service teachers	0.95 0.93	.151	.001
	Use of computers at home	Instructors Pre-service teachers	1.99 2.12	2.26	.008
Technology-related Perceptions	Perceived Self-efficacy	Instructors Pre-service teachers	4.34 3.97	8.07	.028
	Perceived awareness	Instructors Pre-service teachers	4.38 4.24	1.71	.006
	Perceived concept 1: Using technology in education generally	Instructors Pre-service teachers	0.39 0.30	1.27	.005
	Perceived concept 2: To be a normal part of the class	Instructors Pre-service teachers	0.24 0.16	1.56	.006
	Perceived concept 3: Implementing technology in education effectively	Instructors Pre-service teachers	0.53 0.31	7.19	.025
	Perceived concept 4: To be a normal part of the class and to be used effectively	Instructors Pre-service teachers	0.55 0.43	2.13	.008
Pedagogical Perspective *Curriculum Technology practice*	Curriculum design	Instructors Pre-service teachers	3.64 4.11	**15.20*** **	**.052**
	Access to computers at the university	Instructors Pre-service teachers	0.87 0.55	**14.49*** **	**.049**
	Computer use at the university	Instructors Pre-service teachers	1.75 1.36	**13.41*** **	**.046**
	Digital technologies use at the university	Instructors Pre-service teachers	1.94 1.59	**11.42*** **	**.039**
Administration Perspective	Current administration practices	Instructors Pre-service teachers	2.49 2.70	1.11	.004

***p<0.003

When the results for the dependent variables were considered separately, a number of statistically significant differences were found. First, there was a statistically significant difference between instructors and pre-service teachers in terms of computer qualifications [F (1, 280) = 34.80, p = .000, partial η^2 = .111]. An examination of the mean scores indicated that approximately 80 per cent of instructors (M = 0.84) were more qualified in terms of computers and technology than pre-service teachers (M = 0.36). Second, results showed that pre-service teachers (M = 3.03) were more involved with digital technologies at home, spending about one to two hours per day, compared to instructors who reported using computers for approximately less than one hour per day (M = 2.31) [F (1, 280) = 18.20, p = .000, partial η^2 = .061].

Conversely, the MANOVA results showed no statistically significant differences between instructors and pre-service teachers in terms of access and use of computers at home (see Table 5-14). The results also showed no statistically significant differences between instructors and pre-service teachers in their technology-related perceptions, especially the concepts of technology integration, technology awareness and self-efficacy.

In relation to the instructors and pre-service teachers' pedagogical perspective, differences between their views regarding the curriculum design, computer access and use as well as the use of other types of digital technologies at the university were investigated. The results reveal a statistically significant difference between instructors and pre-service teachers' views regarding the curriculum design [F (1, 280) = 15.20, p = .000, partial η^2 = .052]. Here, pre-service teachers responses fell in the range of agree with (M = 4.11) and were more positive in their views regarding the curriculum design in comparison with their instructors (M = 3.64). Despite the statistically significant difference, instructors' responses also tended to be in the range of agree on the curriculum design. Further, other differences were found between the two groups in terms of computer access at the university [F (1, 280) = 14.49, p = .000, partial η^2 = .049], computer use at the university [F (1, 280) = 13.41, p = .000, partial η^2 = .046] and the use of other types of digital technologies at the university [F (1, 280) = 11.42, p = .001, partial η^2 = .039]. Mean scores indicated that almost 90 per cent of instructors (M = 0.87) have more access to computers at the university compared to 55 per cent of pre-service teachers (M = 0.55). However, instructors (M = 1.75) tended to use computers for less than one hour per working day, which was more than pre-service teachers (M = 1.36) who had almost no use for computers at the university. Similarly, as reported in Table 5-14, mean scores revealed that instructors (M = 1.94) tend to use other types of digital technologies at the university more so than pre-service teachers (M = 1.59), despite the weak use in general (1 = Never, 2 = Rarely).

Finally, a MANOVA was performed to investigate differences between instructors and pre-service teachers in their views and attitudes towards the current administration practices. The results shown in Table 5-14 indicate no statistically significant differences between the two groups regarding this issue.

In summary, the results regarding the investigation of differences between instructors and pre-service teachers in terms of their technological perspective reveal that instructors were more technology-qualified than pre-service teachers were. However, pre-service teachers appeared to be more involved with digital technologies at home than instructors. Conversely, no significant differences between the two groups were recorded in terms of access and use of computers at home. In addition, no statistically significant differences were found between them regarding their technological perceptions including concept, awareness and self-efficacy. In relation to the differences in the results between the two groups in terms of their pedagogical perspective, pre-service teachers were more positive regarding the curriculum design. In terms of practice, instructors have more access to computers and digital technologies at the university. Instructors also tend to use computers and digital technologies more than pre-service teachers. Finally, no statistically significant differences between instructors and pre-service teachers were observed regarding their administration perspective.

5.2.5 The impact of background information on the instructors' responses

The impact of independent variables upon the dependent variables of the instructors was also investigated using a MANOVA. Independent variables include position, teaching load, computer qualifications and access to computers at home as well as at the university. The results showed no statistical relationship between the instructors' background information and their technological, pedagogical or administration perspectives presented in their technology-related concepts, awareness, self-efficacy, computer and digital technologies use at home, computer and digital technologies use at the university, and their views regarding the curriculum design and the current administration practices.

However, using Pearson's product-momentum correlation coefficients, relationships between the instructors' technological, pedagogical and administration perspectives were investigated, revealing nine positive correlations (see Table 5-15).

Table 5-15: Pearson's correlations for instructors (Sig. 2-tailed)

		Awareness	D.T Home	Computer Uni.	D.T. Uni.	Curriculum design
Leadership	P.C.				**.438****	**.701****
	Sig.				.003	.000
	N				43	48
Self-efficacy	P.C.	**.729****				
	Sig.	.000				
	N	49				
Computer Home	P.C.		**.709****	**.675****	**.361***	
	Sig.		.000	.000	.016	
	N		47	44	44	
D.T. Home	P.C.			**.568****		
	Sig.			.000		
	N			44		
Computer Uni.	P.C.				**.392***	
	Sig.				.011	
	N				41	
D.T. Uni.	P.C.					**.296***
	Sig.					.048
	N					45

P.C. = Pearson Correlation, D.T. = Digital Technologies

There was a strong, positive correlation between the instructors' perceived self-efficacy and perceived awareness of technology importance and usefulness, r = .729, n = 49, p = .000. This suggested that higher levels of perceived self-efficacy are associated with higher levels of perceived awareness.

In terms of technology practice, there was a strong, positive correlation between the instructors' use of computers and digital technologies at home [r = .709, n = 47, p = .000]. There was a strong, positive correlation between the instructors' use of computers at home and their use of computers at the university [r = .675, n = 44, p = .000]. Further, their use of computers at home is positively correlated with their total use of other digital technologies at the university [r = .361, n = 44, p = .016]. This shows that higher levels of the instructors' use of computers at home may possibly indicate their higher levels of computer use at the university as well as their higher levels of digital technologies use at home and at the university. Moreover, a strong positive correlation was found between the instructors' higher levels of digital technologies use at home and their higher levels of computer use at the university [r = .568, n = 44, p = .000]. Nonetheless, instructors with higher computer use at the university are expected to use more digital technologies at the university [r = .392, n = 41, p = .011].

Concerning the instructors' views and attitudes, a positive correlation reflects that instructors with more positive views in terms of administration practices are more likely to use more digital technologies at the university [r = .438, n = 43, p = .000]. Further, those instructors with more positive views in terms of administration are also expected to have more positive views regarding the curriculum design. The latter correlation was also found to be statistically positive and strong [r = .701, n = 48, p = .000]. Then, instructors with more positive views regarding the curriculum design are likely to be practicing more digital technologies at the university [r = .296, n = 45, p = .048].

In summary, although there were no statistical relationships between the instructors' backgrounds and their technological, pedagogical and administration perspectives, variables included within these perspectives were correlated. In terms of perceptions, it has been found that higher levels of the instructors' self-efficacy are associated with higher levels of their technology awareness. In terms of technology practice, their high levels of computer use at home are mostly accompanied with high levels of other digital technologies use at home. Further, the instructors' higher uses of computers at home are associated with their higher uses of both computers and other digital technologies at the university. In addition, the instructors' higher levels of other digital technologies use at home could possibly lead to higher levels of computer use at the university. These higher levels of computer use at the university are also associated with higher levels of digital technologies use at the university. With regard to their views and attitudes, instructors with more positive views in terms of administration are more likely to use more digital technologies at the university. They could also have more positive views regarding the curriculum design. Instructors holding more positive views regarding the curriculum design are further expected to use more digital technologies at the university (see Figure 5-1).

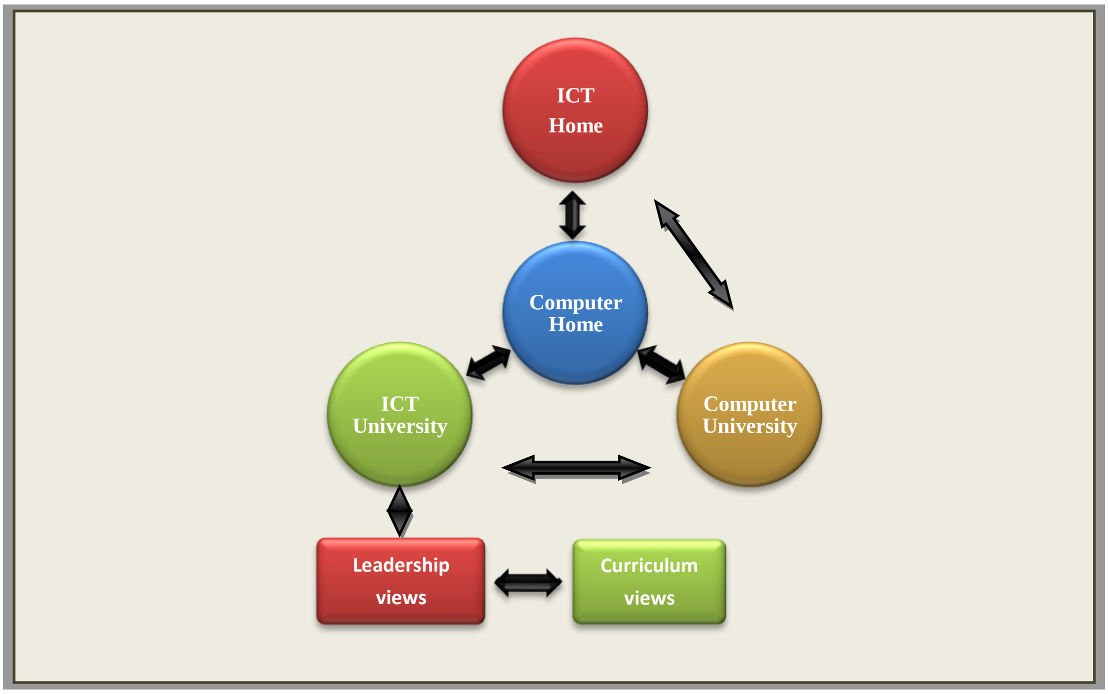

Figure 5-1: Relationships between instructors' practice and views

5.2.6 The impact of background information on the pre-service teachers' responses

Similar to the instructors, the impact of background information on the pre-service teachers' dependent variables was investigated using a MANOVA. Independent variables include their current activities, course load, computer qualifications and access to computers at home as well as at the university. Independent variables include their concepts, awareness, self-efficacy, computer and other digital technologies use at home, computer and other digital technologies use at the university as well as their views regarding curriculum design and the key roles of leadership. Pre-testing shows slight violation of MANOVA assumptions, especially in terms of Levene's test (see Table 5-16).

Table 5-16: The impact of demographic background on the pre-service teachers: Levene's Test

Variable	Sig.
Computer use at Home	.009
Computer use at the university	.000
Digital technologies use at the university	.000
Administration practices	.001
The concept of: Using technology in education generally	.000
The concept of: Implementing technology in education effectively	.000

Accordingly, the Bonferroni alpha level was adjusted to .005. The report adopts Pillai's Trace. The follow-up of the results demonstrated some statistical relationships between the pre-service teachers' backgrounds and the combined dependent variables (see Table 5-17).

Table 5-17: The impact of pre-service teachers' background on their responses

Dependent Variable	**Group**	*M*	*F*	η^2
Computer use at home	- Have access to computers at home - Do not have access	2.43 1.00	**5.03*****	.150
Computer use at the university	- Have access to computers at the university - Do not have access	1.59 1.05	**11.04*****	.052
Levels of self-efficacy	- Have access to computers at the university - Do not have access	4.13 3.86	**8.83*****	.042
Levels of self-efficacy	- Have access to computers both at home and at the university - Do not have access to computer at both	4.05 3.42	**10.13*****	.048

***p<0.005

First, computer access at home was found to impact on the pre-service teachers [*F* (10, 193) = 5.034, *p* = .000; Pillai's Trace = .207; partial η^2 = .207]. The only relationship to reach the adjusted alpha level was with computer use at home [*F* (40, 202) = 35.56, *p* = .000, partial η^2 = .150]. An inspection of the mean scores indicated that pre-service teachers who have access to computers at home (*M* = 2.43) were more active in terms of computer use in comparison with those who do not (*M* = 1.00).

Computer access at the university was also found to impact on the pre-service teachers [*F* (10, 193) = 2.333, *p* = .013; Pillai's Trace = .108; partial η^2 = .108]. At the university, their access to computers was associated with their computer use [*F* (40, 202) = 11.039, *p* = .001, partial η^2 = .052]. Pre-service teachers with proper access to computers at the university (*M* = 1.59) demonstrated higher levels of computer use compared to those had no access (*M* = 1.05). Interestingly, access to computers at the university impacts on the pre-service teachers' levels of self-efficacy [*F* (40, 202) = 8.834, *p* = .003, partial η^2 = .042]. To clarify this, mean scores suggest that pre-service teachers who have access to computers at the university (*M* = 4.13) were more motivated and trusted their abilities to use technology in comparison with those who do not have access (*M* = 3.86). Although this difference is statistically significant, the mean difference is slight. Both mean scores tend to be in the range of agree (4).

Finally, combined computer access both at home and the university was found to affect the pre-service teachers [F (10, 193) = 2.175, p = .021; Pillai's Trace = .101; partial η^2 = .101]. The only relationship that did not exceed the adjusted alpha level was self-efficacy levels [F (40, 202) = 10.125, p = .002, partial η^2 = .048]. Based on this, pre-service teachers who have access to computers both at home and the university (M = 4.05) have higher levels of self-efficacy compared to those who do not have either access (M = 3.42).

Similar to the instructors, relationships between the pre-service teachers' responses were investigated using Pearson's product-momentum correlation coefficient. Table 5-18 shows 11 positive correlations.

Table 5-18: Pearson's correlations for pre-service teachers (Sig. 2-tailed)

		Awareness	Computer Home	D.T. Home	Computer Uni.	D.T. Uni.	Curriculum design	Administration
Self-efficacy	P.C	**.511****	**.223****				**.376****	**.170****
	Sig.	.000	.000				.000	.004
	N	292	288				295	283
Awareness	P.C						**.550****	**.156****
	Sig.						.000	.007
	N						306	296
Computer at Home	P.C			**.338****	**.256****			
	Sig.			.000	.000			
	N			297	301			
Computer Uni.	P.C					**.195****		
	Sig.					.001		
	N					304		
D.T. Uni.	P.C							**.295****
	Sig.							.000
	N							291
Curriculum design	P.C.							**.310****
	Sig.							.000
	N							296

P.C = Pearson Correlation, D.T. = digital technologies

There was a positive correlation between the pre-service teachers' perceived self-efficacy and their perceived awareness of technology importance and usefulness [r = .511, n = 292, p = .000]. This indicates that higher levels of perceived self-efficacy are associated with higher levels of perceived awareness. Self-efficacy is also positively associated with computer use at home [r = .223, n = 288, p = .000]. Moreover, higher levels of self-efficacy are positively correlated with positive views regarding the curriculum design, r = .367, n = 295, p = .000 and administration practices [r = .170, n = 284, p = .004]. Likewise, the pre-service teachers' technology awareness is found to be positively correlated with their views in terms of both curriculum design [r = .550, n = 306, p = .000] and administration practices [r = .156, n = 296, p = .007].

In relation to the pre-service teachers' use of technology, higher levels of computer use at home is positively associated with higher levels of digital technologies use at home [r = .338, n = 297, p = .000] and computer use at the university [r = .256, n = 301, p = .000]. Further, their use of computers at the university is positively correlated with their use of digital technologies at the university [r = .195, n = 304, p = .001]. Interestingly, higher levels of digital technologies use at the university is positively associated with positive views regarding the current administration [r = .295, n = 291, p = .000]. In addition, pre-service teachers with positive views in terms of administration are more likely to be satisfied with the current curriculum design [r = .310, n = 296, p = .000].

In summary, background and personal circumstances affects pre-service teachers. Pre-service teachers who have access to computers at home were effectively using computers at home. Similarly, those that have access to computers at the university were also more active in using computers at the university. Further, those with more access to computers at the university demonstrated higher levels of self-efficacy. Moreover, combined positive access to computers at home and the university was positively associated with higher levels of their self-efficacy. Interestingly, pre-service teachers' higher levels of self-efficacy are associated with higher levels of perceived awareness, computer use at home, positive views of the curriculum design as well as leadership. In addition, pre-service teachers with higher levels of technology awareness are found to be more positive in terms of both leadership and the current curriculum design. For technology practice, higher levels of pre-service teachers' use of computers at home are positively associated with higher levels of other digital technologies use at home and computer use at the university. As such, higher levels of computer use at the university are positively correlated with their use of other digital technologies at the university. Higher levels of other digital technologies use at the university are correlated with positive views regarding leadership. Those who hold positive views in terms of leadership are more likely to be satisfied with the current curriculum design (see Figure 5-2).

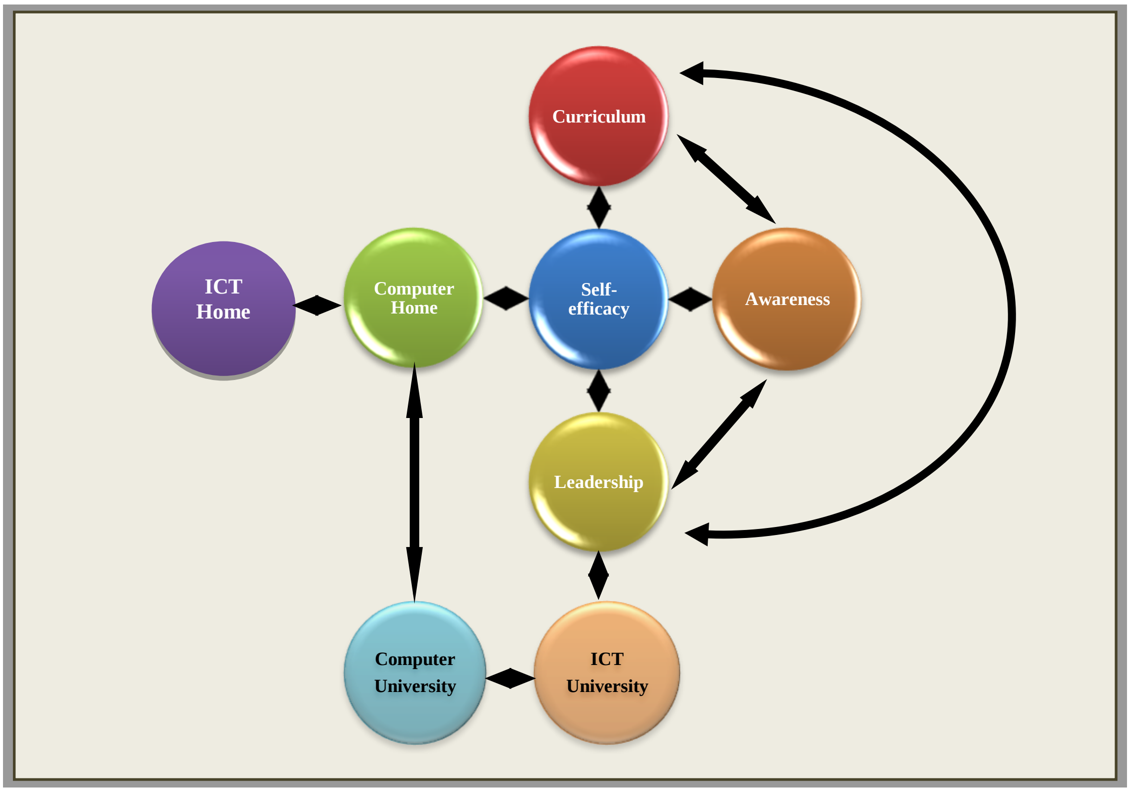

Figure 5-2: Relationships between pre-service teachers' practice and views

5.3 Interview results with instructors and pre-service teachers

Semi-structured interviews were conducted to understand, explain and illustrate the results of the survey questionnaire. The interviews were organised, coded and analysed based on the three perspectives under investigation, which are the technological, the pedagogical and the administration perspectives. A summary of the interview themes is presented in Table 5-19.

Table 5-19: A summary of the interviews themes and issues of investigation

Major theme	Sub-themes	Group	Purpose
The technological perspective	- Technology expertise and familiarity - Perceived concept - Perceived awareness - Perceived self-efficacy	- Instructors - Pre-service teachers	- Clarify previous findings - Add more understanding - Provide new dimensions - Cover uncovered issues
The pedagogical perspective	- Curriculum design - Technology practice	- Instructors - Pre-service teachers	
The administration perspective	- The importance of technology integration - The importance of infrastructure - The importance of training and support - The importance of building a technology resource base	- Instructors - Pre-service teachers (*except for the third sub-theme*)	

5.3.1 The instructors and pre-service teachers' technological perspective

In terms of their technology expertise and familiarity, instructors were significantly more qualified in terms of computers and technology. This can be attributed to the fact that many pre-service teachers are unemployed and perhaps cannot afford commercial training. For instance, two examples of pre-service teachers' comments are given:

> *I have the willingness, but I am waiting for my financial situation to improve.* (Ammar, Int. 10, p. 6, Line 142–144)
>
> *I do not have enough money for training.* (Abbas, Int. 15, p. 21, Line 583)

Instructors also confirmed and elaborated on this issue. Emad argued that:

> *Instructors have access to training more than students. Students cannot get adequate training in private institutions due to financial issues. Even though commercial training is expensive, many of them find it useless. Some of them told me that the purpose of their attendance is only to obtain a particular certificate.* (Int. 8, p. 24, Line 804–809)

Both instructors and pre-service teachers reported very good access to computers at home with no statistical difference between them. Likewise, both groups tend to use computers at home for less than two hours per day with no statistical difference. In addition, they were similar in terms of the positive relationship between their use of computers and other digital technologies at home. These results confirm what the policymakers have stated about the notion that both instructors and pre-service teachers are increasingly using technology in their everyday activities (see Chapter 4). However, statistical results indicated that access to computers at home only impacts positively on pre-service teachers' use of computers. As such, pre-service teachers statistically were more involved with other digital technologies at home such as mobile phones and gaming technologies such as PlayStation. Several pre-service teachers' comments on this issue are provided:

> *I have a lot of digital devices such as a laptop, PlayStation and many others that are available in most homes nowadays.* (Murad, Int. 14, p. 16, Line 426)
>
> *I have a computer at home and I browse the Internet. I also have other advanced types of technology that I can easily use such as mobile phones.* (Samer, Int. 19, p. 36, Line 1035–1036)
>
> *I am familiar with technology because my parents have provided me with a lot since childhood.* (Waleed, Int. 20, p. 40, Line 1158)

For the instructors and pre-service teachers' perceived concepts, the survey questionnaires show that both groups seem to have a good grasp of the meaning of the effective integration of technology with no statistical difference between them. Their responses mainly focused on the effective use of technology and largely disregarded technology being a normal part of the classroom. However, in the follow-up interviews, the instructors' perceptions of the effective integration of technology seem to be hesitant. Some instructors indicated that they have limited knowledge of this concept:

> *I have not heard of this concept before, but I know that pre-service teachers cannot be prepared without educational technology.* (Omar, Int. 23, p. 32, Line 1062–1063)

> *I do not know exactly what this concept means. However, what I do know is that we should use technology extensively in the preparation of pre-service teachers.* (Ahmed, Int. 2, p. 8, Line 271–272)

Although both Omar and Ahmed showed limited knowledge of this concept, they revealed that the use of technology and educational technology is essential to the preparation of pre-service teachers. Nonetheless, few instructors elaborated on this to the degree to which Faris and Emad did. Their comments provided below support the claim.

> *It means the effective implementation and use of technology by both teachers and learners. Hence, both groups must possess the skills as well as the tools that allow them to effectively integrate technology in their approaches whether teaching or learning.* (Faris, Int. 1, p. 2, Line 44)

> *It is the use of modern technologies in teaching as well as in the development and management of education. These concepts overlap and intersect with the concept of the effective integration of technology.* (Emad, Int. 8, p. 21, Line 698–699)

The instructors' unclear concepts can be attributed to the limitations associated with understanding the purposes, roles and effectiveness of using technology in education. This is demonstrated in the following examples:

> *It is common to limit this concept to the use of electronic devices and artefacts. In this case, essential theories and basic knowledge that are associated with effective use of technology will be minored and neglected.* (Hisham, Int. 7, p. 17, Line 586–588)

> *The integration of technology is still limited to the use of technology that has been considered as a teaching aid rather than a teaching method. This perception still prevails amongst both instructors and pre-service teachers.* (Emad, Int. 8, p. 21, Line 702–704)

The survey questionnaires showed no statistical difference between pre-service teachers and instructors in terms of their perceived concepts. However, pre-service teachers, offered more elaborative and precise concepts through the interviews. The following are some illustrative comments:

Technology integration means the use of technology, but in the right way. (Osama, Int. 9, p. 1, Line 4)

I can say that the integration of technology includes many other related concepts such as its use and the implementation. (Salman, Int. 12, p. 13, Line 350)

Effective integration of technology means the use of contemporary teaching methodologies in addition to digital technologies in the facilitation and delivery of information. (Murad, Int. 14, p. 15, Line 420)

It means the quality in using modern technologies to become the way of education. (Azzam, Int. 17, p. 19, Line 850–851)

Although there was a kind of ambiguity surrounding some of the instructors' concepts of the effective integration of technology, the interviews revealed that all of them were aware of the vital role that the effective integration of technology may play. This result is consistent with the survey findings in which instructors were found to be highly aware of the importance and usefulness of technology. Their level of awareness can be attributed to the evident impact of the global development of technology. This also is in line with the policymakers' high level of awareness of technology and its effective use. Three examples are:

The use of technology is no longer a kind of entertainment! (Faris, Int. 1, p. 1, Line 26)

Teaching without the effective use of technology is a certain failure! (Sami, Int. 6, p. 12, Line 418)

Without technology being effectively integrated, we cannot design meaningful learning environments. (Hisham, Int. 7, p. 18, Line 600)

In light of the instructors' high level of awareness, the instructors suggested some potential uses of technology and the capabilities of technology that may have a positive effect on the learning environment. The most common notion is the facilitation of communication and effective delivery of information. For example:

Technology significantly helps instructors to communicate, deliver information and facilitate the students' understanding. (Rashid, Int. 3, p. 10, Line 337–338)

Not only does the effective use of technology facilitate communication and the delivery of information, it also enhances and boosts various educational situations in which learning can be more constant. Sami as an instructor argued that:

The real purpose of education is the successful delivery of information. Students may possibly learn through traditional methods of teaching, but learning with technology will be more stable. (Int. 6, p. 13, Line 422–424)

As such, all interviewed pre-service teachers strongly acknowledged the importance and the usefulness of the effective integration of technology into the curriculum. Their responses were consistent with previous survey statistical findings in which they were sharply aware of the role that technology may play in enhancing their current learning activities and/or their prospective teaching approaches. Moreover, the interview findings were consistent with the increasingly important place of technology globally and were in line with the high level of awareness of both policymakers and instructors. The following are two examples of their comments:

> *Digital technologies for the new generation are definitely very important.* (Osama, Int. 9, p. 1, Line 6)

> *The effective integration of technology has become something compulsory. The whole world is evolving because of technology and we must keep up with these developments*. (Salman, Int. 12, p. 13, Line 352–353)

This awareness is reflected in a call for more effective integration of technology into Saudi education to advance of the society and deal with globalisation as well as the increase in student numbers. As Waleed and Murad respectively stated:

> *Technology now is more important for Saudi society. Almost every Saudi youth now has a laptop, mobile phone and many other types of technology. It takes the bulk of their attention and is the focus of their preferences. This leads Saudi Arabia to become a technological society in which the effective integration of technology, especially in education, has become significantly important.* (Waleed, Int. 20, p. 39, Line 1146–1151)

> *Technology must be effectively integrated to meet the huge number of students in our education. This also may help achieving more openness in terms of culture, science and urbanization for both students and teachers alike.* (Murad, Int. 14, p. 15, Line 420–423)

In terms of technology usefulness, the dominant notions according to many pre-service teachers are the enhancement of information delivery, the facilitation of effective communication, the improvement of classrooms management and the enrichment of students' learning. It may also draw the students' attention and make lectures more enjoyable. Again, evidence from the interviews shows that traditionalism in pedagogy is becoming increasingly inappropriate:

> *Advanced technologies are important to facilitate and speed up information delivery. The old way has become boring and inadequate to deliver meaningful learning.* (Ammar, Int. 10, p. 4, Line 84–85)

> *Students in traditional lectures tend to be bored and distracted. Once instructors use technology, students start to be positive and interact. This is simply because there is something new that attracts their attention. This new method is innovative and works to increase the students' focus and understanding.* (Samer, Int. 19, p. 35, Line 1024–1030)

> *A lot of courses such as biology are largely in need of the effective use of technology. In this way, such courses will become closer to our understanding rather than being merely words… Learning through technology is excellent, easy and enjoyable. It also decreases the amount of time and effort needed to accomplish certain tasks.* (Majed, Int. 21, p. 42, Line 1233–1234 and p. 44, Line 1272–1273)

Highlighting the issue of innovating traditionalism in pedagogy and learning approaches, pre-service teachers acknowledged that the effective integration of technology could be fundamental in this process. Yet, differences between generations may discourage the proposed change. As Abbas and Majed respectively pointed out:

> *The effective integration of technology is assumed to be a way of breaking the routine. However, in reality this is not happening… We can easily accept the idea of the effective integration of digital technologies more than our instructors who tend to be more traditional.* (Abbas, Int. 15, pp. 19–20, Line 537–547)

> *Rather than adopting ancient and primitive methods in education, there should be a new way that effectively integrates modern technology to diversify students' learning and gets rid of boring traditional methods*. (Majed, Int. 21, p. 42, Line 1227–1232)

In relation to the instructors and pre-service teachers' perceived self-efficacy, the survey questionnaires show that both instructors and pre-service teachers have high levels of self-efficacy, motivation and generally trust their abilities to integrate technology into their practices, including teaching and learning. From a statistical point of view, there was no significant difference between them. For the instructors, those with higher levels of self-efficacy statistically tend to embrace higher levels of technology awareness. This is supported by the interviews. A good example was given by Sami:

> *I believe that self-efficacy is very important in the technology era. When you feel confident, you will be motivated and have the ambition to develop.* (Int. 6, p. 13, Line 439–441)

Based on this importance, the vast majority of the interviewed instructors had positive perceptions of their ability to integrate technology into their teaching approaches. For example:

> *I do not have any problems with technology!* (Ahmed, Int. 2, p. 8, Line 278)

> *I consider myself well acquainted with computers and technology.* (Rashid, Int. 3, p. 11, Line 357–358)

Although the instructors' background had no significant impact on their perceived self-efficacy, the interviews demonstrated that training may play a vital role in the augmentation of their experience, expertise and consequently on their self-efficacy. In this regard:

> *Training courses, conferences, seminars and workshops held by the University or the Faculty on the use of modern technologies are important factors in raising our self-efficacy level.* (Ahmed, Int. 2, p. 8, Line 282)
>
> *The instructors' level of self-efficacy is primarily related to their professional development.* (Ayman, Int. 13, p. 28, Line 947)

Similar to the instructors, interviews with pre-service teachers revealed that most of them have outstanding levels of perceived self-efficacy with regard to technology. They are motivated and trust their abilities to integrate the significant capabilities of technology into their learning approaches successfully. The survey results show a positive relationship between the pre-service teachers' self-efficacy and technology awareness. This relation is confirmed in the interviews. Two significant comments are:

> *I give myself 100%! I am fully informed of the latest developments of modern technologies and their uses.* (Yasser, Int. 16, p. 25, Line 724)
>
> *Dealing with technology is not hard. I trust myself in this regard.* (Samer, Int. 19, p. 36, Line 1033–1034)

Conversely, a few pre-service teachers demonstrated lower levels of self-efficacy. For example, both Osama and Ammar explicitly described their self-efficacy as 'moderate'. Only Haitham perceived his level of self-efficacy as 'low'.

The latter pre-service teachers' responses focus on factors that contribute to the enhancement of their general perceived self-efficacy. For the pre-service teachers who demonstrated higher levels of self-efficacy, much emphasis was on technology-related expertise that can be obtained through more access, familiarisation with technology and self-motivated learning. This can be supported by the statistical results showing that pre-service teachers with higher levels of self-efficacy are more likely to have more access to computers at the university, combined access to computers at both home and the university and higher levels of computer use at home. Some comments showing this are:

> *For me, close and direct contact with technology has positively contributed to the enhancement of my self-efficacy.* (Salman, Int. 12, p. 13, Line 360)

> *I trust my abilities because I have a computer at home and I browse the Internet. I also have other advanced types of technological equipment that I can easily use such as a mobile and a PlayStation. (*Samer, Int. 19, p. 36, Line 1035–1036)

> *I am confident because I used to browse the Internet to get all the answers that I need. Also, I am familiar with technology as my parents have provided me with various types since childhood.* (Waleed, Int. 20, p. 40, Line 1158–1166)

With regard to the role of professional training, many pre-service teachers, especially those with higher levels of self-efficacy, argued that it plays a limited role in the enhancement of their self-efficacy. Self-learning, motivation and greater access resulting in a greater familiarisation with technology may have made the real contribution. Interestingly, statistical results show that computer qualifications do not affect their self-efficacy levels:

> *Not necessarily! A lot of people use computers very well without having specialised training.* (Salman, Int. 12, p. 13, Line 364–366)

> *I do not think so. Indirect training is better*. (Azzam, Int. 17, p. 30, Line 364)

> *It is true that I had some computer training, which significantly impacted on my experience, but I do not think that it had an impact on my self-efficacy. I believe that my understanding was the real reason!* (Kamal, Int. 18, p. 33, Line 951–952)

Nevertheless, pre-service teachers with moderate or lower self-efficacy levels stressed the importance of professional training and motivation. A good example was given by Osama:

> *To raise my self-efficacy, I need to learn more about how to properly use technology.* (Int. 9, p. 1, Line 13)

The next sub-section reports on the instructors and pre-service teachers' pedagogical perspective. This includes their views and attitudes on the curriculum design and associated technology-based pedagogical practices.

5.3.2 The pedagogical perspective

The statistical results indicate that both instructors and pre-service teachers were generally satisfied with the curriculum design. Descriptive statistics show that both groups view the current curriculum as suitable for the effective integration of technology as one way of implementing the technological transformation of the society. The curriculum provides adequate training and necessary skills to use technology effectively in practice. However, the clarity of technology integration-related goals and objectives seems to be an issue for the instructors from a descriptive point of view. Nonetheless, results significantly show that pre-service teachers were more positive in their views regarding the curriculum design.

Evidence from the instructors' interviews confirms their general satisfaction with the curriculum design and its suitability for the effective integration of digital technologies. A good example was given by Faris:

> *The existing curriculum is appropriate and we are very satisfied with it. With a commitment to the key principles of the curriculum, there is flexibility to update and add new parameters.* (Int. 1, p. 3, Line 91–92)

The reason behind this satisfaction seems to be the curriculum's cultural and religious fundamentals, which are usually sensitive to Arabic and Islamic contexts such as that in Saudi Arabia. Ayman, similar to many other instructors, placed great emphasis on these fundamentals, pointing out that:

> *There are essentials or basics of the curriculum that cannot be touched or changed and have special status.* (Int. 13, p. 29, Line 964)

Yet, a few instructors stated that the existing curriculum needs updating, especially in terms of digital technologies. Emad argued that:

> *The existing curriculum is inappropriate for the technology era. It has been there for more than 30 years!* (Int. 8, p. 22, Line 729–730)

As a result, traditionalism seems to dominate the instructors' practices. This result is consistent with the views of the policymakers on this issue. The policymakers pointed out that most of the instructors largely adopt traditional pedagogical approaches such as teacher-centred education and have low willingness and motivation for curriculum change and/or innovation, especially with technology (see Chapter 4). Instead, the focus is very much on the instructors' theoretical proficiency, and technology plays a very minor role:

> *Although the Faculty has provided us with technology such as laptops, faculty members tend to use traditional methods.* (Faris, Int. 1, p. 6, Line 210)
>
> *We suffer from traditionalism. Many of us are eager for the effective use of technology to help us doing our job.* (Ahmed, Int. 2, p. 10, Line 329)
>
> *Instructors who hold a traditional view usually think that it is not important to use technology. It is more important to them to master theories in the field!* (Rashid, Int. 3, p. 11, Line 378–379)

Although statistically the instructors' backgrounds had no impact on their views, two main factors were identified in the interviews with the instructors that contributed to the dominant use of traditional teaching approaches. First, the curriculum lacks technology integration goals and objectives. This may explain why the statement regarding the clarity of technology integration-related goals and objective had the lowest agreement among the instructors. In relation to this, Ahmed stated that:

> *The curriculum that I teach does not contain any goals or objectives related to the integration of technology!* (Int. 2, p. 9, Line 296)

The second factor is the instructors' attributes such as age and technology expertise. For expertise, many instructors share the notion that:

> *Old generation instructors usually lack effective use of technology due to the lack of desire and required skills... Younger instructors are more able to catch up with technology and develop themselves.* (Faris, Int. 1, p. 6, Line 210–217)
>
> *Older generation instructors have a strong desire to resist the new. They want to continue using the traditional methods of teaching. In contrast, younger instructors want to learn new and different technology skills.* (Hisham, Int. 7, p. 18, Line 611–612)
>
> *Traditional instructors do not have a good technological background or cannot efficiently manage time when using technology ... The new generation is different from the old generation who tend to be anxious about coping with the new technology.* (Ayman, Int. 13, p. 28, Line 929–941)

For pre-service teachers, the descriptive findings of the survey show that they are generally agreed on the suitability of the current curriculum design to integrate technology effectively. They were more positive in their views than their instructors were. Further, their views correlated were significantly and positively with both their perceptions of self-efficacy and technology awareness. In contrast, interviews revealed that most pre-service teachers generally appreciated the curriculum, but not their instructors' pedagogical practices, which was reported to be traditional and unsatisfactory. This result is largely consistent with the previous findings from the policymakers (see Chapter 4) and instructors regarding the fundamentals of the curriculum, which are sensitive to change. This is also can be due to their limited role in the curriculum design. The learners' voice, including pre-service teachers, in the development of Saudi curricula is hardly heard, which confirms the passive image of learners held by the policymakers as described in Chapter 4. For instance, Waleed said:

> *Development in the curriculum design are proceeding slowly in Saudi Arabia. We are rarely asked for our opinion in this regard!* (Int. 20, p. 40, Line 1180–1181)

However, most of them indicated that traditionalism is widely adopted by their instructors and will more likely continue for years. This has limited the impact of technology in terms of their learning activities. Some illustrative comments are:

> *We normally study through traditional ways such as textbooks. Unfortunately, there is no effective use of technology and there is no development in this area.* (Ammar, Int. 10, p. 5, Line 112–113)
>
> *The number of faculty members who employ technology does not exceed 1%.* (Haitham, Int. 11, p. 10, Line 275)
>
> *The majority of faculty members perform in a traditional manner.* (Abbas, Int. 15, p. 23, Line 669)

Abbas continued with a very interesting comment. He elaborated on the reason behind the instructors' dominant use of traditional pedagogical practices, saying:

> *I do not really blame them for that. They teach the same way they were taught!... As such, if instructors use technology, I am going to use the technology. We copy their styles and try to keep abreast of them and apply the same methods… We will follow the same way we have learned.* (Int. 15, p. 23, Line 663–671)

As such, Yasser commented with confidence:

> *The problem in the first place is faculty members who do not use technology. If they use it, they will be a good example for us to learn from. In addition, we will be able to use technology and become completely qualified. Simply, if technology is integrated in our preparation, we will incorporate it in our future classrooms.* (Int. 16, p. 26, Line 659–761)

In addition to the dominance of traditionalism, there were other negative issues associated with the curriculum design. Most of the pre-service teachers believe that their curriculum is heavy and theoretically dominated. Moreover, it lacks real-life application and connection to their current and/or future teaching approaches. In this sense, the status quo of the ineffective curriculum design may result in less opportunity for the effective integration of technology. As Salman said:

> *The curriculum is dramatically traditional and does not have web-based content or technology integration-related courses.* (Int. 12, p. 15, Line 405)

The curriculum focuses on memorization, quantity rather than quality and theory over application:

Our curriculum mostly depends on memorisation, which is not suitable for many disciplines such as Mathematics. (Salman, Int. 12, p. 13, Line 369–370)

Most of our courses are just theoretical-based and largely focus on recitation, which is not helpful at all. (Yasser, Int. 16, p. 26, Line 749–750)

Further, pre-service teachers complained about the heaviness of the curriculum load. For instance, Haitham simply commented that 'our curriculum is very, very heavy' (Int. 11, p. 12, Line 337). This is due to their multi-disciplinary preparation. In addition to the specialised courses that pre-service teachers must undertake in terms of majors, they also have to study other multi-disciplinary courses such as the Arabic language, English Literature, Islamic Studies, Arts, Physical Education and Chemistry. As most of the pre-service teachers emphasised, this makes them generally overloaded and frustrated. Consequently, experiencing new activities such as learning through technology may add more pressure:

Many of the general courses that I study now are useless. However, they are something that I must do. (Samer, Int. 19, p. 36, Line 1049–1050)

Much of what we are studying is unnecessary. We study various courses from various disciplines such as History, Geography and Arts. (Nadeem, Int. 22, p. 46, Line 1328–1329)

After gaining a general picture of the curriculum design and the pre-service teachers' views and attitudes towards it, the focus was shifted to critically investigate the Educational Technology Preparation Module. The major theme that emerged from the interviewed pre-service teachers is the general inefficiency of this module. Two key characteristics of its inefficiency were identified: the lack of effective technology-related courses and the out-dated content of the existing courses. In terms of technology-related courses, Murad gave the most significant response:

Technology-related courses are generally weak and very few. The number of accredited hours for such courses is also very few compared to other courses that are huge in number and less in value. (Int. 14, p. 16, Line 442–443)

Many of the pre-service teachers further indicated that the existing technology courses are out-dated in their content and instead train them to use the old or traditional teaching methods. They also contained more theory than practice. According to Azzam:

I studied two courses, which are 'Introduction to Educational Technology' and 'Using Educational Means'. Both courses were very traditional. In addition, books and references that assumedly should provide the philosophical foundation were useless and provided no more than talk. (Int. 17, p. 31, Line 880–890)

For technology-based pedagogical practices, instructors have been noted to have more access to computers at the university. Accordingly, they tend to use computers and other digital technologies more than pre-service teachers. The instructors indicated that they used computers at the university less than one hour per day and their use of other digital technologies in their teaching activities only involved data projectors. Nonetheless, at the university, the instructors' higher levels of computer use are associated with higher levels of other digital technologies use. In contrast, the overall practices of pre-service teachers were quite different. Their main access to computers was from the university's coffee shops and restaurants or their own personal laptops. Further, they experienced almost no technology-based learning practices at the university in terms of either online activities or engaging with other digital technologies such as data projectors. However, statistically, pre-service teachers with more access to computers at the university are expected to be more active in terms of computer use at the university. Similar to the instructors, pre-service teachers with higher levels of computer use at the university tend to be higher users of other digital technologies at the university.

The instructors' interviews confirmed that only a few of them have incorporated technology into their teaching approaches. The most commonly used technology includes computers, the Internet and data projectors for PowerPoint presentations. Statistical findings revealed that the instructors' familiarity with technology in terms of both computer use and other digital technologies at home might possibly lead to higher levels of using both computer and digital technologies at the university. Hence, the interviews with the instructors have added new dimensions. It was found that the main reason motivating the instructors to integrate technology effectively into their teaching approaches was the nature of the subjects that they teach. In other words, the instructors who teach technology, computer and design courses demonstrated more uses of technology. Nevertheless, most of the instructors' responses revealed that their use of technology was at a personal level. For example, Faris mentioned that he prepared his lectures using technology:

> *I used to fetch my laptop with me and prepare some PowerPoint presentations. Computer, Internet and networks are currently the tools of education... I browse some lecture-related websites. I also use the Interactive Smart Board and the OHP. This is because I possess the skills and the tools that I try to effectively integrate.* (Int. 1, p. 2, Line 45–47 & Line 48–50)

Interestingly, Faris showed great satisfaction with the current curriculum design when responding to this issue. Thus, his statement may support the statistical finding that instructors with positive views regarding the curriculum design tend to use more digital technologies at the university. Other instructors also expressed appreciation and were positive about the nature of the curriculum they taught. For instance:

> *The nature of the courses that I teach relies on photos, slides and colour. Therefore, I prepare all my lectures using PowerPoint and a data projector.* (Rashid, Int. 3, p. 11, Line 358–395)
>
> *The nature of the subjects that I teach requires the use of technology.* (Emad, Int. 8, p. 25, Line 855)

However, the rest of the instructors showed lower levels of technology-based practices. For example, Ahmed revealed that his use of technology, especially the Internet, did not reach the level of effective integration:

> *I sometimes use technology, particularly searching the Internet for related topics. Hence, this use is simple and very few.* (Int. 2, p. 9, Line 298)

Omar revealed that he never used the Internet at home. He uses the Internet at work only to some extent due to the nature of his profession as an instructor. This interesting comment is consistent with the positive statistical relationship between the instructors' use of computers and digital technologies at both home and the university. Omar declared that:

> *Really, I do not use the Internet at home, and only to some extent at the University... The nature of my work has necessitated the need to use technology sometimes.* (Int. 23, p. 32, Line 1071–1074)

Concerning pre-service technology-related activities, few instructors made serious efforts in this regard. For example:

> *I personally refuse to deal with paper. Thus, I require all my students' assignments and workshops to be sent via e-mail. In turn, I electronically correct and return them.* (Faris, Int. 1, p. 6, Line 195–197)
>
> *I do ask for some technology-based work from my students. For example, I have a special website where students can access the Unit's topics, contents and materials. Further, any assignment must be sent via e-mail. Any student who does not do this will have marks deducted.* (Emad, Int. 8, pp. 25–26, Line 855–860)

The semi-structured interviews with the pre-service teachers confirmed there is very little effective use of digital technologies such as online environments in their learning activities. A small sample reported the learning activities were of poor quality, ineffective and very limited. They were generally based on a requirement of the instructor and did not go beyond traditional online research skills and some limited use of e-mail. As a result, the pre-service teachers appeared to be less motivated, despite their great willingness to effectively use and practice more technology throughout their learning. With regard to the nature of the pre-service teachers' technology-based learning activities:

> *Only a few instructors require their students to conduct research on the Internet on a particular topic or subject. Most of them prefer traditional methods through classroom participation, homework and tests.* (Ammar, Int. 10, p. 5, Line 115–118)

> *I do not browse the Internet in order to search for a specific topic related to my study, unless I instructed by my instructor. The use of technology is not related to my learning; it is more related to my regular daily practices.* (Haitham, Int. 11, p. 10, Line 279–281)

Despite most pre-service teachers indicating that their technology-based learning activities were unsatisfactory, some of them showed that they were self-motivated to use the Internet, for example, to discover and learn things. This can be supported by the statistical results showing that higher levels of pre-service teachers' use of computers at home are positively associated with higher levels of computer use at the university. In other words, their familiarity with technology at home may motivate them to increase their use of technology at the university. For example:

> *I browse the Internet in order to understand some issues related to the subjects that I study. I am personally driven to do this, not obliged. I do this for myself to learn, but occasionally I need to do so*. (Salman, Int. 12, p. 14, Line 379–381)

> *I personally started to use the Internet to search for information that I need. To be honest, I was not doing this before, but now I do this on my own and for myself. After that, I may copy the information found on my USB or send them to the instructor.* (Kamal, Int. 18, p. 33, Line 970–972)

Further, most of the interviewed pre-service teachers showed their frustration of the traditional methods of learning that their instructors are currently enforcing. Haitham argued that:

> *Some instructors specifically say that they do not want our assignments to be Internet-based. They must be handwritten and strictly from books. If I get the same quality instructors in the future, I will delete the course even it was the only one left before graduation. Why not use technology or search Google? Why should we continue using traditional ways?* (Int. 11, p. 10, Line 267–271)

The next sub-section highlights the practitioners' administration perspective. It focuses on their views and attitudes towards the four main roles of leadership: the importance of technology integration; the importance of technology infrastructure; the importance of technology training and support; and building a reliable technology resource base. The last issue was investigated only from the instructors' point of view because pre-service teachers lack direct involvement with this.

5.3.3 The administration perspective

The quantitative analysis of the surveys shows that there is no statistical difference between the instructors and pre-service teachers' views with regard to their administration perspective. Both groups seem to appreciate the current leadership efforts in relation to digital technologies and its effective integration into the curriculum. This generally is in line with what has been indicated by the policymakers who revealed some positive signs in this regard (see Chapter 4). Further, it has been found that both instructors and pre-service teachers who appreciated the current curriculum design also appreciated the current leadership practices. Likewise, both instructors and pre-service teachers who positively acknowledged the current leadership practices are more likely to use more digital technologies at the university. Unlike instructors, pre-service teachers with higher levels of self-efficacy and technology awareness are found to hold more positive views regarding leadership practices.

With regard to the importance of technology integration in the leadership mission, interviews with instructors confirmed what the survey questionnaires revealed. Most of them agreed that leadership considers the integration of technology as a priority. They generally showed that leadership has a satisfactory level of awareness with regard to the importance and the usefulness of the effective integration of technology. This awareness reflects on current practices, which were positively acknowledged by the instructors. For example, most of the instructors indicated that King Abdulaziz University is one of most highly advanced Saudi universities in terms of technology and its effective integration:

> *Educational leaders at the University have made considerable effort in introducing technology. It is one of the few universities that have a Deanship for e-learning, and a Deanship for Distance Education!* (Faris, Int. 1, p. 7, Line 232–233)

> *I believe that senior management here is reserving no effort to ensure the quality of prospective teachers. For example, classrooms are fully equipped with technology with unlimited expenditure.* (Hisham, Int. 7, p. 20, Line 675)

In contrast, most pre-service teachers were found to be conservative in their responses to questions relevant to the technological vision of the current leadership. Many of them would not comment on this issue, saying they had no previous contact or direct communication with leadership. Many of them made similar comments:

> *I do not know anything about the senior management and I had no connections with it.* (Haitham, Int. 11, p. 11, Line 312), (Salman, Int. 12, p. 14, Line 397) and (Nadeem, Int. 22, p. 47, Line 1378)

Further, many pre-service teachers indicated that their communication with leadership should be facilitated through their instructors. This is an indication to centralisation:

> *I think that leadership is primarily connected to faculty members and we are connected through them. We cannot directly reach the senior management to get our voices heard. In fact, direct access to the leadership is very difficult.* (Nadeem, Int. 22, p. 47, Line 1378–1381)
>
> *The link between students and leadership is the instructors who are in charge of implementing its policies and guidelines. Therefore, faculty members are normally closer to the leadership than us.* (Murad, Int. 14, p. 18, Line 507–508)

However, a few of the interviewed pre-service teachers had opinions about the current leadership's technological vision. Despite their relatively positive position in general, they were tentative and uncertain. However, they seem to be more familiar with digital technologies at the university than other pre-service teachers are. This may contribute to the survey result showing that pre-service teachers with higher levels of digital technologies use at the university are more likely to be positive in their views regarding key roles of leadership including its technological vision. The following comments may also reflect their technological awareness as well as self-efficacy, which was previously found to be generally high and contemporary:

> *To the best of my knowledge, leadership has done much to integrate technology into our preparation at the theoretical level, but not much at the application level.* (Yasser, Int. 16, p. 29, Line 832–833)
>
> *There has been some effort, but as I saw, there is nothing that is completely new. They are the same things that I experienced in my primary school!* (Azzam, Int. 17, pp. 31–32, Line 918–921)
>
> *God only knows, but I noticed some improvement with regard to technology.* (Kamal, Int. 18, p. 35, Line 1008)

In order to provide wide access to technology, firstly, technology resources and facilities must be affordable. Most instructors expressed the view that the current management is making commendable efforts in providing and promoting various forms of technology. Statistically, it was found that instructors with more positive views in terms of leadership and administration practices are more likely to use digital technologies effectively at the university. A comprehensive example is given by Sami:

> *The University has provided us with laptop computers and has installed data projectors in the classrooms where I can now access the Internet, introduce the things that I want, show multimedia and give interesting lectures'…'Each faculty member in his office has a free high speed Internet connection. Faculty members now can obtain any information they need. In my view, this is a quantum leap.* (Int. 6, p. 13, Line 432–433 & p. 15, Line 521–523)

Since the provision of computers is not the only way to integrate technology effectively into the curriculum, other technology resources and facilities such as laboratories, smart classrooms and educational resources centres are also important. According to many instructors, the current leadership efforts in this regard seem to be satisfactory. For example, Emad stated that:

> *There are ongoing developments in terms of the Educational Resources Centre, the two Micro Teaching Centres and the Language Learning Laboratories. Also, classrooms have been supplied with modern technologies such as data projectors and smart interactive whiteboards.* (Int. 8, p. 26, Line 873–874)

Secondly, although most of the instructors were generally satisfied in terms of the affordability of computers as well as technology resources and facilities, they had some accessibility issues. The dominant issue affecting both instructors and pre-service teachers' access is centralisation where prior permission must be obtained. Faris said:

> *Access to the computer labs or the Educational Resources Centre (ERC) is not possible until permission has been obtained from their directors... The ERC is supposed to be open from 8 am to 2 pm, but we must obtain permission and inform the director of the dates and times we would like to use the Centre.* (Int. 1, p. 5, Line 165–171)

Not only are permission and notice of prior arrangements required, access is also limited to some disciplines. In other words, instructors from the Educational Technology Department, for example, have greater access to the ERC, and instructors from the Curriculum and Teaching Method Department have greater access to the Micro Teaching Centre (MTC):

> *Technology resources and facilities such as the ERC and the MTC are not available to everyone. They are only available to those from relevant disciplines.* (Sami, Int. 6, p. 16, Line 535–536)

With respect to the interviewed pre-service teachers, the vast majority indicated that they had limited access to the available technological resources and facilities. Their central access points to computers are the Student Club inside the university, Internet coffee shops outside the university and their own personal laptop computers. Unfortunately, other technology resources and facilities such as the Educational Resources Centre are unlikely to be affordable and accessible to them. This is supported by the results showing that pre-service teachers statistically have less access to computers at the university. Based on this, pre-service teachers use computers and digital technologies significantly less than their instructors do during school hours. It is disappointing that the Students Club is their only access point in the university. For instance, Nadeem commented that:

> *It is inconvenient, uncomfortable and overcrowded. It has approximately five computers, which are always busy!* (Int. 22, p. 46, Line 1356)

As a result, pre-service teachers try to find alternate ways to complete their technology-based tasks, including Internet coffee shops near the university and their own laptops:

> *I often go to the nearest Internet cafe to meet my requirements.* (Azzam, Int. 17, p. 31, Line 912–913)

> *I used to bring my laptop with me. I also noticed that many of the students bring their laptops with them to be able to finish their assignments.* (Waleed, Int. 20, p. 41, Line 1197)

Many pre-service teachers confirmed that other technology resources and facilities such as the Educational Resources Centre were only available during their formal lectures. Centralisation is the reason given by many:

> *They are not available all the time, only during formal lectures.* (Osama, Int. 9, p. 2, Line 49)

> *They should be firstly booked by instructors. I can never access them directly!* (Abbas, Int. 15, p. 23, Line 645–646)

To illustrate the importance of training and support, the majority of instructors reported that they have been provided with some training in terms of technology. For instance:

> *The University launched a program called 'Developing Capacity of Faculty Members'. This program aims at providing us with many courses in terms of professional development such as the use of technology, e-learning, computer uses, SPSS... etc.* (Faris, Int. 1, p. 3, Line 73)

Despite the reported usefulness and importance of such training, some of these courses seemed unsatisfactory because:

> *Some of the courses were very traditional.* (Rashid, Int. 3, p. 11, Line 384)

> *Training courses for both faculty members and students are very poor and very few.* (Sami, Int. 6, p. 14, Line 491)

However, there is evidence that some instructors may lack interest in participating in such training. The dominant influence of traditionalism and the fact that training is optional were the most commonly reported reasons. Traditionalism may cause instructors to lack motivation unless certain conditions exist:

> *Technology training courses were joined by instructors who had the desire for development.* (Rashid, Int. 3, p. 11, Line 376)
>
> *Motivation is important to attend such sessions. If it exists, issues such as money and venue will never be obstacles*. (Sami, Int. 6, p. 14, Line 488–490)

According to many of the instructors, such training courses should be mandatory. This may assist the transition from traditionalism to quality education. Ayman, for example, said:

> *All instructors should be obliged to participate and attend. This can be useful to the future development of the people, place and work.* (Int. 13, p. 28, Line 950)

On the other hand, most of the interviewed pre-service teachers indicated that they lacked adequate training in technology as well as professional support. Ammar explained that:

> *Usually when we try to enrol, we find that we have been preceded by a huge number of students. Training courses are very few and they also lack adequate places.* (Int. 10, p. 7, Line 187–188)

Nadeem was very disappointed and even became emotional when asked to comment on training. His comment reflects the prevailing negative image of learners (see Chapter 4):

> *I had no training. Even though that I have the desire to develop myself in this regard, where should I go? Will my words echo when I speak? I believe no! Whether we speak or not, they will not listen to us as we are only recipients.* (Int. 22, p. 47, Line 1372–1374)

In addition to the paucity of training offered for pre-service teachers, the heavy load of the curriculum also contributed to their lack of attendance at training courses as well as negatively affecting their willingness to participate:

> *One of the biggest obstacles that we have is the heaviness of the curriculum. As I have lectures from 8 am until 3 pm, there is no time for training!* (Ammar, Int. 10, p. 6, Line 137–139)

In relation to the importance of building a technology resource base, according to the policymakers' interviews (see Chapter 4), there was a clear absence of cooperation with the private sector. Instead, leadership has tried to be totally independent and self-supporting via its internal resources and capabilities. The quantitative investigation of the instructors' views regarding the importance of building a technology resource base indicated that this issue was a lower priority for senior management. This was in terms of cooperation with private sectors and other organisations to support a technology resources base, training and maintenance, sharing technology resources, and the provision of expensive technologies. Nevertheless, the interviews with academic instructors showed a lack of knowledge in terms of the current efforts needed to build a technology resource base. Only Faris mentioned that there was limited cooperation with a private institution to train pre-service teachers on the use of computers. This institution was located within the premises of the Faculty of Education and was very useful.

5.4 Conclusions

The results in relation to the instructors and pre-service teachers' technological perspective examined their expertise and familiarity with technology and three perceptions including concept, awareness and self-efficacy. In terms of their technological expertise and familiarity, instructors were significantly more qualified in terms of technology compared with pre-service teachers who reported some difficulties regarding the provision of commercial training. However, both groups were found to be very familiar with technology at home when they had excellent access to computers and technology. Access to computers was only found to have a positive statistical relationship with the pre-service teachers' use of computers at home. Both groups tend to use computers for less than two hours per day. For both, higher levels of computer use are associated with higher levels of digital technologies use. Yet, pre-service teachers were more likely to use digital technologies at home than instructors.

In relation to the perceived concept for both groups, the results of the questionnaires indicated that both groups might have a similar positive perceived concept, which focuses on the effective use of technology. Nonetheless, the results of the interviews with the instructors showed that they have more of a moderate concept that was largely based on the general use of technology. Despite this, they demonstrated higher levels of awareness in terms of the usefulness and importance of the effective integration of technology. They also indicated higher levels of perceived self-efficacy in which interviews showed that training played a major role. In contrast, pre-service teachers, throughout the interviews, show more understanding of the concept. They were also found to be aware of the importance and the usefulness of the effective integration of technology in the enhancement of their current learning activities and their prospective teaching approaches. This awareness is positively correlated with their levels of self-efficacy, which were also found to be high. Statistically, self-efficacy levels were positively correlated to their access to computers at the university, combined with access to computers both at home and the university and higher levels of computer use at home.

In addition to the statistical results that show no relationship between computer qualifications and self-efficacy levels, the interviews confirmed that professional training has a limited impact on these levels. Instead, they were found to be more self-motivated to acquire the technology expertise that may stimulate higher levels of self-efficacy. Nevertheless, those with moderate or lower levels expressed the need for more training to motivate and enhance their self-efficacy. A summary is provided in Table 5-20.

Table 5-20: Summary of major findings in relation to the technology perspective

Sub-themes	Instructors' responses	Pre-service teachers' responses
Technology expertise and familiarity	• They were significantly more qualified in terms of technology • They have excellent access to computers at home and tend to use them for less than 2h/d • At home, higher levels of computer use are associated with higher levels of digital technologies use	• They have difficulties associated with training • They have excellent access to computers at home and tend to use them for less than 2h/d • Access to computers at home was found to positively impact their use of computers also at home • They use digital technologies at home more than instructors • Higher levels of computer use are associated with higher levels of digital technologies use at home
Perceived concept	• They have an acceptable level of perceived concept with no statistical difference • Interviews clarified that their concept is moderate • Their central perception is the general use of technology	• From the survey, they have an acceptable level of perceived concept • Interviews show that they have a wider understanding of technology than instructors • They assert on effectively using, utilising and implementing technology
Perceived awareness	• They have higher levels of awareness of the importance and usefulness of technology • Technology may facilitate communication and effective delivery of information • Through the effective integration of technology, knowledge and learning can be more consistent	• They were highly aware of the importance and the usefulness of technology • Technology has the possibility of creating more acceptable and enjoyable learning environments • Technology facilitates their learning, understanding, communication and attracts their attention
Perceived self-efficacy	• Higher levels of perceived self-efficacy • No correlations were found between their levels of self-efficacy and other aspects • Interviews showed that only training impacts on their self-efficacy	• They were highly motivated to use technology • Their self-efficacy is positively correlated with their awareness, access to computers at the university, combined access to computers both at home and the university and higher levels of computer use at home. • Both surveys and interviews show no relationship between computer qualifications and self-efficacy. • Those with moderate or lower levels of self-efficacy expressed the need for more professional training

One of the key findings, associated with academic instructors and pre-service teachers' pedagogical perspectives is that they are generally satisfied with the existing curriculum and its suitability for the effective integration of digital technologies. However, this can be attributed to the fact that the current curriculum has cultural-religious fundamentals that are sensitive to change. Conversely, interviews with both groups revealed that there was a dissatisfaction associated with traditionalism, which is widespread and dominates the instructors' practices. The interviews with the instructors showed that the reason behind this domination is to do with the technology-free goals and objectives of the curriculum and the personal attributes of the instructors such as age and technology expertise. For pre-service teachers, the questionnaires showed that they are statistically more positive in this regard, despite the fact that their voice has a limited impact, especially in terms of curriculum development. Their positive views were correlated with their higher levels of self-efficacy and technology awareness. According to the interviews, shortcomings associated with the domination of traditionalism suggest that the current curriculum design is inefficient, especially the Educational Technology Preparation Module, which is considered out-dated. Moreover, the current curriculum is largely reported to be heavy, over multi-disciplinary and theoretically dominated.

In terms of technology practice, statistically instructors have more access to computers at the university than do pre-service teachers. Consequently, instructors were also found to use computers and digital technologies more than pre-service teachers did. The instructors' highest uses of computers at the university tend to be for less than one hour per working day and have some educational purpose. Instructors showed that they rarely used other forms of digital technologies in their pedagogical practices at the university, apart from data projectors, which tended to be used regularly. However, the instructors' higher levels of computer use at the university are associated with their higher uses of digital technologies at the university as well. Statistical results revealed that instructors' higher levels of using both computers and digital technologies use at home are associated with higher levels of using both computers and digital technologies at the university. Moreover, instructors with positive views regarding the curriculum design are more likely to use more digital technologies at the university. For a summary of the instructors and pre-service teachers' pedagogical perspective, see Table 5-21.

Table 5-21: Summary of major findings in relation to the pedagogical perspective

Sub-themes	Instructors' responses	Pre-service teachers' responses
Curriculum design	• They were satisfied with the existing curriculum design • This can be attributed to curriculum cultural-religious fundamentals that are sensitive to change • Traditionalism dominates their practices due to: - the curriculum's lack of technology goals, - the instructors' age - technological expertise	• They were generally satisfied and statistically more positive than instructors • Their positive views were correlated with their higher levels of self-efficacy and technology awareness • Their voice has a limited impact, especially on curriculum development • The Educational Technology Preparation Module is inefficient • Curriculum is heavy, over multi-disciplinary and dominated by traditionalism
Technology practice	• They have more access to computers at the university • They tend to use computers and digital technologies more than pre-service teachers • Their highest use of computers at the university was for less than 1 hr/working day • They rarely use other forms of digital technologies at the university apart from the data projectors • At the university, higher levels of computer use are associated with higher levels of digital technologies use • The instructors' higher levels of both computer and digital technologies use at home are associated with higher levels of both computers and digital technologies use at the university • Instructors with positive views regarding the curriculum design are expected to use digital technologies more at the university • The interviews showed that the instructors who taught technology-related subjects have higher levels of technology use at the university	• Despite the very good access to computers at the university, it was through coffee shops, restaurants and personal laptops • They have almost no technology-based learning activities at the university (both online activities and other digital technologies) • Pre-service teachers with more access to computers at the university are expected to be more active in terms of computer use • At the university, their higher levels of computer use are correlated with more digital technologies use • Their higher levels of computer use at home have a positive correlation with higher levels of computer use at the university • Interviews confirmed that their technology-based learning activities were few, frustrating and educationally unsatisfactory • The few reported technology-based learning activities were based on the instructors' requirements and did not go beyond traditional Internet searching and some limited use of e-mail • A number of pre-service teachers were self-motivated to use technology in their learning approaches

Table 5-21 also shows that the overall technology use of pre-service teachers reported in both questionnaires and interviews is far from satisfactory. From the questionnaires, their access to computers was from the university's coffee shops and restaurants and their own personal laptops. Further, they engage in almost no technology-based learning practices at the university, neither online activities nor with other digital technologies. Statistically, pre-service teachers with more access to computers at the university are expected to be more active in terms of computer use at the university. Moreover, their higher levels of computer use at the university are correlated with more digital technologies use at the university. In addition, higher levels of pre-service teachers' use of computer at home have a positive correlation with higher levels of computer use at the university. The interviews confirmed the previous issues and added that their practices have not gone beyond traditional Internet research and limited e-mail use, which was based on their instructors' requirements. Hence, some of them showed that they were self-motivated to use the Internet, for example, to acquire information related to their field of study. However, most of the pre-service teachers showed their frustration of the current traditional learning approaches that they are forced to adopt. This may lessen the opportunity for effective integration of technology.

In relation to the administration perspective, both academic instructors and pre-service teachers' views were similar. They indicated their general satisfaction with the current leadership practices. Both instructors and pre-service teachers who appreciated the curriculum design also appreciated the current leadership practices. Similarly, both instructors and pre-service teachers with positive views of the current leadership practices are more likely to practice more digital technologies at the university. Only pre-service teachers with higher levels of self-efficacy and technology awareness are expected to be more positive in their views regarding leadership practices. Interviews with instructors confirmed the previous statistical findings. The majority validated that the leadership has considered the effective integration of technology as a priority into its mission. In contrast, interviews with pre-service teachers showed that most of them lack direct communication or contact with leadership. Consequently, their views regarding leadership theory were conservative and tentative. The few who could positively comment in this regard were those who tended to be more familiar with digital technologies at the university.

Despite the acknowledgement of the current leadership's efforts in terms of infrastructure, some access issues were identified in the interviews with the instructors. These issues include centralisation and discipline limitations. For pre-service teachers, the severe lack of access was attributed to a lack of technology resources and facilities dedicated for their use. Reported access points included the Student Club, Internet coffee shops outside the university and their own personal laptops. Access to other resources and facilities inside the university was usually hindered by centralisation. This is consistent with the statistical results that revealed that instructors have more access to computers at the university than pre-service teachers. Thus, pre-service teachers were found to use computers and digital technologies at the university significantly less. See Table 5-22 for a summary of the administration perspective.

Table 5-22: Summary of major findings in relation to the administration perspective

Sub-themes	Instructors' responses	Pre-service teachers' responses
The importance of technology integration	• They were generally satisfied with the current leadership practices • Instructors who appreciated the current curriculum design also appreciated the current leadership practices • Instructors with positive views of the current leadership are more likely to use digital technologies at the university • Interviews confirmed that technology is considered a priority to leadership	• They were generally satisfied with the current leadership • The pre-service teachers who appreciated the curriculum design also appreciated the current leadership practices. • Those with positive views of the leadership are expected to use more digital technologies at the university. • Pre-service teachers with higher self-efficacy and technology awareness are expected to be more positive in their views regarding leadership practices. • Interviews showed that most pre-service teachers lacked direct communication with leadership. • The few pre-service teachers who commented positively on the current leadership tended to be more familiar with digital technologies at the university.
The importance of infrastructure	• The instructors felt that the current leadership acknowledged the importance of infrastructure • Interviews revealed that centralisation and discipline limitations were the most challenging issues to accessibility	• They severely lacked access to technology at the university • Access points were the Student Club, Internet coffee shops and their personal laptops • Access to other facilities was hindered by centralisation. This is consistent with the result that instructors have more access to computers at the university than pre-service teachers. • As a result, pre-service teachers were found to use computers and digital technologies significantly less at the university.
The importance of training and support	• Training and support was positively acknowledged by most instructors. • Training courses were reported as being traditional, few, and space and time limited. • Other instructors reported that a lack of motivation, dominance of traditionalism and optionality of training were associated with their lack of willingness to participate in training.	• Most of the interviewed pre-service teachers indicated that they lacked the necessary training and professional support. • Issues reported include the heaviness of their curriculum and limitations associated with training such as an inadequate number of places. • Pre-service teachers have been considered as merely receivers of knowledge.
The importance of building a technology resource base	• They moderately acknowledged the leadership practices in building a technology resource base. • Interviews confirmed the absence of cooperation with the private sector in terms of support, training, maintenance, information sharing and the provision of expensive technologies.	NA

As shown in Table 5-22, training and support were also positively acknowledged by the instructors in the survey. Hence, training courses were reported in the interviews as traditional, few, and space and time limited. Other instructors reported that the lack of motivation, the domination of traditionalism and the optionality of training were associated with a general lack of affiliation. In addition, most of the interviewed pre-service teachers showed that they lacked the necessary training and professional support. Issues reported included the heaviness of their loads as well as limitations associated with adequate training places. This confirms the negative image of pre-service teachers being merely receivers of knowledge. The importance of building a technology resource base was investigated from the instructors' points of view. Despite the relatively positive acknowledgement of leadership practices in this regard, interview results confirmed that there was a clear absence of cooperation with the private sector in terms of support, training, maintenance, information sharing and the provision of expensive technologies.

5.5 Summary

The primary goal of this chapter was to investigate possibilities for the effective integration of technology into the instructors and pre-service teachers' practices, both teaching and learning, using survey questionnaires and semi-structured interviews. This chapter focused on three main perspectives: the instructors and pre-service teachers' technological, pedagogical and administration perspectives. The next chapter provides a synthesis of the results obtained from the data analysis and those presented in Chapters 4 and 5. It also provides a discussion and contextualisation of the obtained results.

Chapter 6 DISCUSSION

6.1 Introduction

The results of investigating the possibility of the effective integration of digital technologies into Saudi pre-service teacher education policy and practice were presented in Chapters 4 and 5. This chapter discusses the key findings obtained from the mixed-method approach.

6.2 Research overview

The primary goal of the study was to investigate the possibility of the effective integration of digital technologies into the Saudi pre-service teacher education curriculum. Saudi-based literature reveals that there is a lack of teacher preparation and training in digital technologies and that it should be improved (e.g. Al-Asmari, 2008; Al-Jarf, 2006; Al-Otaibi, 2007; Al-Towjry, 2005; Abu-Arrad & Fosaiel, 2006; Bingimlas, 2010; Bin-Taleb, 2005). To achieve this, the study employed a mixed-method approach/design that included document analysis, survey questionnaires and semi-structured interviews. In the first phase, document analysis was thematically conducted and included national and curriculum documents that are mostly relevant to the study aim and scope. Then, semi-structured interviews were conducted with policymakers to confirm, enrich and understand the role of policy in promoting effective integration of technology. After obtaining the results from the first phase, survey questionnaires were distributed to academic instructors and pre-service teachers to understand their views, attitudes, practices and activities in relation to teaching and learning with digital technologies. Follow-up semi-structured interviews were conducted with instructors and pre-service teachers to provide a richer and deeper understanding of the results.

In terms of the theoretical background, the current research focused on three main perspectives. Aimed at context-appropriate recommendations for the effective integration of technology into Saudi pre-service teacher education curriculum, the three perspectives were:

- The practitioners' technological perspective: This perspective included the instructors and pre-service teachers' expertise and familiarity with technology. Perceptions investigated included their perceived concept of effective technology integration, their perceived technology awareness, and their levels of self-efficacy (except the policymakers). Data sources involved both survey questionnaires and semi-structured interviews. Participants included policymakers, academic instructors and pre-service teachers.

- The pedagogical perspective: This perspective looked into the design of the pre-service teacher education curriculum as well as the instructors and pre-service teachers' technology-based pedagogical practices related to teaching and learning. Data sources involved document analysis, surveys questionnaires and semi-structured interviews. Participants included policymakers, academic instructors and pre-service teachers.

- The administration perspective: This perspective focused on four key functions or roles of leadership, including the consideration of technology as a high priority into the administrative mission; the provision of training and support; the provision of technology infrastructure, and the establishment of a technology resource base. Data sources involved document analysis, surveys questionnaires and semi-structured interviews. Participants included policymakers, academic instructors and pre-service teachers.

The results of these investigations were presented in the previous two chapters (see Chapters 4 and 5) and are synthesised and discussed in the following sections.

6.3 Synthesis and discussion of the research key findings

The findings can be categorised into two major areas:

- Indications of context readiness: This includes expertise and familiarity with technology, the concepts of effective technology integration, the high levels of technology awareness, and the high levels of self-efficacy.

- Challenges to the effective integration of digital technologies into the Saudi pre-service teacher education curriculum. These challenges include the strong tendency towards conservatism, the domination of traditionalism in pedagogy, and finally, the wide adoption of centralisation in the operation, implementation, and diffusion of technology.

6.3.1 Indications of context readiness: the practitioners' technological perspective

Despite the fact that the results generally indicate that all groups of participants, including policymakers, instructors and pre-service teachers, do not possess clear concepts regarding the effective integration of technology, they have other promising aspects. For instance, the instructors and pre-service teachers' levels of technology familiarity, expertise, awareness and self-efficacy are very promising. Similarly, the policymakers' have high levels of technological awareness. Therefore, results, in the main, indicate the readiness and willingness of technology practitioners who are policymakers, instructors and pre-service teachers to integrate technology effectively into the curriculum.

6.3.1.1 Technology expertise and familiarity

Instructors and pre-service teachers in the current study show high levels of familiarity with technology in their daily lives and everyday activities, especially at home. Both instructors and pre-service teachers have high levels to access computers at home (96 per cent and 92 per cent respectively) as well as many other types of technology. However, all work on computers for less than two hours on a daily basis. Further, at home, their higher levels of computer use are associated with higher levels of digital technologies use. This is supported by the statements of the policymakers described in Chapter 4 with regard to the significant increase in technology use as an integral part of Saudi everyday life. These results reflect the expanding consumption of technology in Saudi Arabia (Al-Towjry, 2005; Bank Audisal, 2008; Communications and Information Technology Commission, 2011; GITEX Saudi Arabia, 2010; Hartley & Al-Muhaideb, 2007; Internet World Stats, 2010; Joseph & Lunt, 2006; Krieger, 2007; MCIT, 2011; Nelson, 2010; Onsman, 2011; Ramady, 2010; Sutton, 2007; Zeen, 2007). This pattern mirrors the global rapid increase in the use of technology as a global power (Bongo, 2005; Fong, 2009; Nasab & Aghaei, 2009; Poorfaraj et al., 2011).

Access at home was associated with the pre-service teachers' higher levels of computer use at home, especially e-mail, social networking, video sharing and online games. Conversely, there was no statistical relationship between the instructors' access and use of computers at home. Pre-service teachers appeared more familiar than instructors did with other types of digital technologies at home, such as mobile phones and gaming technologies. These findings are consistent with many researchers' assumptions that the new generations of learners are very familiar with technology in their daily lives (Enochsson & Rizza, 2009; Gao et al., 2010; Prensky, 2001a, 2001b; Robertson et al., 2007; Rogers, 2007; Valentine et al., 2002).

As might be expected in terms of the instructors and pre-service teachers' technology expertise and qualifications, the instructors have significantly more qualifications and professional training compared to pre-service teachers. This may be attributed to the fact that most pre-service teachers are unemployed and may be facing financial difficulties, thereby making their access to commercial training problematic (see Chapter 5). Despite the logic of this interpretation that was reported by both instructors and pre-service teachers, and despite the fact that instructors may have more financial resources to support their professional training, instructors seem to be more curious about learning technology. In other words, instructors may have an intense desire to attend commercial training, especially in technology. Nonetheless, digital technologies seem to be a part of the current learners' natures as a digital generation living in a digital world. Interestingly, this situation may also support Prensky's (2001a, 2001b) assumption that digital immigrants (instructors) usually try to cope with digital technology and their implications, despite their attitudes towards it.

6.3.1.2 Tentative conceptualisations of the effective integration of technology

Results generally pointed to the fact that all groups of participants, including policymakers, instructors and pre-service teachers, do not have a clear concept of the effective integration of technology into the curriculum. Statistically, there were no differences between instructors and pre-service teachers in terms of their perceived concepts, which seemed to focus on the use of technology in education in a general sense. Although the interviewed pre-service teachers apparently had a wider understanding of this concept in which they emphasised the importance of effectively using and implementing technology during their preparation, both policymakers and instructors, who are the educators, lack this wider understanding. The policymakers generally failed to clearly conceptualise the effective use of technology. Likewise, the interviewed instructors also showed tentative and/or moderated concepts that were largely based on the general use of technology in teaching and learning activities.

Understanding the way that technology practitioners conceptualise the effective integration of digital technologies is quite critical for their effective integration into the curriculum (Chai et al., 2009; Chitiyo, 2010; Dawson, 2006; Dede, 2011; Dockstader, 1999; Gale, 2007; Judson, 2006; Mumtaz, 2000; Pianfetti, 2005; Roberts, 2004; Sang et al., 2010; Smolin & Lawless, 2007; Technology in Schools, 2003; Teo et al., 2008; Willis & Raines, 2001). However, establishing a clear concept of the effective integration of technology seems to be a globally problematic issue that is not solely limited to this study context of Saudi Arabia. The current theoretical approaches globally acknowledged the difficulty in establishing an academically clear concept of the effective integration of technology in education generally and into pre-service teacher education in particular (Pianfetti, 2005). It can be argued that this difficulty is due to the notion that the effective integration of technology is challenging, complex and a multi-dimensional issue (Gale, 2007; Nkonge & Gueldenzoph, 2006; Polly et al., 2010; Smolin & Lawless, 2007).

Most existing approaches towards establishing a satisfactory and understandable definition/concept of the effective integration of technology into the curriculum focus on the effectiveness of the innovation and sophistication in implementing and using technology as their standpoints (for example, Dawson, 2006; Dede, 2011; Dockstader, 1999; Gale, 2007; Smolin & Lawless, 2007; Technology in Schools, 2003). Applying this understanding to the current study findings with regard to the policymakers, instructors and pre-service teachers' concepts of the effective integration of technology, it seems that their concepts were simply centred around expanding and enhancing the use of technology, especially pre-service teachers who stressed the importance of using technology in the right way for effectiveness. However, all groups of participants (policymakers, instructors and pre-service teachers) appeared to lack sophistication and complexity in their understanding and comprehension of this concept compared to Smolin and Lawless' (2007) as well as Gale's (2007) multi-complex definitions. All groups of participants also lacked other related concepts articulated by Dockstader (1999) such as efficiency, incorporation, learning enhancement, support, application, coordination and purposeful use of technology. Moreover, other concepts such as the incorporation of technology into daily routine, practice, work, research, communication and management were not identified in the participants' responses (Technology in Schools, 2003). Further, all groups of participants throughout the interviews missed the issue that technology should be a normal part of the everyday classroom's pedagogical practices (Dawson, 2006). Finally, for all groups of participants, the effective use of technology did not necessarily suggest new meanings for teaching and learning and/or changes in their nature as has been the practice identified in Dede's (2011) research.

Establishing a concept of the effective integration of technology into the curriculum is a globally problematic issue. A number of studies have been conducted to investigate perceptions and conceptualisations of practitioners with regard to technology and its effective use (for example, Al-Haizan, 2008; Chitiyo, 2010; Pianfetti, 2005; Willis & Raines, 2001). However, many of them indicated that technology practitioners' perceptions tend to be at unsatisfactory levels, which require improvements. For instance, Willis and Raines (2001) found that both instructors and pre-service teachers' concepts of using technology in the classroom had improved after more exposure to various educational technologies. After Pianfetti (2005) tested his developed framework, he found that there were no significant changes to the pre-service teachers' moderated perceptions of the value of integrating technology in education in general. In another study, Chitiyo (2010) found that most of the instructors in Zimbabwean pre-service teacher education programs lacked wider concepts of the effective integration of technology. Their focus retained technology as a merely traditional audio-visual tool or aid (Chitiyo, 2010). Similarly, but grounded in the Saudi context, Al-Haizan (2008) studied the extent to which e-learning tools are implemented in supporting pedagogy among instructors in four leading Saudi universities and found that the perceived concept of e-learning is still ambiguous among academic staff (Al-Haizan, 2008).

6.3.1.3 High levels of technology awareness

Regardless of the difficulties generally faced by most of the participants to provide elaborative meanings of the effective integration of technology as a concept, higher levels of awareness regarding its importance and usefulness have been documented. All groups of participants demonstrated that technology is important and useful in the facilitation and the advancement of education, especially pre-service teachers' preparation. This can be considered a very promising result and is consistent with the global trends regarding the impact of technology as a global power (Bongo, 2005; Fong, 2009; Nasab & Aghaei, 2009; Poorfaraj et al., 2011). Further, this result is justifiable in that Saudi national policies have positioned technology as a critical element to its future developments and transformation plans and strategies.

A great deal of existing literature emphasises that perceived awareness of technology importance and usefulness contributes to its effective integration (Gregor et al., 2005; Hall et al., 1975; Lee et al., 2007; Lockyer & Patterson, 2007; Nkonge & Gueldenzoph, 2006; Robertson et al., 2007; Sime & Priestley, 2005; Smith & Kelley, 2007; Yuen & Ma, 2002). Findings associated with the current study suggest that all groups of participants have high levels of perceived technology awareness of its importance and usefulness. Their levels of perceived awareness can be classified between *Aware* and *Proficient* according to Hall et al. (1975). *Aware* refers to the fact that technology users have limited knowledge and require more skills, training and support (Hall et al., 1975). Being *proficient* means that technology users have necessary skills, but their skills need to be expanded. As Hall et al.'s (1975) terms suggest, in the current study, technology practitioners' levels of awareness can be in the middle. They were generally more advanced than non-users who have absolutely no knowledge about technology and less than advanced users who are expert in the use of technology and have the ability to transfer this knowledge to others.

It seems that the effective use of technology is a priority in the leadership mission. This also reflects high levels of technology awareness in Saudi Arabia. Accordingly, administration has many ongoing technology-related developments and plans in which the policymakers have tried to translate this theoretical position into real practice. Efforts include the provision of hardware, software, training and professional support. Yet, this vision has been only partly translated into practice. There is a gap between leadership theory and practice. The policymakers reported many challenges that may slow the translation of their vision into practice on the ground, such as a lack of financial resources. However, the consideration of the effective integration of technology as a priority can be a promising result. In this regard, a great deal of literature emphasises that this positive vision or theory should be the first stage to ensure the effective integration of technology into pre-service teacher education (Anderson & Weert, 2002; Culp et al., 2005; Fabry & Higgs, 1997; Lessen & Sorensen, 2006; Robertson et al., 2007).

Like the policymakers, the instructors showed a satisfactory level of awareness in the current study. This finding is better than that found by Abu-Arrad and Fosaiel (2006) in another Saudi-based study. While they found that some instructors lacked a technological awareness of computers and technology importance and usefulness, the current study showed an increase in their level of perceived awareness. Perhaps this can be attributed to the significant expansion of technology and use in the Saudi lifestyle in general (Al-Towjry, 2005; Bank Audisal, 2008; Communications and Information Technology Commission, 2011; GITEX Saudi Arabia, 2010; Hartley & Al-Muhaideb, 2007; Internet World Stats, 2010; Joseph & Lunt, 2006; Krieger, 2007; MCIT, 2011; Nelson, 2010; Onsman, 2011; Ramady, 2010; Sutton, 2007; Zeen, 2007). Abu-Arrad and Fosaiel (2006) found that instructors have positive attitudes towards using computers, especially in terms of academic and research areas. In this regard, the current study revealed more elaborative findings. The instructors strongly acknowledged many other potential benefits in relation to the importance and the usefulness of technology and its effective integration. These potential benefits include the facilitation of effective information delivery; the encouragement of easy and fast two-way communication; and lastly the enhancement of students' learning by making it easier, more stable and permanent.

In the US, Nkonge and Gueldenzoph (2006) also reveal similar findings regarding the instructors' perceived awareness. The instructors, in their study, believed that technological tools such as online teaching can facilitate 'constructivism, communication, feedback, encourage collaboration and cooperation, enforcing academic rigor, providing both structure and flexibility, and supporting student success' (p. 42). However, the instructors in the current study were less elaborative in this regard.

For the pre-service teachers' awareness, the current research is in line with many previous studies. For example, the importance and the usefulness of the effective integration of technology have been perceived by pre-service teachers as a feature of modernisation as and a catalyst that could change the nature of education (Sime & Priestley, 2005). Due to technology's importance and usefulness, pre-service teachers, in particular, showed that the effective integration of technology would satisfy their needs and learning preferences as a digital generation. They stress the use of technology effectively and meaningfully in which technology acts as a language they prefer, desire and understand. Lockyer and Patterson (2007) reported similar findings. They found that physical and health education pre-service teachers perceived technology such as the Internet as a useful and valuable tool that can be effectively used in their future classrooms to enhance pedagogy and create meaningful learning.

There is an acceptable level of technology awareness among all groups of participants in the current study. This can be considered a promising result, as this awareness may work as a foundation to increase their involvement with technology in the process of the effective integration of technology into the curriculum.

6.3.1.4 High level of perceived general self-efficacy

It was found that both instructors and pre-service teachers have high levels of self-efficacy with no statistical difference between them. This was strongly supported by the interview results. It can be said that both groups, theoretically, are highly motivated, and trust their abilities to integrate technology effectively into their approaches, including teaching and/or learning activities.

However, although there was no statistically significant relationship between the instructors' self-efficacy levels and computer qualifications (training), interviews showed that training might contribute to the enhancement of their self-efficacy levels. The pre-service teachers, on the contrary, reported that professional training has a limited impact on their self-efficacy levels. This is supported by the statistical results showing that computer qualifications have no relationship to their levels of perceived self-efficacy. Alternatively, pre-service teachers reported that self-motivation and familiarity with technology might enhance their technology expertise and accordingly, stimulate higher levels of perceived self-efficacy. The role of self-motivation and technology familiarity may further justify the statistical results, indicating that those pre-service teachers with higher levels of self-efficacy are more likely to have higher levels of technology awareness, have more access to computers at the university, have combined access to computers at both home and the university and have higher levels of computer use at home. In other words, the overall results indicate that familiarity with technology can be crucial to the enhancement of the pre-service teachers' levels of motivation, confidence and self-efficacy. Nonetheless, this is not always the case. The interviewed pre-service teachers with moderate or lower self-efficacy levels expressed the need for more professional training to boost their levels of confidence, motivation and the way they trust their abilities to integrate technology effectively into their learning activities.

The literature on the role of self-efficacy maintains its importance in the promotion of the effective integration of technology. Explicitly, higher levels of self-efficacy may contribute to the effective integration of digital technologies into the curriculum (e.g. Bandura & Wood, 1989; Bong & Skaalvik, 2003; Brosnan & Thorpe, 2006; Chao, 2003; Gosselin, 2009; Gong et al., 2004; Judson, 2006; Lucas et al., 2006; Maninger & Anderson, 2007; Sang et al., 2010; Sumner & Niederman, 2003; Vannatta, 2007; Webb, 2006). Not only does self-efficacy influence the effective integration of technology, it may also influence students' learning and academic performance as well as the general environment of the educational institution (Jungert & Rosander, 2010; Lancaster & Bain, 2007). The latter notion may be supported by results indicating that pre-service teachers with higher levels of self-efficacy tend to be more positive regarding the curriculum design.

Generally, the promising results regarding the participants' levels of self-efficacy and technology awareness reflect the Saudi technological transformation and development as well as the sizeable consumption of technology in comparison with other countries in the Gulf region (Al-Towjry, 2005; Bank Audisal, 2008; GITEX Saudi Arabia, 2010; Hartley & Al-Muhaideb, 2007; Internet World Stats, 2010; Joseph & Lunt, 2006; Krieger, 2007; Nelson, 2010; Onsman, 2011; Ramady, 2010; Sutton, 2007; Zeen, 2007). For pre-service teachers in particular, this result can also be explained in terms of their previous experiences with computers and technology during their high school years. The results are similar to those identified in the literature. For example, many researchers, such as Maninger and Anderson (2007), Liang and Tsai (2008), and Sam et al. (2005), asserted that pre-service teachers with higher self-efficacy levels usually demonstrate more progress and ease in their use of technology. Self-efficacy in the current study was found to be the centre of pre-service teachers' practices, especially computer use at home that is anticipated to impact on their use of digital technologies at home as well as their computer use at university.

Further, it seems important to understand the factors affecting self-efficacy levels. This is explicitly to enhance and boost these levels and eventually promote effectiveness in using technology into the curriculum. As pre-service teachers in the current study suggested that professional training has a limited impact on their higher levels of self-efficacy, this may contradict a number of previous studies. For instance, Abu-Jaber and Qutami (1998) found that student self-efficacy was improved through proper technology training, which led to increased computer experience. In addition, Maninger and Anderson (2007) found that pre-service teachers' self-efficacy was significantly correlated with their technological expertise gained through training; while, Hakverdi et al. (2007) found that levels of computer use, whether educational or general, impacted pre-service teachers' self-efficacy. Conversely, the limited impact of training on students' self-efficacy levels supports findings from previous studies. For example, Angeli and Valanides (2004) reported that using an online interactive website (*Filamentality*) in scaffolding some aspects of the integration of technology was not statistically significant in affecting the pre-service teachers' level of self-reported confidence.

Bearing in mind that pre-service teachers can be considered a digital generation (Prensky, 2001a, 2001b; Robertson et al., 2007; Rogers, 2007; Valentine et al., 2002), it can be said that the role and the importance of professional training in the enhancement of their confidence and self-efficacy is decreasing in return for the significant increase in their dealing and familiarity with digital technologies in everyday activities. However, it can be argued that increasing the pre-service teachers' involvement with computer training and practices can positively influence their perceived self-efficacy, especially for those with moderate or lower levels of motivation and self-efficacy (Milbrath & Kinzie, 2000).

The instructors in the current study believe that professional development, especially training, has the potential to enhance and boost their self-efficacy levels. This result is consistent with what both Gosselin (2009) and Shepherd et al. (2007) found. Both asserted the need for more and continuous professional development programs to augment the instructors' levels of self-efficacy in terms of technology use, such as online teaching in higher education institutions including pre-service teacher training. Further, professional development programs should encourage, motivate and enhance faculty members' confidence and abilities to use technology effectively in their pedagogical approaches (Shepherd et al., 2007).

In total, as both instructors and pre-service teachers demonstrated higher levels of perceived self-efficacy, this can be considered a promising result. Both groups showed a high level of trust in their abilities to integrate technology into the curriculum and appeared highly motivated in their readiness and willingness to increase the incorporation of technology into their pedagogical practices and curriculum activities.

6.3.2 Challenges and obstacles to the effective integration of technology

This section discusses challenges and obstacles found in the current study that impact on the effective integration of technology in Saudi pre-service teacher education curriculum. It also provides a reflection on the global literature with regard to such challenges reported in other contexts, both western and eastern based.

Although there were positive signs to suggest the readiness and willingness of Saudi society to integrate technology into daily practices, including teaching and learning, three main issues were identified in the study that were associated with the lack of the effective integration of technology in the pre-service teacher education curriculum. These issues, which can be considered as challenges and/or obstacles, are as follows:

1. The domination of cultural-religious conservatism
2. The prevailing traditionalism
3. The wide adoption of centralisation.

These three main issues are strongly related in the context of Saudi Arabia (see Figure 6-1).

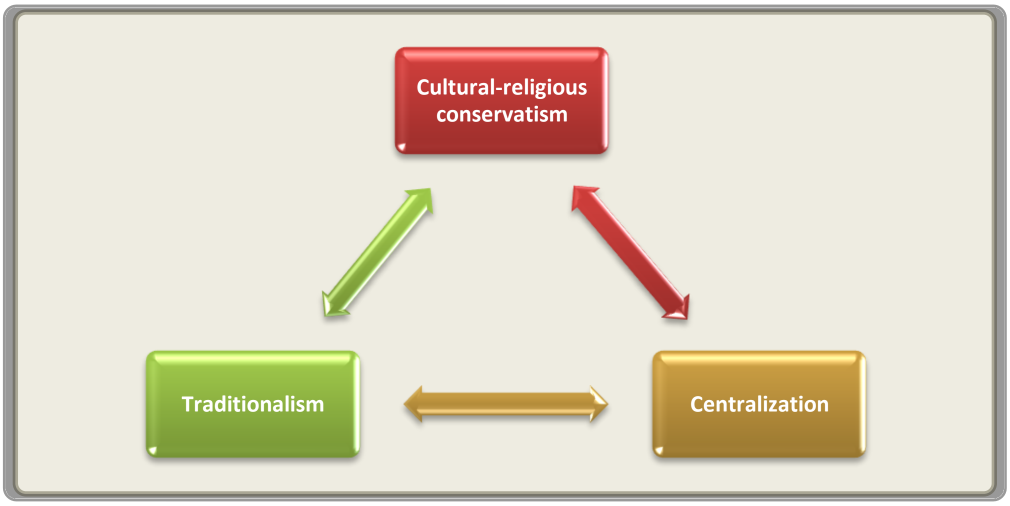

Figure 6-1: The inter relationships between conservatism, traditionalism and centralisation

Along with conservatism, centralised systems and traditional practices help explain obstacles to the effective integration of digital technologies.

The effective integration of technology is accepted as a challenging issue around the globe. However, challenges and obstacles may differ in different contexts. This can be attributed to the type of obstacles and the way that different contexts respond to such challenges. As the issue of challenges was comprehensively discussed in Chapter 2, the aim here is to provide more insight relevant to the results found in the current study. Challenges and obstacles to the effective integration of technology in the current study can be classified into two categories:

1. Major or direct challenges: three main challenges were identified, which are conservatism, traditionalism and centralisation.

2. Secondary or indirect challenges: these challenges are considered consequences of the major challenges. They include the lack of a clear concept of the effective integration of technology; the lack of accessibility to technology resources and facilities; the lack of training and support, as well as the lack of communication, especially with pre-service teachers who are considered passive in the learning context. Other obstacles were associated with the curriculum design including the heaviness of the curriculum, which is also theoretically dominated, and the wide adoption of traditional educational models such as teacher-centred education.

Reflecting on the global perspective in relation to the issue of challenges and obstacles, findings from the study support those from the existing literature. For instance, Robinson's (2007) classification of the kinds of barriers associated with effective integration of technology. According to Robinson (2007), barriers are primary and secondary. Primary barriers include a lack of access, a lack of time dedicated for planning, and a lack of support. Secondary barriers include beliefs about teaching, computers and classroom practices as well as an unwillingness to change. To some extent, the current study similarly found two kinds of barriers. However, the current study focused more on the foundations (direct challenges) that may underpin the existing indirect challenges including the obstacles mentioned above. Robinson's (2007) classifications also placed beliefs about teaching and computers as well as classroom practices as secondary barriers. In contrast, the current study found that practitioners' beliefs, attitudes and views can be more important than physical barriers such as the lack of access to hardware or software. Conservatism, traditionalism and centralisation are the results of the practitioners and educators' beliefs. They are also indicators of the ideology of the community's sets of fundamentals and principles.

Kaganoff (1998) suggested another classification, which focuses on two major concerns related to technology. The first and the major concern is the front-end cost of technology including the cost of hardware, software, and professional support. The secondary concern is the traditional model of education that is yet not ready to accommodate new technologies. Similar to Robinson's (2007) assumptions, Kaganoff (1998) primarily placed physical barriers, such as the cost of hardware and software, over beliefs that may result in larger problems in relation to the effective integration of technology. The study found, for example, that the pre-service teacher curriculum is overloaded and this may create less opportunity for the effective integration of technology. The curriculum overload cannot be dismissed from the Saudi cultural-religious conservatism, centralisation as well as traditionalism.

Further, both Robinson's (2007) and Kaganoff's (1998) primary barriers can be overcome by establishing appropriate and sufficient financial resources. Simply, it is a matter of balancing value against cost. Here, Robertson et al.'s (2007) recommendations, in terms of the value and the cost of the two parts of information technology that is 'information' and 'technology' can be useful. In relation to the value of information, the required time and effort, for example, in terms of cost should be carefully recognised. Further, to add value effectiveness to technology, issues related to cost, such as hardware, software and training, are unavoidable. Conversely, Robertson et al.'s (2007) recommendations can be practical in terms of the secondary or indirect challenges in the study such as the financial difficulties associated with the high cost of technology as well as training and support. Hence, major obstacles in the study context of Saudi Arabia need time and long-term planning to be minimised.

For the indirect or secondary obstacles, the current study contains some similarities and differences to findings from other previous studies. Generally, this study is consistent with the findings of many previous studies, such as affordability and accessibility to technology and related resources and facilitations (for example, Al-Asmari, 2008; Al-Jarf, 2006; Bin-Taleb, 2005; Duhaney, 2001; Goktas et al., 2009; Keiper et al., 2000; Kleiner et al., 2007; NCES, 2007; Zeen, 2007). Another similarity is in terms of the lack of professional training and/or support in technology (e.g. Al-Jarf, 2006; Duhaney, 2001; Johnston &

Cooley, 2001; Pierson & McNeil, 2000; Zeen, 2007). Further, with respect to curriculum structure, courses, guidelines and effectiveness in general, many other studies indicated that plans or models for effective integration of technology were absent (e.g. Al-Asmari, 2008; Chao, 2003; Goktas et al., 2009; Moursund & Bielefeldt, 1999; Pierson & McNeil, 2000; Zhao & Bryant, 2006). Appendix 19 compares and contrasts the current study and many other previous studies.

6.3.2.1 Technology as a global power versus the domination of cultural-religious conservatism

The effective integration of technology into the Saudi pre-service teacher education curriculum falls under the influence two major powers. With the global expansion of the technology industry and the focus on its effective use, especially in education, different contexts may respond differently to this global power and/or pressure (Bongo, 2005; Fong, 2009; Nasab & Aghaei, 2009; Poorfaraj et al., 2011). Grounded in the context of Saudi Arabia, the current findings show that the influence of technology on Saudi higher policies including those formulating education is evident. Technology has been introduced in Saudi national policies as a power that must be taken advantage of in terms of the advancement and the development of the country. The main goal for this is to cope wisely with the challenges of globalisation and modernisation. This is acceptable in light of the current global competition to make the most of technology and its rapid developments in building knowledge-based societies as well as strong and competitive digital economies (Bongo, 2005; Fong, 2009; Nasab & Aghaei, 2009; Poorfaraj et al., 2011).

However, in the current study context, the role of technology may be minimised in reality due to the strong tendency towards cultural-religious conservatism. Considering technology as a global power, conservative and traditional contexts such as those in Saudi Arabia may bear witness to a legitimate resistance to adopt some new global trends, such as the integration of technology on a wide scale (Al-Asmari, 2008; Burkhart & Goodman, 1998; Krieger, 2007; Onsman, 2011; Ramady, 2010; Saleh, 1987; Ziadah, 2007a). As a case in point, Lim, Hung, Wong and Hu (2004) reported that traditional institutions, including pre-service teacher education, might resist the effective integration of technology due to lack of understanding of the positive social and cultural implications for online learning environments and tools.

In addition to the fact that technology can be a powerful tool for cultural exchange, it also may facilitate incompatible cultural-religious values. In the context of Saudi Arabia, there is a belief that the wide use of technology, especially the Internet, could threaten the principles of the dominant culture. The interviewed policymakers showed great concern with regard to the inappropriate use of technology and the effect it may have on the local cultural and religious values. As a result, the policymakers demanded new strategies of censorship to reduce the potentially inappropriate use of technology. Restrictions and new strategies of censorship can be justified by so-called 'cultural sheltering', according to Al-Asmari (2008, p. 250). Usually, authorities in conservative contexts such as Saudi Arabia take 'proactive measures' to protect the local culture by reducing and sometimes blocking interaction with foreign cultures (Al-Asmari, 2008, p. 250). It is also believed that exposure to foreign cultures may reduce the value of the native culture (Al-Asmari, 2008). Further, as Saudi Arabian people are usually committed to their social and religious values and principles (Burkhart & Goodman, 1998; Krieger, 2007), they tend to reject new ideologies that may cause confusion or that clash with these values and principles.

The notion of cultural sheltering or, in other words, filtering western-based knowledge, can be also found in other similar or relatively similar contexts. Even if it is not obvious, it is present in many other contexts. For example, Abuhmaid (2010) revealed that the national Jordanian project, named the Education Reform for the Knowledge Economy (ERfKE), was proceeding very slowly as it was in conflict with the dominant culture of the local educational system. In Turkey, which is another similar context, E. Çakirogoelu and J. Çakirogoelu (2003) argue that:

> We believe that there are many things that we can learn from the international literature on the field of education. However, we also believe that there needs to be a filter of critical perspectives for any knowledge that is being used in other cultures. (p. 262)

Both national and curriculum policy documents reviewed in the study promote the Islamic orientation. Saudi education, including pre-service teacher preparation, is strongly religiously oriented with a great deal of local focus and less emphasis on issues relating to globalisation (Al-Issa, 2009, 2010; Al-Mane, 2004; Prokop, 2003). Therefore, it usually takes time for change to occur in conservative societies such as Saudi Arabia. This thinking was clearly seen in the policymakers' responses, which identified time as an important factor that may play a vital role in the process of change in Saudi Arabia. This result is in line with Burkhart and Goodman's (1998) conclusions about the Saudi context with respect to the adoption of technology, who accept that change in Saudi Arabia is relatively slow as it follows a top-down scheme with a strong tendency towards cultural-religious conservatism. This finding generally supports the argument that change can be a slow and complicated process in Saudi Arabia due to religious and cultural fundamentals, which could be more important than the proposed development (Burkhart & Goodman, 1998). Bearing this in mind, the time factor can be very crucial to the gradual control and acceptance of change (Burkhart & Goodman, 1998).

In Saudi Arabia, criticising the educational agency may be viewed to be the same as criticising the Saudi cultural-religious fundamentals. Saudi Arabian people usually have unlimited respect for authority and leadership. Their respect implies being obedient and disciplined in a centralised manner. This is deeply rooted in their beliefs as Muslims following the commandments of the *Holy Quran*. For example, Allah said:

> O ye who believe! Obey Allah and obey the Messenger and those charged with authority among you. If ye differ in anything among yourselves, refer it to Allah and His Messenger if ye do believe in Allah and the Last Day: that is best, and most suitable for final determination. (*The Holy Quran*[1]*: An-Nisa, Verse 59*)

Interestingly, in the current study, both instructors and pre-service teachers who were positive in their view regarding curriculum design were also positive in their views in terms of the current leadership practices towards the effective integration of technology. Further, the pre-service teachers, according to the questionnaire results, were statistically more positive in their views regarding the curriculum design, despite their voice having a limited impact, especially in terms of curriculum development. It seems that they appreciate the system/agency as a whole, due to their high appreciation of its cultural-religious fundamentals. However, this might explain the reason why the instructors and pre-service teachers who have positive views, especially in terms of leadership, are further motivated to use digital technologies at the university.

Respect for authority is common in conservative societies (Palfreyman & Smith, 2003). This can be seen not only in Islamic societies such as Saudi Arabia, but also among Asian nations such as China, Vietnam and Japan. Asian conservative contexts are mostly mono-cultural, community-focused and largely conditioned by values of collectivism and conformity of authority (Palfreyman & Smith, 2003). Therefore, it is common to see that

[1] See http://www.quranexplorer.com/quran/

Asian learners, including Saudi students, tend to be less autonomous from the western point of view (Palfreyman & Smith, 2003).

However, due to globalisation and the wide expansion of digital technologies, some positive signs towards a globalised curriculum are found within Saudi national policies as well as the policymakers' responses. This may support the fact that digital technologies are an unavoidable global pressure (Bongo, 2005; Fong, 2009; Nasab & Aghaei, 2009; Poorfaraj et al., 2011). Thus, it can be argued that the Saudi outlook and viewpoint, with regard to other cultures, especially western-based, is shifting from sheltering (Al-Asmari, 2008) towards more openness and cultural selectivity. The move towards more openness and cultural selectivity can be supported by what Onsman (2011) suggests regarding the role of conservatism on the change process in Saudi Arabia. Onsman (2011) argues that Saudi cultural-religious norms are subject to a significant impact that could be permanent due to the pressure of 'international competitiveness' (p. 1).

From another perspective, it could be asked, what is the origin of Saudi cultural-religious conservatism? In addition, how can culture and religion, as different concepts, be combined to formulate Saudi conservatism? Although the answers to these questions appear irrelevant to the current study's aim and scope, the answers may elaborate on an understanding of the Saudi context. They may also provide insights into and reasons behind the clashes with many proposed developments, such as the widespread adoption of digital technologies. To answer the previous questions, it can be said that Islam and culture in Saudi Arabia are inseparable; in fact, they mean the same thing in the Saudi context. This can be attributed to two main reasons: first, Saudi Arabia is a non-colonial or post-colonial state; and secondly, Saudi social fabric is largely homogeneous in terms of ethnic origins. The vast majority of the Saudi population are Muslim Arabs with ethnic origins dating back to the ancient tribes that lived in the Arabian Peninsula. Consequently, they share the same background, ethnicity, language, habits, customs and cultural traditions with minimal influence from the outside world, especially the west.

Islam has a very strong position in strengthening Saudi culture and shapes most of the cultural norms and practices. In essence, Saudi values, in terms of culture and religion, are mutually and perpetually related. In Islam, there is too much emphasis on the importance of the community's unity, which may lessen the influence of outsider factors and strengthen the Islamic culture. This viewpoint supports the current study findings with regard to Islamic fundamentalism, especially in Saudi teacher preparation. To explain the value of unity and solidarity of the community, Saudi Arabian people always recite this verse from the *Holy Quran*:

> And hold fast, all together by the rope which Allah (stretches out for you), and be not divided among yourselves. (the *Holy Quran: Al-E-Imran, Verse 102*)

The meaning is that all Muslims must adhere to the *Holy Quran* and its commandments in unity and harmony. Despite the fact that there are other verses in the *Holy Quran* that encourage interaction with other nations and races, especially in terms of humanity, knowledge and wisdom, the role of Muslims is to stick to the Islamic identity and not to be influenced by incompatible values. For example;

> O mankind! Lo! We have created you from male and female, and have made you nations and tribes that ye may know one another. Lo! the noblest of you, in the sight of Allah, is the best in conduct. Lo! Allah is Knower, Aware. (the *Holy Quran: Al-Hujraat, Verse 13*)

In summary, despite the fact that Saudi Arabia is a religious, mono-cultural, conservative and highly policy-driven context, the expansion of the use of technology, especially in pre-service teacher education is promising in the near future. Technology now presents a global power, which must be taken advantage of to build stronger systems, economies and education. Further, despite the strong Saudi tendency towards conservatism that can sometimes be out of place, positive signs towards cultural selectivity are observed rather than cultural sheltering.

6.3.2.2 The impact of traditionalism on pre-service teachers' curriculum design

Results associated with the curriculum design show that all groups of participants, including the policymakers, instructors and pre-service teachers, generally appreciated the current curriculum due to its cultural-religious fundamentals. Conversely, traditionalism, unfortunately, is widely prevailing and still practiced as the obvious model of education. Taking into careful consideration the fact that Saudi Arabia is highly policy-driven, culturally and religiously conservative from both insider (Al-Asmari, 2008; Saleh, 1987) and outsider (Burkhart & Goodman, 1998; Onsman, 2011) perspectives, strong attitudes towards preserving the traditional cultural-religious fundamentals of the curriculum are found in the current study. This can be clearly found in all Saudi national policies and reflects great concerns from the policymakers who believe that religious and cultural fundamentals of the curriculum cannot be changed.

All groups of participants in the study had great concerns with regard to the domination of traditionalism on the curriculum and pedagogy. In terms of pedagogy, the policymakers were frustrated from this domination, while the instructors also commonly tended to adopt more traditional pedagogical approaches. Further, the domination of traditionalism is confirmed by the interviews with the pre-service teachers. This result strongly supports the assumption that teacher preparation and training in the Arab world, including Saudi Arabia, are still conditional upon the old vision of instruction through applying traditional methodologies of teaching and learning (Al-Asmari, 2008; Al-Otaibi, 2007; Developing the Arabic Teachers' Preparation Approaches, 1999; Zeen, 2007). Consequently, pre-service teachers in particular revealed that they will teach the same way as they were taught. However, this finding conflicts with the current global and theoretical approaches that stress the need for innovative pedagogy, meaningful learning, globalised curriculum and technology-based pedagogical practices (Leach & Moon, 2008; Robertson et al., 2007; Zeen, 2007).

Further, this finding also reflects the transmission of cultural values between generations. In other words, it was noted that teachers usually tend to teach the same way as they were taught (Goldman et al., 1991; Opfer & Pedder, 2011; Pellegrino et al., 2007; Shelley et al., 2004). Nonetheless, the literature also acknowledges that teacher preparation has not significantly changed for a long time, especially in relation to technology, and this seems likely to continue for years to come (Bagwell, 2008; Capper, et al., 2007; Enochsson & Rizza, 2009; Katyal, 2010; Navarro & Natalicio, 1999; Peeraer & Van Petegem, 2011; Polly et al., 2010; Reimer, 2005; Song, 2010; Vannatta, 2007; Willumsen, 1998). This view was founded on the notion that content and teaching approaches in higher education are not keeping pace with generic societal trends in both developed (Bagwell, 2008; Navarro & Natalicio, 1999; Reimer, 2005; Vannatta, 2007; Willumsen, 1998) and developing countries, such as Saudi Arabia (Al-Asmari, 2008; Developing the Arabic Teachers' Preparation Approaches, 1999; Zeen, 2007). This means that the domination of traditionalism is a common global problem. However, in the context of Saudi Arabia, it seems to be more critical. This can simply be attributed to the fact that the Saudi context is highly policy-driven and culturally too conservative to easily accept and/or adopt changes in both curricular contents and teaching methodologies. This can also be considered a non-promising result.

In addition, the interviews with the instructors show that they believe the reasons behind the domination of traditionalism can be seen in the technology-free goals of the curriculum and the instructors' personal attributes such as age and technology expertise. Concerning the curriculum design, particularly with its technology-free goals and objectives, findings from the initial curriculum document analysis were very supportive. No explicit reference was found in terms of the effective integration of technology into the curriculum. This also reflects the gap between the national policies that placed the effective implementation of technology as an important demand and the curriculum policies that seem to only focus on the process of technology learning.

The instructors suggested that age can be an important factor. They believe that younger instructors can be more capable, confident and have more trust in their technological abilities to use technology effectively. This can also be considered an indication of the generational conflict between younger and older instructors. Perhaps younger instructors are more familiar, enthusiastic and motivated to use technology effectively in their pedagogical approaches. Conversely, the older generation of instructors is likely to be more familiar with traditional methods of teaching. According to Prensky (2001a, 2001b), this kind of generational conflict is understandable, particularly between the digital natives who are the younger generation instructors and the digital immigrants referring to their colleagues of the older generation. The digital generation is usually familiar with technology as part of their daily life routine, while the digital immigrants struggle to cope with the invasion of technology (Prensky, 2001a, 2001b). For the same reason, the wide adoption of traditional approaches of teaching and learning seems to encounter the pre-service teachers' meaningful learning and progress as a digital generation living in a digital world. Here, it can be noticed that there is an indication of another kind of generational conflict, specifically between the digital natives who are pre-service teachers and their educators that is policymakers and instructors who might be regarded as being digital immigrants in a general sense (Prensky, 2001a, 2001b).

Conservatism is combined with an overloaded curriculum. A standardised multi-module curriculum was constructed to preserve Saudi religious-cultural fundamentals such as Islam, the Arabic language and the solidarity of the community. Such fundamentals are very sensitive to change and have been strongly supported by the national wide educational and curriculum policies. As the policymakers showed a strong position in that the multi-disciplinary curriculum must be maintained, the pre-service teachers explicitly revealed their frustration with this situation. The heaviness of the curriculum has resulted in them lacking the time and opportunity to participate effectively in both curricular and non-curricular activities, including the use of and the general training in technology. Here, it can be said that Saudi pre-service teacher education curriculum is traditional, standardised and theoretically dominated rather than responsive to global trends. This finding is in line with many previous Saudi-based studies in this regard (Al-Aqeel, 2005; Al-Issa, 2009, 2010; Al-Miman, 2003; Al-Otaibi, 2007; Bingimlas, 2010; Krieger, 2007; Oyaid, 2009). For instance, Al-Miman (2003) found that Saudi pre-service teachers' preparation essentially focuses on quantity over quality. The focus is on cultural-religious preparation over the areas of global trends, such as the effective use of technology (Al-Issa, 2009, 2010). This has been further confirmed by the reality that Saudi education generally and pre-service teacher preparation particularly are still conditional upon the traditional model of teacher-centred education (Al-Aqeel, 2005; Al-Otaibi, 2007; Bingimlas, 2010; Krieger, 2007; Oyaid, 2009). Specifically, the current finding affirms Al-Otaibi's (2007) assumptions that Saudi teacher preparation is heavily traditional and lacks effective access to global trends, including technology. Most importantly, Saudi teacher education is offered in isolation from the requirements of the social and organisational bodies of the society such as schools (Al-Otaibi, 2007).

Pre-service teachers also share great concerns with regard to out-dated curriculum content, especially the educational technology preparation that is generally incompetent and does not meet expectations. This finding reflects what has been found previously during the phase of document analysis that showed a clear gap between the national and curriculum policies. Precisely, Saudi national policies have acknowledged the role of technology in the process of modernisation and the advancement of the country, including the education sector. Conversely, curriculum policies, structure and guidelines lack this vision, especially in relation to the educational technology preparation. In this case, very little support was found in curriculum policies for the effective integration of technology in practical terms.

Interestingly, pre-service teachers with higher levels of technology awareness were statistically found to be positive in their views regarding the curriculum design. While their levels of technology awareness as well as their views of the current curriculum design were separately investigated by different sections in the questionnaire, their responses to items in one section were not mediated by those in the other section. However, a possible interpretation of this positive relationship is that pre-service teacher with higher levels of technology awareness, in terms of its importance and usefulness, perhaps imagine the way they can effectively use technology in their learning approaches in light of the current curriculum design that is largely appreciated based on its cultural-religious fundamentals.

While the curriculum tends to be more standardised, traditional and focuses on quantity rather than quality, little opportunity for the effective integration of technology seems to be offered. This conflicts with the findings of the literature in this regard. In terms of technology, the literature stressed the effectiveness, efficiency, productivity and competency of the curriculum design. Technology should be an integral part of all facets of the pre-service teachers' curriculum to meet their needs, preferences and learning styles, and the challenges of digital societies (Abdal-Haqq, 1999; Altun, 2007; Anderson & Glenn, 2003; Baylor & Ritchie, 2002; Chao, 2003; ISTE, 2007; Keiper et al., 2000; Mesut, 2000; Pianfetti, 2005; Roblyer & Edwards, 2003; Rogers, 2007; Shelley et al., 2004; Shoffner et al., 2001; Smith & Kelley, 2007; Smolin & Lawless, 2007; Teo et al., 2008; Townsend et al., 2007; Wetzel, 1999; Willis & Raines, 2001).

As this seems not to be promising in the context of Saudi pre-service teachers' preparation, it also presents a global concern. For example, Goktas et al. (2008) found that although the majority of the participants in their study perceived technology-related courses as effective, they felt that they largely needed to be updated. In contrast, participants in the current study, especially pre-service teachers, reported that technology-related courses were ineffective due to their out-dated content. Conversely, findings from the study agree with Goktas et al.'s (2008) results that technology preparation courses should be evaluated, redesigned and updated to ensure their effectiveness and eligibility for more practice.

Another major concern that appears in the current study and falls under the domination of traditionalism is the learner's passive image. Evidence from the current study shows that the learner's image, unfortunately, is far from positive. Their image was perceived as being merely receivers or recipients. Explicit references to their negative image and role were documented in Chapters 4 and 5. For instance, the policymakers have revealed that they are only receivers and instead positioned instructors in the centre of their approaches. A case in point is what many pre-service teachers have showed with regard to their inactivated role in the curriculum development and their lack of communication with leadership except through their instructors. This result supports the fact that this problem is rooted in the education system in Saudi Arabia. Saudi students are considered only receivers (Al-Aqeel, 2005; Al-Gamedi, 2005a; Al-Otaibi, 2007; Bingimlas, 2010; Oyaid, 2009). In light of the globalised world, this results in very traditional learners who always copy the styles of their traditional teacher (Al-Aqeel, 2005; Al-Otaibi, 2007).

Nonetheless, this major finding cuts against the global trend towards expanding learner-centred education that fundamentally stresses the importance of considering learners as effective, positive and the core element of any educational model. For example, the literature in this regard advocates the need to robustly steer learners into the right areas of knowledge, skills and competence (Robertson et al., 2007). It seems impossible to do so without positively considering the current learners' nature, choices, preferences, needs and learning styles as a digital generation who arguably can be very different, especially in terms of thinking and information processing (Prensky, 2001a, 2001b**)**.

Having found that traditionalism continues to dominate the Saudi pre-service teacher education curriculum, technology-based pedagogical practices were consequently found to be ineffective from both instructors and pre-service teachers' points of view. Although the instructors, from a statistical point of view, had more access to computers and other digital technologies at the university and consequently tended to use them more frequently than pre-service teachers, these uses were very few in general.

In terms of computer use, the instructors have not exceeded an average of one hour per working day for educational purposes, such as research and e-mail uses. Further, they lacked the purposeful use of other types of technologies at the university. Only data projectors tended to be regularly used by the instructors. In relation to this, the instructors were found to be more active in terms of both computers and other digital technologies used at the university. Moreover, the instructors who had positive views regarding the curriculum design were expected to use more digital technologies at the university. Further, statistically, the instructors who were more familiar with computers and used more digital technologies at home used more computers and other digital technologies at the university. In other words, it seems that the instructors' familiarity with technology, especially at home, has a positive impact on their use of technology at the university and motivates them to be more effective users. From another perspective, it can be said that the instructors' high levels of technology awareness and self-efficacy have not yet been translated into practice. Perhaps this is due to their general satisfaction with the traditional pedagogical approaches that they heavily adopt.

Current findings regarding the instructors' motivation to use technology at the university emphasise the role of familiarity with technology, especially at home, as the major motivation. Nkonge and Gueldenzoph (2006) reached similar conclusions. However, while no evidence was found to support the possible nexus between professional training and technology-based pedagogical practices, this cuts against some previous findings. For instance, Georgina and Hosford (2009) found that there is a significant relationship between technology literacy and technology-based pedagogical practices. This also can be complemented by the findings of Peeraer and Petegem (2011), who found that digital technologies skills and computer confidence are associated with the instructors' use of technology in their teaching approaches.

In contrast, the case of pre-service teachers was more extreme. Most of the pre-service teachers' technology-based learning activities were few, frustrating, and educationally unsatisfactory, according to the results obtained from the survey as well as the follow-up interviews. They had less access to computers and technology at the university than their instructors. Their access points, according to the survey results, were mainly the university's food facilities such as coffee shops and restaurants. Some of them used their own personal laptops. This is largely consistent with the statistically positive relationship between both computer access and use at the university. Further, the same can be said with regard to the positive correlation between computer and other digital technologies uses at the university.

Interestingly, the pre-service teachers' higher levels of computer use at home have been positively correlated with their higher levels of computer use at the university. Similar to the instructors, this also indicates that their familiarity with technology in their daily lifestyles and activities may have contributed to their better use of technology at the university. Consequently, their technology-based learning practices at the university, with both computers and other digital technologies, were low. Only a few of them reported during the interviews that their technology-based activities were based on their instructors' demand and did not exceed the traditional uses of the technology such as searching the Internet and sending a few e-mails. While they were found to have promising good levels of technology familiarity, awareness and self-efficacy, they were less motivated by the traditional and centralised system against their willingness to use technology effectively in their learning activities. Only a few of them were self-motivated to use technology in their learning activities. Hence, it can be argued that their learning practices are also traditional and considered a result of their instructors' traditional practices. This may lessen the opportunity for the effective integration of technology.

However, these results conflict with the majority of research in this regard. Higher education students, especially today, usually prefer technology-based learning approaches such as online courses that may provide them with more opportunities in terms of communication, collaboration and flexibility over traditional, face-to-face courses (Barnard, Paton & Rose, 2007). The literature suggests that technology-based pedagogical practices should be authentically motivated, sustained, supervised, directed and embedded within the curriculum activities (Bahr et al., 2004; Barnett, 2006; Brush et al., 2003; Culp et al., 2005; Fabry & Higgs, 1997; Masalela, 2009; Mesut, 2000; Moursund & Bielefeldt, 1999; Pellegrino et al., 2007; Vannatta, 2007). This is to reflect effective and meaningful learning and changed behaviours in the future (Robertson et al., 2007). However, similar findings were found in many previous studies. In the US context, for example, Moursund and Bielefeldt (1999) found that most pre-service teachers lack field experience on technology and professional supervision on technology practices.

Regarding the instructors' limited technological practices, Nkonge and Gueldenzoph (2006) revealed almost similar findings. In the context of US higher education, their report showed a clear gap existed between the instructors' theory and real practice. They found that some instructors were unable to successfully manage online environments (WebCT) such as learners' activities, discussions and even file sharing. Likewise, Masalela (2009) found that the instructors' technology-based pedagogical practices such as the use of WebCT were very limited in the Turkish higher education. Most of the instructors in the latter study failed to master the technological tools for pedagogical gains such as group management, online discussion, information sharing, collaboration and communication. Recently, Peeraer and Petegem (2011) found that the use of digital technologies by instructors in the context of Vietnamese teacher education remains limited and only replaces the traditional teaching approaches. Therefore, it is necessary to provide instructors with more technical guidance and instructional design support to increase their familiarisation with technology and the associated knowledge necessary to execute meaningful pedagogies with technology (Georgina & Hosford, 2009; Masalela, 2009). Further, instructors should participate in the construction of their training needs, goals, contents and various activities (Shepherd et al., 2007).

6.3.2.3 The role of centralisation in minimising effective integration of technology

The current study demonstrated that centralised systems affect the effective integration of digital technologies, especially in top-down conservative contexts such as Saudi Arabia. It can be argued that centralisation causes financial difficulties, difficulties associated with training and support, accessibility and availability as well as communication issues, especially with pre-service teachers.

As centralisation is a challenging issue, it theoretically has a perpetual relationship with conservatism from the Saudi socio-cultural perspective. Centralisation and the stance of being highly policy-driven are justifiable and widely acceptable as a result of cultural-religious conservatism (Al-Asmari, 2008; Al-Issa, 2009; Burkhart & Goodman, 1998; Onsman, 2011; Ramady, 2010; Saleh, 1987). However, this case is not only limited to the context of Saudi Arabia. A working example was given by Abuhmaid (2010). In Jordan, which is a similar Islamic, conservative context, Abuhmaid (2010) mentioned that the national project ERfKE was lagging behind as it is 'practically tested against the local context of the educational system' (p. 1). Hence, centralisation may minimise the effective integration of technology. Rogers (1995) pointed out that centralised contexts such as Saudi Arabia usually tend to vertically diffuse technology in their systems in comparison with decentralised systems such as many developed countries that horizontally tend to diffuse innovations in their systems. Further, due to the fact that centralised systems, such as Saudi Arabia, are mainly controlled by national or top authorities, it has been noticed that flexibility and autonomy of adoption, reinvention and evaluation of innovation by individuals, sub-systems and organisations can be limited (Rogers, 1995).

The academic instructors and pre-service teachers indicated a common appreciation of the current leadership practices in relation to the effective integration of technology in the curriculum, with no statistical differences observed. However, differences in their views were observed in the follow-up interviews. The majority of the instructors confirmed that leadership has considered the effective integration of technology as a priority into its mission. In contrast, most of the interviewed pre-service teachers' views were conservative, tentative and indicated a lack of direct communication with leadership. Here, it is evident that instructors have more chances to communicate with leadership in a centralised manner. In contrast, pre-service teachers' communication with leadership can be only channelled through their instructors. Consequently, most pre-service teachers lack an awareness of the current leadership practices in relation to technology. This also causes them to be hesitant, unmotivated and reluctant to criticise the current leadership vision or attitudes in a general sense. The few pre-service teachers who could positively comment during the interviews on the leadership practices were those who tend to be more familiar with digital technologies at the university.

Figure 6-2 illustrates the process of communication and policymaking in Saudi pre-service teacher education.

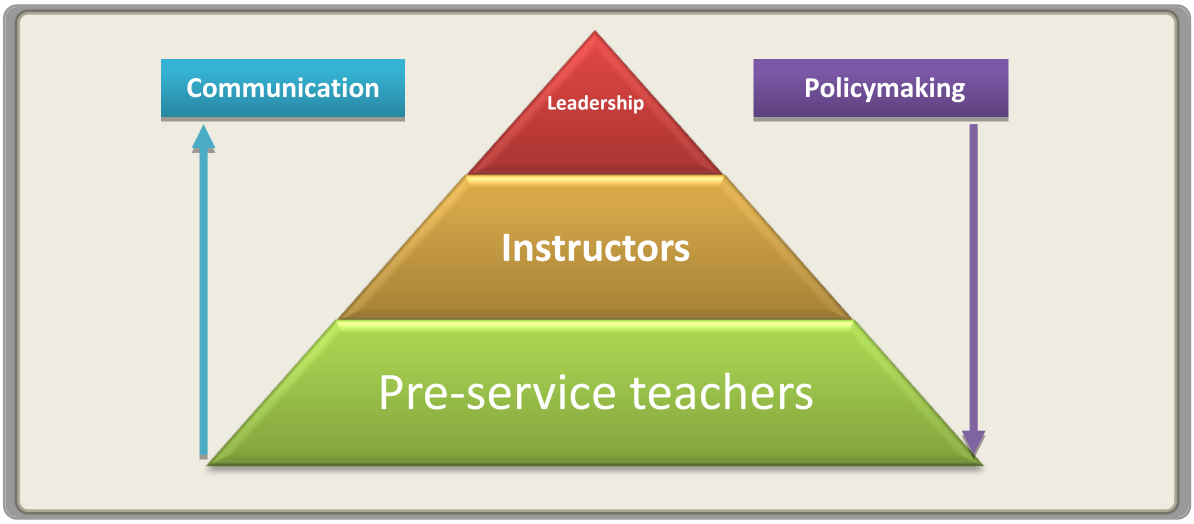

Figure 6-2: The system of policymaking and communication in Saudi pre-service teacher education

Another interesting result is that pre-service teachers with higher levels of both self-efficacy and technology awareness were positive in their views regarding leadership practices in relation to the effective integration of digital technologies. As each issue was studied by a different section in the questionnaire, responses of pre-service teachers to items in one section were not mediated by those in other sections. Nonetheless, it seems that pre-service teachers who were technology aware and had trust in their abilities in relation to technology are more likely to find and conceive ways to use technology effectively in their learning activities, despite the limitations that the centralised system may pose.

In terms of financial difficulties, self-independence is the main goal. The policymakers reported that the aim is to create a more financially independent system. Further, they reported that there is a very little cooperation with the private sector and other bodies of the community, even in the case of expensive technologies. This critical situation has resulted in some shortcomings, especially in terms of the difficulties associated with training and support. The study demonstrates that training for both instructors and pre-service teachers is inadequate, ineffective and demands improvement. Due to centralisation, instructors and pre-service teachers' preferences and training needs are out of focus. They have very little opportunity to choose subjects of training, to modify content or to suggest new topics or areas. Training is usually standardised and vertically diffused.

However, the affordability of providing adequate financial resources to support the provision of costly technology, both hardware and software, seems to be a globally problematic challenge. Many scholars acknowledge that the high cost of technology is one of the major obstacles to accommodating new technologies in any educational model (Kaganoff, 1998; Lessen & Sorensen, 2006; Robertson et al., 2007; Smith & Kelley, 2007). It can be argued that this is value versus cost (Robertson et al., 2007). Similar findings were found in many other contexts. For example, both Duhaney (2001) and Zeen (2007) found that the lack of funding and financial support negatively affected the effective integration of technology in the pre-service teacher education curriculum in Egypt. Moreover, Goktas et al. (2009) found that the lack of needed software, materials and hardware obstructed the effective integration of technology in Turkey's pre-service teacher education programs.

The difficulties associated with training and support in technology are an important issue in Saudi national policies as reflected in the policymakers' comments that training and support are important demands. However, the policymakers reveal that there are several difficulties associated with the training and support offered to both instructors and pre-service teachers.

In the instructors' views, leadership is positively acknowledged in terms of the provision of training and support, according to the survey results. However, the mere affordability of training and support does not necessarily reflect their quality. Training courses were reported in the interviews to be rare and traditional, and had space and time limitations. In addition, the instructors reported that many lacked the motivation to attend training due to the domination of traditionalism as well as the optionality of the offered training. As the current study revealed the instructors' inadequate technology training, similar findings were found in the global literature. For example, in the study conducted by Shepherd et al. (2007), instructors also reported inadequate training and considered their training successful only if they contributed to its content. With similar findings, Georgina and Hosford (2009) stressed the importance of providing instructors with one-on-one training, small group training and finally peer-to-peer training. These kinds of training sessions should have specific goals and be logistically supported by effective leadership (Georgina & Hosford, 2009).

From the pre-service teachers' perspective, the interviews showed that they lacked adequate technology training and professional support due to the heavy study loads, the inadequacy of training courses that had limited places and their passive image as being merely receivers of learning. The heaviness of their curriculum resulted in them having a shortage of time and motivation to attend technology training courses. Motivation is greatly significant in the learning process, a notion supported by Nkonge and Gueldenzoph (2006), who found that motivation was significantly correlated with students' learning, especially in online learning environments.

Although both instructors and pre-service teachers had positive views regarding the affordability of appropriate technological infrastructure, according to the survey findings, some access issues were identified during the interviews. These issues included centralisation and discipline limitations. Due to centralisation, both instructors and pre-service teachers reported that they lacked adequate access to the existed technology-related resources and facilities such as the Educational Resources Centre. Prior official permission must be sought before using such facilities. It can be said that due to centralisation, less tolerant access to such technology-related resources and facilities is the major consequence. While instructors usually have computers in their offices, pre-service teachers usually turn to the Student Club, despite its condition, and the Internet cafes outside the university. Alternatively, some of them bring their own personal laptops. This supports the result that pre-service teachers statistically have less access to computers at the university than instructors. For this reason, pre-service teachers do not greatly use computers and other digital technologies inside the university. In relation to this, many researchers globally found that access to technology, particularly with regard to pre-service teachers, has determined the extent to which various technologies were used in their learning approaches (Duhaney, 2001; Keiper et al., 2000; Nkonge & Gueldenzoph, 2006). This also supports what has been found in many other Saudi-based studies, which revealed that the lack of access is one of the greatest obstacles that challenge the effective integration of technology (Al-Asmari, 2008; Al-Jarf, 2006).

In relation to different educational disciplines, disciplines close to digital technologies in teaching and learning have more access to technology resources and facilities. For instance, instructors in the DET usually have more access to computer laboratories and the ERC. Another example is that instructors from the Department of Curriculum and Teaching Methods can easily access the MTC that is under their official supervision. Similarly, language laboratories are usually accessed by instructors and pre-service teachers who belong to the Departments of Arabic Language and English Literature and computer laboratories are supervised by the Department of Computer Science. In relation to this, Nkonge and Gueldenzoph (2006) revealed similar findings. They found that the discipline or field of study is a key issue that is associated with the frequent use of technology by both instructors and pre-service teachers.

6.4 Conclusions

This chapter has discussed the findings that emerged in the preceding results chapters, four and five. Promising and challenging results are reported. Major findings associated with context readiness to integrate technology effectively into teaching and learning practices can be summarised in the following points:

- The first result relates to instructors and pre-service teachers' technology expertise and familiarity. Technology is being increasingly used as a normal part of their everyday life, as shown in their high levels of availability and accessibility to computers and other kinds of digital technologies at home. Both groups showed acceptable levels of technology use, both computers and digital technologies, at home. In terms of their technology expertise, instructors were more qualified in terms of technology due to their desire to attend commercial training. Instructors seemed to be more curious about technology. Despite this, technology seems an integral part of the pre-service teachers' nature as a digital generation living in a rapidly developing digital world.

- The second result highlights the technology policymakers, instructors and pre-service teachers' conceptualisations of the effective integration of technology. Here, all groups had tentative concepts in which they lacked a clear understanding of the effective integration of technology. The promising result is that they have focused on their concept of the effective integration of technology. Further, this issue is reported to be a global problem that does not belong only to the Saudi context.

- The third important result is the policymakers, instructors and pre-service teachers' high levels of technology awareness in terms of its importance and usefulness. All groups demonstrated that technology is critical in the advancement of pre-service teacher education. However, their level of awareness indicated that they generally have basic skills that need to be expanded.

- The fourth result that is associated with context readiness is the instructors and pre-service teachers' high level of perceived general self-efficacy. They were found to be motivated, and with a trust in their abilities to integrate technology effectively into their practices. For the factors that led to these high levels of confidence, instructors mainly reported training, while self-motivation and familiarity with technology was acknowledged by pre-service teachers.

Three major challenges to the effective integration of technology into Saudi pre-service teacher education curriculum were identified. These three major challenges are summarised as follows:

- First, the domination of cultural-religious conservatism on Saudi pre-service teacher education curriculum. Despite the high position of technology in the Saudi national policies as a catalyst of change and advancement, the role of technology, in reality, is minimised due to the strong tendency towards conservatism. The prevailing culture in this regard is that technology, especially the Internet, is threatening Saudi's cultural-religious fundamentals. Consequently, new strategies of censorship are suggested, especially by policymakers, to maintain the local focus of education.

- Second, the domination of traditionalism on the current curriculum design and associated pedagogical practices. It seems that maintaining traditionalism is an important approach that sustains the widely appreciated cultural-religious fundamentals of the current curriculum. However, despite the fact that all groups of participants, including the policymakers, instructors and pre-service teachers, discouraged the domination of traditional approaches in teaching and learning, their role in effecting change is minimal, especially pre-service teachers.

- Third, the continuing centralisation in the process of defusing, supporting and operating technology. Centralisation serves decision making and the implementation of educational policies in top-down conservative contexts such as Saudi Arabia, but it challenges the widespread use of technology. In the current study, centralisation has contributed to the creation of many complications in terms of financial resources, training and support, availability and accessibility as well as communication.

In brief, the future of the effective integration of technology into Saudi pre-service teacher education is conditional. Balancing the promising results with the key challenges summarised above indicates that the fundamental issue is not with the users. It is with the ideology of the educational agency in Saudi Arabia presented in pre-service teacher education, meaning that this issue is not merely related to availability and accessibility, neither financial resources, nor technology-related literacies and skills; rather, the real issue is to do with the general concept of technology use in the Saudi context. Technologies must be understood as constructive tools rather than threats to the local culture. Implications of the current situation are provided in the following chapter.

6.5 Summary

The current chapter started with a synthesis of the results regarding the investigation of possibility of the effective integration of technology into the Saudi pre-service teacher education curriculum. This was followed by a critical discussion of the key findings. Structurally, the discussion was divided into two main sections. The first section focused on the key indications associated with context readiness to use technology effectively. This section discussed the practitioners' familiarity with technology, concepts, awareness and self-efficacy. Challenges and obstacles to effective integration were discussed in the second section. These challenges included conservatism, traditionalism and centralisation. To critically contextualise the current findings, this chapter provided a section that compared and contrasted the current study findings with many other previous studies. Finally, this chapter concluded with the most significant issues discussed in this chapter followed by a summary.

The following chapter provides a summary of the research key findings. It further provides the final research conclusions and key implications derived from the current study findings. The study implications offer context-appropriate recommendations in terms of theory, policy and practice.

Chapter 7 CONCLUSION AND IMPLICATIONS

7.1 Introduction

The need to integrate digital technologies into pre-service teacher education curriculum is a recognised foundation of the digital age. There is a paucity of research on conditions surrounding the adoption levels of digital technologies in conservative and mono-cultural contexts such as pre-service teacher education in Saudi Arabia. Underpinned by the range of current practice and theoretical approaches to the effective integration of technology, this study investigated possibilities for integration into the Saudi pre-service teacher education curriculum. Using a mixed-method research approach, the study has looked into the existing relevant policy and practice, including teaching and learning activities, with the critical lens of both the insider and outsider. A summary of the key findings, recommendations for potential effective technology integration followed by a reflective evaluation of the study constitute the major sections of this concluding chapter.

7.2 Summary of the research key findings

This section summarises the most significant findings emerged from the current study. The summary is in the form of major themes.

7.2.1 Digital technologies in Saudi pre-service teacher education policy

The global pressure of the rapid development of digital technologies on Saudi national policies has been evident. Technology has been given a prominent place in Saudi national policies, including plans and strategies to cope with modernisation and globalisation and to ensure the digital transformation of the society. This necessitates the need for the effective integration of technology into the pre-service teacher education curriculum. However, a strong inclination of cultural-religious conservatism is also confirmed. An obvious theme found in most Saudi national policy documents is strengthening Islamic fundamentals as well as Saudi cultural values. While technology is considered a tool/channel of cultural invasion, the adoption/expansion of technology in teaching and learning approaches can be limited. As Saudi Arabia remains one of the world's most conservative societies, time is needed for change to occur. Over time, the imported values, which will be eventually adopted, will be validated and tested.

Due to the strong tendency towards conservatism, Saudi pre-service teacher education, including curriculum structure, guidelines, goals and objectives is totally built upon the fundamentals of Islam and Arabic culture. This may limit the role of technology when considered as a religious-cultural threat. An analysis of curriculum-relevant policies and documents revealed that there is a clear absence of a valid vision for the effective integration of digital technologies and there is a clear gap between national and curriculum policies. While Saudi national policies have prominently positioned technology and its effective use in the process of development and modernisation, curriculum policies have retained their traditional focus in relation to technology learning and training. Technology learning and training has a limited connection with current learning and/or future teaching approaches and only focuses on learning technology rather than pedagogical implications.

The overall concept of the policymakers regarding the effective integration of technology appears limited and reasonably unsatisfactory. The notions underpinning their concept were simplistic, such as introducing, understanding, and intensifying the use of technology, as a way to cope with global technological developments and modernisation, but in a conservative manner. However, despite this, they appeared keenly aware of the importance and the usefulness of digital technologies and their effective integration in both pedagogy and administration. They acknowledged that technology plays a major role in the advancement of the curriculum including the facilitation of online learning and distance education. Further, technology can be critical in increasing interactivity and enhancing fast two-way communication.

The policymakers revealed that traditional pedagogical approaches such as teacher-centred education still prevail in Saudi Arabia. As the policymakers had very strong attitudes towards preserving the traditional cultural-religious fundamentals of the curriculum, they differentiated between totally importing the curriculum and only importing styles, methods and approaches of the curriculum. Accordingly, the curriculum remains traditional and focuses on quantity rather than quality. As a result, opportunities for curriculum and pedagogy innovation, especially with digital technologies, have been reduced.

Digital technologies and their effective integration have been considered a priority in the mission of the current administration. This positive consideration has motivated a wide range of technology developments. However, the current administration has been challenged by funding issues, training and support, and the domination of traditionalism. These challenges may minimise the effective integration of technology into the curriculum.

7.2.2 The integration of digital technologies in practice

While pre-service teachers had difficulty with commercial training, instructors were significantly more qualified in terms of technology. However, both groups had excellent access to computers and various types of digital technologies at home. Further, both groups' higher levels of computer use are associated with their higher levels of digital technologies use. In contrast, pre-service teachers' use of computers at home was correlated with their accessibility. In addition, at home, they used digital technologies more than instructors did.

The overall concept of the academic instructors, in terms of technology focused on the general use of technology. Despite this, the academic instructors demonstrated higher levels of technology awareness. They believed in the importance and the usefulness of technology, and its effective integration. All instructors acknowledged the significant potential of technology in the advancement of pre-service teacher education curriculum. For, instance, digital technologies may promote effective communication as well as fast and easy information delivery. Digital technologies may contribute to the enhancement of students' learning, possibly making it easier and more permanent. Conversely, the academic instructors reported higher levels of perceived self-efficacy, which is assumed to have been boosted through training.

In contrast, pre-service teachers were more elaborative with respect to the concept of the effective integration of technology. This generally suggests that they have a wider understanding of the concept compared to the policymakers and the instructors. They emphasised the effectiveness of using, utilising and implementing technology. This is supported by their strong awareness of the importance and usefulness of technology to their current learning activities and future teaching approaches. They revealed that digital technologies create more effective and enjoyable learning environments. In addition, technology was perceived as a facilitator of their learning, communication, and understanding and for many, it also attracted their attention. Further, pre-service teachers were found to be highly motivated and trusted their ability to integrate effectively technology into their learning approaches. This high level of self-efficacy is reported to be motivated by more familiarity and technology self-directed learning. Interestingly, the majority of pre-service teachers with higher levels of self-efficacy believed that professional training in technology has a limited impact on their levels of self-efficacy. Conversely, those with moderate or lower self-efficacy expressed the need for professional training to enhance their self-efficacy levels.

Similar to the policymakers, the academic instructors and pre-service teachers confirmed that the curriculum is suitable for the effective integration of digital technologies. Statistically, pre-service teachers were more positive in their views than instructors were. This can be attributed to the fact that conservatism has a significant influence on their perspective that curriculum cultural-religious fundamentals can be threatened by change. Therefore, traditionalism is widely prevailing and continues to dominate their practices. In the instructors' view, this domination is also stimulated by the traditional curriculum that lacks technology-free goals and objectives. Further, the instructor's age and technology expertise contributed to the lack of technology implementation in the curriculum.

In terms of the instructors' actual practice, they have more access to computers and digital technologies at the university and thus tend to use them more than pre-service teachers. However, this use was inadequate. Their highest use of computers at the university was for less than one hour per working day and they rarely used other forms of digital technologies apart from the data projectors. Nonetheless, their higher levels of computers use are correlated with their higher levels of digital technologies use at the university. In addition, the instructors' higher levels of use of both computers and digital technologies at home are associated with higher levels of both computers and digital technologies use at the university. Interestingly, instructors with more positive views of the curriculum design were more likely to use digital technologies at the university. The interviews revealed that the instructors who taught technology-related subjects tended to have higher levels of technology use at the university.

Despite the pre-service teachers' general satisfaction with the curriculum design, the overall results suggest the inefficiency of the curriculum, especially the educational technology preparation. Those who were positive regarding the curriculum design had higher levels of self-efficacy and technology awareness. However, the vast majority stressed that the curriculum was overloaded, too multi-disciplinary and dominated by traditional pedagogical approaches such as teacher-centred education. Further, they felt that their voice had a limited impact, especially on curriculum development and could hardly be heard.

Concerning the pre-service teachers' practice, they had very good access to computers at the university, but it was through the Student Club, coffee shops, restaurants and personal laptops. Unfortunately, they had almost no technology-based learning activities, both online activities and other digital technologies at the university. However, pre-service teachers with more access to computers at the university are expected to be more active in terms of computer use. This, in turn, is correlated with higher levels of digital technologies use. From another perspective, their higher levels of computer use at home had a positive correlation with higher levels of computers use at the university. Complementing this, the interviews confirmed that their technology-based learning activities were few, frustrating and based on their instructors' requirements. Such uses did not go beyond traditional Internet searching and limited e-mail use.

The academic instructors and pre-service teachers confirmed that the effective integration of digital technologies has been considered a priority of the current administration. Both groups generally indicated their general satisfaction with the current administration's practices. Further, for both groups, their positive views with regard to the current administration practices are also correlated with their positive views of the curriculum design. Accordingly, instructors and pre-service teachers who positively viewed the administration's practices are expected to be more active in terms of digital technologies at the university, not with computer use. Only pre-service teachers with higher levels of self-efficacy and technology awareness are expected to be more positive in their views regarding the administration's practices. However, the interviews showed that due to centralisation, most pre-service teachers had no opportunity for direct communication with the administration. The few pre-service teachers who commented positively on the current administration tended to be more familiar with digital technologies at the university.

In terms of infrastructure, the instructors had more access to computers at the university than pre-service teachers. Access points for the latter group were the Student Club, Internet coffee shops and their personal laptops. Their access to other facilities was hindered by centralisation. Similarly, the instructors reported that centralisation and discipline limitations were the most challenging issues to accessibility. As a result, pre-service teachers were found to use computers and digital technologies significantly less than their instructors did at the university.

Training and support were positively acknowledged by most of the instructors, unlike pre-service teachers who indicated that they lacked the necessary technology training and professional support. However, according to the instructors, training courses were traditional, few in number and had space and time limitations. Other instructors reported that a lack of motivation, the dominance of traditionalism and the optionality of training were associated with their lack of willingness to participate in training. From the pre-service teachers' view, the lack of training is associated with the heaviness of their curriculum and limitations in relation to the inadequate number of available places. Most importantly, pre-service teachers are considered mere receivers of knowledge, which resulted in their lack of attention from the current administration.

With respect to building a technology resource base, the instructors moderately acknowledged the current administration's practices in building a reliable technology resource base. The interviews confirmed the absence of cooperation with the private sector in terms of support, training, maintenance, information sharing and the provision of expensive digital technologies.

7.3 Implications of the research findings

There is an urgent need for concerted efforts to achieve the effective integration of technology in Saudi pre-service teacher education, which is currently deemed to be dominated by traditional approaches to teaching and learning. The reality of the current digital generation of learners implies new meanings of knowledge and learning, curriculum and leadership. Such new meanings cannot be offered within the traditional paradigm of pre-service teacher education.

Based on the current study's findings in association with previous research, context-appropriate recommendations are proposed. These involve three main domains: enhancing instructors and pre-service teachers' technological beliefs; enforcing innovative technology-based pedagogical models; and developing effective leadership (see Figure 7-1).

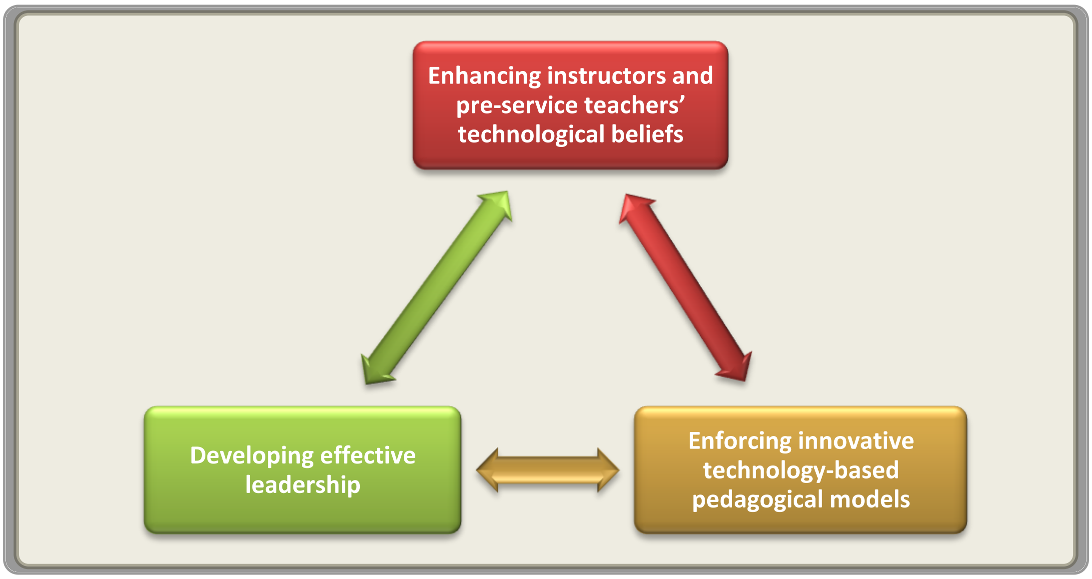

Figure 7-1: Context-appropriate recommendations for effective integration of digital technologies

7.3.1 Enhancing the instructors and pre-service teachers' technological beliefs

The first domain is enhancing instructors and pre-service teachers' technological beliefs. 'Cognitive habits', according to Robertson et al. (2007, p. 35) can be useful in the enhancement of practitioners' technological beliefs such as self-efficacy and an awareness of the importance and usefulness of technology. It can be also helpful in terms of re-conceptualising the effective integration of technology. Habits occur when learners' working knowledge, beliefs and skills intersect (Robertson et al., 2007). Accordingly, to enhance technological beliefs, it is important to boost levels of self-efficacy and technology awareness. Further, the significant work of many other scholars (e.g. Bong & Skaalvik, 2003; Chao, 2003; Hall et al., 1975; Maninger & Anderson; 2007; Robertson et al., 2007; Sang et al., 2010; Smith & Kelley, 2007; Webb, 2006) was carefully considered. Recommendations in this regard are as follows:

- Determining the level of instructors and pre-service teachers' beliefs and intersecting attitudes and perceptions such as technology awareness and self-efficacy is essential. Frequent assessments are required to identify the strengths and weaknesses and thus deal with them.
- Increasing professional training by means of professional development, especially for instructors, to boost their level of awareness and self-efficacy, as well as technology expertise is required. In contrast, training is also important for pre-service teachers, especially those with moderate or lower levels of self-efficacy. Most importantly, increasing their involvement with various kinds of technologies,

both inside and outside the university, may enhance their familiarity with them and consequently increase their motivation, awareness and level of technology self-efficacy.

- To enhance both groups' technological beliefs, it is also necessary to provide them with proper incentives, both financially and psychologically. Incentives may have very positive impact on their motivation, beliefs and consequently on their practices.
- The previous recommendations need logistic and professional support to be successful. Support is important in identifying problems of technology implementation at the personal, operational and pedagogical levels.

Further, the perceived concept of the effective integration of technology in the current study was found to be tentative and demanding special consideration. It requires re-conceptualisation. In order to do this, Robertson et al.'s (2007) work on 'cognitive habits' could aid the development of the technology integration concept that is assumed to be relevant to the Saudi pre-service teacher education curriculum. In addition, definitions provided by previous researchers (Dawson, 2006; Dede, 2011; Dockstader, 1999; Gale, 2007; Smolin & Lawless, 2007; Technology in Schools, 2003) were also helpful. Understanding technology and its effective integration is fundamental in the process of shifting the focus from hardware and software to pedagogy. In relation to this, the effective integration of digital technologies refers to the purposeful and meaningful *technology-programmed habit* that can be found at the intersection of the practitioners' knowledge, beliefs and skills.

Another important concept that requires re-conceptualisation is technology itself. Due to conservatism, there is a prevailing culture that sees technology, especially the Internet, as a pure threat. For the purpose of the effective integration of technology, this concept should be reformed. Technology per se is not a threat. Although technology has a negative side such as the possibility of being exposed to pornography and violence, there are numerous positive aspects to technology that will enhance education and help spread knowledge. The negative aspects of technology should be addressed through firstly, increasing awareness and then, providing effective censorship protocols. In Saudi Arabia, too much focus is on censorship by blocking culturally inappropriate content. Currently, there is no focus on increasing the awareness of the user. Therefore, it can be argued that it is extremely important to raise the technology users' awareness about both positive and negative aspects of technology.

To realise the effective integration of technology, it must be used to achieve meaningful pedagogy, especially in the current era. Pedagogy, in turn, adds new meanings of using technology. This is what I believe is educational technology. Therefore, technology should be used in everyday classroom pedagogical practices including teaching and learning. It should also be an integral part of the curriculum design and its associated activities. The support of the administration is further required in this process by having a clear and valid technological vision that is relevant to the current digital age and can be implemented.

7.3.2 Enforcing innovative technology-based pedagogical models

Findings from the current study support the fact that the Saudi pre-service teacher education curriculum is dominated by traditionalism, which makes it less efficient, especially in the current digital age. Based on this and in carefully consideration of the research in relation to this (e.g. Altun, 2007; Barnett, 2006; ISTE, 2007; Robertson et al., 2007; Smith & Kelley, 2007; Vannatta, 2007), the efficiency of the curriculum can be increased through two main dimensions that concern curriculum design and associated technology-based pedagogical practices. Recommendations related to this are following:

- Reinforcing innovative educational models to lessen the impact of traditionalism. This can be through observing successful international models of pre-service teacher preparation.

- Redesigning the curriculum to focus on quality rather than quantity is necessary. It is suggested that the amount of theoretical courses be decreased and practical training be increased, especially in terms of technology.

- Updating courses and content relevant to educational technology preparation is critical to enhance the pre-service teachers' effectiveness and eligibility for practice.

- Re-conceptualising learners' passive image. Learners' nature, voice, needs, preferences and learning styles should be carefully considered. This may increase the value of education by creating learner-centred education that fundamentally stresses the importance of seeing learners as effective, positive and the core element of any educational model.

- Increasing embedded technology-based curriculum activities to include all facets of curriculum design and training courses. Such practices should be authentically motivated, sustained, supervised and directed to reflect meaningful learning. Based on Robertson et al.'s (2007) theory of action-reflection, increasing impeded practices may change future behaviours in relation to the effective integration of technology.

- Increasing the number of online courses may enhance communication, collaboration and flexibility of learning.

- Increasing the effective use of Learning Management Systems (LMS) and other technology-based educational systems is necessary to enhance technology-based learning activities.

7.3.3 Developing effective leadership

As leadership is critically important (Moyle, 2006), this sub-section provides recommendations relevant to the leadership theory and practice in relation to technology and its effective integration. For clarity, recommendations are presented in the form of four major themes/roles (Altun, 2007; Fabry & Higgs, 1997; Lessen & Sorensen, 2006; Smith & Kelley, 2007). Each theme contains a number of related points.

7.3.3.1 Technological vision and theory

Results of the current research mainly indicate that despite the fact that technology is seen a high priority and a catalyst for improving levels of Saudi teacher preparation, centralisation controls the process of technology implementation, operation and diffusion. The current findings support Rogers' (1995) theory that centralisation has a negative impact on the process of effective integration of technology. Therefore, proposals to address this are as follows.

- Ensuring more decentralised systems may positively contribute to the effective integration of technology. Decentralised systems are assumed to promote, encourage and support greater information and knowledge sharing, more system flexibility, autonomy, and availability for evaluation and updating (Rogers, 1995).

- Leadership must articulate a valid technological vision that is relevant to the current era, digital learners, and the rapid technology developments around the globe. This process must be combined with providing genuine channels for effective communication with instructors, pre-service teachers, staff and personnel. One significant channel is policymaking, especially in Saudi Arabia.
- Leadership is also required, through policies, to clarify issues surrounding the effective integration of technology at both levels of theory and practice. In other words, it must provide answers to the following questions: what technology should be used; why should this technology be used; how should this technology be used; and when should this technology be used?
- The effective integration of technology as a systematic approach requires careful planning in terms of inputs, processes and outputs. It is also necessary to seek feedback to enhance the systems' quality by evaluating its components (inputs, processes and outputs). Evaluation should be based on the desired goals (see Figure 7-2).

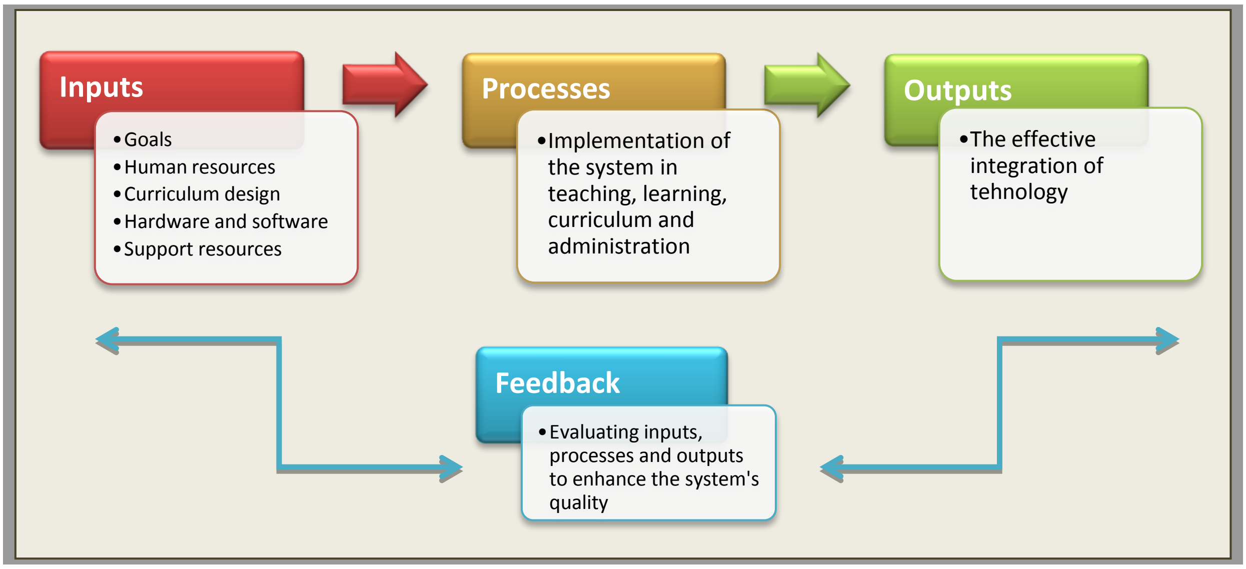

Figure 7-2: A systematic approach for the effective integration of technology

7.3.3.2 Infrastructure

The effective integration of technology cannot be established without proper, operative and sufficient technology infrastructure (Altun, 2007; Fabry & Higgs, 1997; Moursund & Bielefeldt, 1999). In practical terms, sustaining an up-to-date technology infrastructure seems challenging in light of the rapid and massive developments of technology. However, this should not be frustrating. There must be a minimum of adequate technology infrastructure that is available for instructors, pre-service teachers, administrators and personnel. Further, as technology infrastructure in the current study is negatively affected by centralisation, special care should be given to its availability and accessibility. Recommendations with regard to infrastructure include provision of the following:

- Necessary technologies in terms of software and hardware. An important concept that may underpin this process is 'value v. cost' (Robertson et al., 2007).

- Specialised and adequate human resources such as ICT facilitators and educational technology specialists. Their role is to professionally manage, operate and supervise technology-related resources and facilities.

- Independent management that can identify the operational requirements to be to operate, design and implement various kinds of technologies. Further, instructors and pre-service teachers must have adequate and equal opportunity in terms of the availability of and accessibility to technology resources and facilities. Their access should not be affected by centralisation and/or their discipline area.

- The provision of available and accessible infrastructure should be a concurrent effort with the delivery of training and support (Altun, 2007).

7.3.3.3 Training and support

An initial and continuous phase that is important to the effective integration of technology is training and support. It is important to both groups of instructors and pre-service teachers. This can be through the following:

- Motivating instructors and pre-service teachers to attend training through offering proper incentives. For instructors, it could be a feature of their annual performance report. Pre-service teachers could be issued with a certificate that could be useful when seeking future employment.

- Increasing the quality of training through providing courses, lectures and workshops that are most relevant to teaching, learning and using technology in the current digital era.

- Training and support in technology should be continuous and take various forms. It could be through normal face-to-face, individual, group training sessions or online courses.

- Training should include a variety of relevant topics and subjects. To increase the efficiency and effectiveness of such training, it is strongly recommended that the instructors and pre-service teachers suggest topics and drive the content (Shepherd et al., 2007). In doing so, training is expected to become professionally and educationally more relevant and is based on the identified needs.

- Training courses should have enough places and space for trainees, both instructors and pre-service teachers.

- Providing training that suits the needs of instructors and pre-service teachers. Training should not conflict with workloads or recreation time. This will ensure training is more accessible and available.

- Providing continuous support through a professional division (e.g. ICT support) that has a 24/7 accessible website. This website should provide answers to the most common problems and issues associated with pedagogical technology.

7.3.3.4 Technology resource base

Due to centralisation, there was a severe lack of cooperation between pre-service teacher education and various organisations of the community, including educational institutions, schools, universities and the private sector. Therefore, it is recommended that the following be implemented:

- Increasing cooperation with other educational institutions and scientific organisations such as KACST. This is important in enhancing the quality of pre-service teacher preparation by sharing technology resources and facilities, contributing to training and support and sharing specialised resources and databases.

- Attracting and increasing cooperation with the private sector and other commercial organisations to support the provision of expensive technologies as well as training and support.

- Creating more effective cooperation and partnerships with advanced international organisations such as universities and educational institutions, especially those interested in higher education and pre-service teacher preparation. This may increase the quality of Saudi teacher preparation by observing successful expertise in this regard. Further, this may contribute to the creation of global education and curriculum by the means of knowledge sharing and exchange of experience.

- Subscribing to well-known research databases such as ProQuest and promoting their use to instructors and pre-service teachers.

7.4 Reflective evaluation and further directions

This section provides an evaluation of the current research, including theoretical and philosophical foundations. It starts a general perspective, followed by a discussion of the research points of strengths. Then, it provides further directions and suggestions for future research.

7.4.1 General perspective

The core mission of this thesis was not only to investigate the possibility of the effective integration of digital technologies into the Saudi pre-service teacher education curriculum, but also to apply a holistic approach to draw the attention of academia to the delicate dilemmas associated with technology and pedagogy in highly conservative and mono-cultural contexts. Saudi Arabia, being one of the world’s most conservative societies, presented a unique context to investigate the impact of digital technologies as a global power on its socio-cultural fabrics, including education and pre-service teachers’ preparation in particular.

This research was driven by the assumption that if technology is effectively and adequately integrated into all facets of the pre-service teachers’ education curriculum, they are more likely to be able to integrate technology effectively into their future classrooms. Therefore, the effective integration of technology is not only the mission of technology-related and/or specific training courses; it is also the mission of administration, curriculum and its designers, instructors, personnel and pre-service teachers themselves. The effective integration of technology, especially into the pre-service teacher curriculum, is obviously a much more complex issue than a mere professional development process. It is a new paradigm of pedagogy and the context of digital learning has necessitated the need for innovative, flexible and sustainable educational models. Traditionalism that seems to dominate pre-service teacher education globally and in mono-cultural conservative contexts in particular is increasingly becoming inappropriate and invalid. One core mission of this thesis is to highlight the fact that teacher education is not keeping pace with current global trends such as the growing reliance on digital technologies.

7.4.2 Strengths of the current study

In spite of the current study's limitations, a number of strengths have been noted. Based on the current knowledge, this study could be one of the few (if any) studies to critically investigate the effective integration of technology in the context of Saudi pre-service teacher education curriculum. This can be attributed to the fact that technology implementation in Saudi education is generally a new initiative to meet the demands of globalisation and the rapid development of digital technologies. Another reason is that Saudi education, including pre-service teacher preparation, is deemed to be dominated by traditional approaches of teaching and learning. Until recently, the implementation of technology has been considered extravagant. Nevertheless, Saudi Arabia represents a unique context and fertile field for future research, especially with regard to technology and its various implications.

The second important strength is the concurrent investigation of three important perspectives: the practitioners' technology perspective, the pedagogical perspective and the administration perspective. Put simply, this study examined policy, views and attitudes as well as actual practice. These three perspectives have received much attention in the literature, but are frequently examined in isolation to each other. Despite being distinctive, these three perspectives are inter and intra-correlated. They provided the general framework of the study as well as underpinning the context-appropriate recommendations.

The third strength of the current study is the use of a mixed-method design. To deal with Saudi socio-cultural complexity and the integration of technology itself as a multifaceted endeavour, the mixed-method approach was very helpful. The use of a mixed-method design of quantitative and qualitative techniques assisted in establishing wider understanding, with in-depth, rich and valid findings. The implementation of pragmatic principles in a harmonious partnership with the mixed-method research design has facilitated this task. From a pragmatic point of view, finding practical and context-appropriate solutions to the current research problem and associated derived questions was most important. Further, the current research was influenced by a personal value system as the emic insider expert. This research was carried out in anticipation that the results would match the researcher's values and assumptions.

7.4.3 Further directions and suggestions for future research

It is hoped that this thesis will contribute to the field of educational technology by advancing genuine perspectives of Saudi pre-service teacher education. However, based on the study's findings and the research limitations, further research needs to be conducted in the context of Saudi pre-service teachers, especially the female section. As noted in Chapter 1, the current study was conducted on male pre-service teacher education. This sample imbalance has resulted in the current study's lack of perspective on the female voice. In my view, and I know that many Saudi scholars would agree, I believe that the effective integration of technology in educating Saudi females is more important than educating male students. A possible result of the use of technology by female students might be the facilitation of effective interaction between female students and their male instructors, especially in tertiary education. Previously, Closed Circuit Televisions and landline phones were intensively used in female education. Digital technologies have wider atmospheres with more generous channels for effective communication such as LMS, discussion forums, social networking and many other types of the wide acknowledged technology tools.

As the current study was conducted in one educational institution, that is the Faculty of Education at King Abdulaziz University, further research is needed not only to confirm the current findings, but also to increase the generalisability and gain more insight into pre-service teacher education in Saudi Arabia. Given the view that teacher preparation in the Arab world is similar, a study that follows/replicates the processes of this study would contribute to a better understanding of technology implementation in a variety of contexts and educational settings.

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Appendices

Appendix 1: Document protocol

Document summary form

Site: ……………………

Document………………….…...

Date, retrieved, received or collected……………………

Name or description of document

Event or contact with which document is associated

Significance of document

Brief summary of contents

Appendix 2: Selected national policy documents

No.	Policy/Document	Description/Significance/Content	Source
1	The Educational Policy in the Saudi Arabian Kingdom (in Arabic, English & French)	The highest Saudi educational policy that controls all facets of Saudi education and related systems	MoE (1980)
2	The Ten-Year Plan of The Ministry of Education (MoE) (in Arabic & English)	The National strategic plan for the MoE for the period (2004-2014)	MoE (2005)
3	Education Development National Report of the Kingdom of Saudi Arabia (2000-2004) (in Arabic & English)	National report regarding education development in Saudi Arabia produced by the MoE in cooperation with the Ministry of Higher Education (MoHE) and Technical and Vocational Training Corporation (TVTC)	MoE (2004)
4	Report on Identity and Development (in Arabic)	National report on Saudi education development in terms of knowledge economy	MoE (2008)
5	King Abdullah bin Abdulaziz Public Education Development Project (*Tatweer*) (in Arabic)	The project aims at involving the community to formulate a future vision for Saudi education through dialogue and partnerships between state institutions	Tatweer (2010)
6	The National Communications and Information Technology Plan: The Vision Towards The Information Society from the Ministry of Communications and Information Technology (MCIT) (in Arabic & English)	A comprehensive ICT plan that consists of a long-term vision for ICT in SA for the next 20 years plus a five-year plan that projects the long-term vision for the first five years of the plan	MCIT (2006a)
7	Information And Communications Technology (ICT) Policy Statement from the MCIT (in English)	This document is to state the policies that have been adopted by MCIT in the past few years, as well as those MCIT plans to pursue over the next few years in the development of the ICT sector in Saudi Arabia	MCIT (2006b)

No.	Policy/Document	Description/Significance/Content	Source
8	The Universal Access And Universal Service Policy from the MCIT (in Arabic)	This policy implies that 100% of a population can obtain, at a minimum, public access to a defined ICT service at a defined quality, through reasonably available and affordable public or community facilities	MCIT (2006c)
9	The e-Government Program from the MCIT (in Arabic & English)	The program (*Yesser*) translates the Saudi Government's keen interest in implementing the e-government concept as a part of many initiatives aimed at achieving sustained growth and development	Yesser (2009)
10	The Saudi Arabian Home Computing Initiative (SAHCI) from the Communication and Information Technology Commission (CITC) (in English)	This policy has the core mission of enabling all Saudi families to obtain a personal computer through easy and affordable instalment plan	CITC (2010)
11	The Long Term Strategy of The Saudi Economy 2025 from the Ministry of Economy and Planning (MoEP) (in Arabic & English)	A strategy designed to provide a framework for four successive five-year plans until 2024 and aimed at achieving a comprehensive socioeconomic vision by the end of the period	MoEP (2005a)
12	The Eighth Development Plan (2005-2009) from the MoEP (in Arabic & English)	This development Plan has been prepared in the context of a long-term vision and economic and developmental strategy geared to achieving sustainable development	MoEP (2005b)
13	Millennium Development Goals from the MoEP (in Arabic & English)	National policy that aims at formulating a common development vision that would respond to existing needs and rise to new challenges; all within a framework of partnership at national and international levels	MoEP (2010)

Appendix 3: Framework adapted from Mertens (2005) in the survey design

No.	Point	Purpose	Implication
1	Outlining topics to be included in the survey	Concerning important issues that should be included	Topics based on the literature regarding the study focus, aim and scope
2	Reason behind questions	Each question must have an explanation and reason	To investigate issues related to the present study topic
3	Decide on the degree of structure that is most appropriate	*Closed questions:* multiple choice, true or false and checklist questions *Open questions:* participants can respond to the question in their own words	Mixture of closed and open questions that are appropriate to the issue being investigated
4	Include the right options in the case of closed questions	To obtain the best responses	Multiple choice and checklists are included to match the nature of each question
5	Avoid psychologically-threatening questions	To avoid different reactions to sensitive topics	Psychologically-threatening questions are avoided in the present study
6	Ensure clarity of the questions	To ensure that all items mean the same thing to all participants	Clarity enhanced through revising, editing and piloting
7	Preferable short items	Short items are preferable in general to long items	Questions are short and direct as much as possible, ensuring clarity
8	Avoid negative wording	To avoid different understandings and reactions	Questions are clear and negative questioning is avoided
9	Avoid asking for more than one idea per item	To include one idea only in each question	One idea is included in each item under investigation
10	Avoid jargon and difficult words	To suit the approximate reading level of the participants	The questions have been written with simple words and the questionnaire has been piloted
11	Avoid biased or leading questions	To obtain answers that have not been affected by the researchers' opinions, thoughts and worldview	Questions are direct and without any hints that might lead the participants
12	Emphasise critical words	To lead the participants to the main or important ideas in the questions	Critical words such as instructions and important ideas are emphasised by bold or italic font

Appendix 4: Academic Instructors Questionnaire

Dear colleague,

This survey is being conducted for my doctoral degree research titled:

"Preparing pre-service teachers towards effective use of educational technology in Saudi Arabia"

The general aim of this doctoral thesis is to develop a framework to prepare pre-service teachers to use technology effectively in Saudi education. To achieve this aim, this study examines critically the current situation of technology preparation in pre-service in the Saudi teacher education through a research study in the Faculty of Education at King Abdulaziz University.

The answers you give will help me developing this proposed framework for better pre-service teachers' preparation in the future. You will be also contributing to an important study, which will help in improving the quality of the Saudi education.

Thank you very much for your help with this survey.

<u>Section (A): General information:</u>

1. **Current position:** *(Please tick the appropriate box)*

□ Teaching assistant	□ Lecturer	□ Assistant Professor	□ Associate Professor	□ Full Professor

2. **You current activities:** *(Please tick the appropriate box)*

□ Teaching responsibilities only	□ Teaching with a faculty role	□ Faculty role only

3. **Your teaching load: (Hours/week)** *(Please tick the appropriate box)*

□ N/A	□ Less than 8 h/w	□ 8 – less than 14 h/w	□ 14 – less than 18 h/w	□ More than 18 h/w

<u>Section (B): Technology integration relevant perceptions and expertise:</u>

1. **Information and Communication Technology expertise and familiarity:**

   - **Do you have any certificates in computer use or any kind of information and communication technology training?**
     □ **Yes** □ **No**

   - **Do you have computer at home?**
     □ **Yes** *(Please answer Q. 2 and Q.3)* □ **No** *(Please move to Q.3)*

☞ **At your home, how many hours per day on average do you spend on a computer for?**
(Please tick as many as you use and complete the table)

	Uses	N/A	Less than one hour	1 – 2 hours	2 – 3 hours	3 – 4 hours	More than 4 hours
1	E-mail						
2	Banking						
3	News						
4	Forums						
5	Blogs						
6	Wikipedia						
7	Personal spaces *(e.g. Facebook)*						
8	Video sharing						
9	Gaming						
10	Others: *please specify*…………						

☞ **At your home, how many hours per day on average do you spend on technologies other than computer?**
(Please tick as many as you use and complete the table below)

	Other technologies	N/A	Less than one hour	1 – 2 hours	2 – 3 hours	3 – 4 hours	More than 4 hours
1	Television						
2	DVD Players						
3	Mobile Phone						
4	Video Games *(e.g. PlayStation)*						
5	Others: *please specify*…………..…						

2. Relevant perceived concepts:

☞ **Concept: From your point of view, what does the concept of "Technology integration" mean?**
(Tick as many as you think)

□ Using technology in education generally	□ To be a normal part of the class	□ Others: *please specify* ……….……………….….…………
□ implementing technology in education effectively	□ To be a normal part of the class and to be used effectively	

☞ **Awareness: Could you please describe your views on technology integration in pre-service teacher education?** *(Please fill the table below)*

	Statement	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
1	It is important in improving my teaching approaches					
2	It is important in establishing my work satisfaction					
3	It helps me preparing for my lectures and Classes					
4	It helps me to act effectively in my classes and lectures					
5	It helps me in delivering information to my students					
6	It helps me in improving my students' assessment processes					
7	It contributes in rising my students' performance					
8	It gives me the opportunity to prepare my students for the technology era					
9	It helps me to prepare my students to use technology effectively in their classes in the future					

☞ **Self-efficacy: In your view, would you say that you:** *(Please fill the table below)*

	Statement	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
1	Enjoy implementing ICT in my teaching approaches.					
2	Feel confident when I implement ICT in my teaching approaches.					
3	Feel satisfied in implementing ICT in my teaching approaches.					
4	Look forward to integrating ICT in my teaching approaches.					
5	Interested in integrating ICT in my teaching approaches.					
6	Sure that I can integrate ICT in my teaching approaches.					

Section (C): Curriculum design and technology practice inside the university

1. Technology practice:

☞ **Do you have a computer at work?**

□ **Yes** *(Please clarify your computer provider)*		□ **No** *(Please clarify where can you access a computer?) (Tick as many as you do)*	
□ Personal	□ Your department	□ Educational Resources Centre	□ Library
□ The faculty	□ The University	□ Department headmaster's office	□ Colleague's office
□ Others: *please specify* ………..……………		□ Others: *please specify* ……………………………	

☞ **Inside the university, how many hours on average in a working day do you spend on a computer for?**
(Please tick as many as you use and complete the table below)

Uses	N/A	Less than one hour	1 – 2 hours	2 – 3 hours	3 – 4 hours	More than 4 hours
1. E-mail						
2. Databases						
3. News						
4. Educational forums						
5. Blogs						
6. Wikipedia						
7. Social networks						
8. Video sharing						
9. University website						
10. Others: *please specify* ……						

☞ **Inside the university, what other types of technologies do you use?**
(Please complete the table below)

Other digital technologies	Teaching			
	Always	*Usually*	*Rarely*	*Never*
□ Data Projector				
□ DVD Players				
□ Smart Board				
□ Document Projector				
□ Others: *please specify* ………………………………………				

2. **Curriculum design:**

☞ **How does curriculum present and maintain technology integration?** *(Please fill the table below)*

	Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
1	They present technology integration as an important issue to improve pre-service teachers' teaching approaches in their future					
2	They present technology integration as a serious demand for the society's technological transformation					
3	They explain how to integrate technology in their classrooms in the future					
4	They provide them with adequate training and skills to integrate technology in their classrooms in the future					
5	Technology integration goals and objectives in PSTE are clearly explained					

<u>Section (D): Technology integration and leadership:</u>

1. **From your point of view, how does the senior management of the college consider the importance of technology integration in PSTE?** *(Please fill the table below)*

	Statement	High Priority	Priority	Relative Priority	Poor Priority	No Priority
1	Commitment in using technology effectively in its practice					
2	Includes technology use in its mission					
3	Articulating a technology vision in addresses to the faculty and students					
4	Showcasing technology initiatives					
5	Ensuring that leader understands the importance of technology in the school					

2. **From your point of view, how does senior management of the college consider the importance of infrastructure in terms of technology integration in PSTE?** *(Please fill the table below)*

	Statement	High Priority	Priority	Relative Priority	Poor Priority	No Priority
1	Creating an environment where integrating technology is possible					
2	Faculty, staff and students have access to appropriate technological tools (i.e. Internet)					
3	Offering technology to be available in the classrooms					
4	Offering Laptops and portable projectors for faculty staff					
5	Offering adequate technology for students (i.e. Labs, learning centres, wireless access points)					
6	Offering adequate maintenance and support for technology resources					

3. **From your point of view, how does senior management of the college consider the importance of training and support in terms of technology integration in PSTE?** *(Please fill the table below)*

	Statement	High Priority	Priority	Relative Priority	Poor Priority	No Priority
1	Supporting students and training in specialised technologies, labs, Internet access points and resources centres that provides access to the materials needed in classrooms					
2	Offering workshops with open lab time under a supervision of specialised personnel					
3	Offering online tutorials and technical instruction during class time					
4	Offering training for staff and students to upgrade their skills and learn new ones					

4. **From your point of view, how does senior management of the college consider the importance of building a resource base in terms of technology integration in PSTE?** *(Please fill the table below)*

	Statement	High Priority	Priority	Relative Priority	Poor Priority	No Priority
1	Finding other resources to support technology resources beyond the base budget in case of expensive technologies					
2	Creating cooperation with private sectors and other organisations to support technology resources base					
3	Creating cooperation with private sectors and other organisations in terms of training and maintenance					
4	Creating cooperation with private sectors and other organisations to share technology resources bases					

Thank you for your time and the information you have provide

Dear colleague, according to the research plan, I propose to conduct follow-up interviews. If you would like to participate voluntarily, pleases provide me with your contact details below:

Name: ……………………………	**Contact details: …………………………...………………………......**

Appendix 5: Pre-service Teachers Questionnaire

Dear pre-service teacher,

This survey is being conducted for my doctoral degree research titled:

"Preparing pre-service teachers for effective use of educational technology in Saudi Arabia"

The general aim of this doctoral thesis is to develop a framework to prepare pre-service teachers to use technology effectively in Saudi education. To achieve this aim, this study examines critically the current situation of technology preparation in pre-service in the Saudi teacher education through a research study in the Faculty of Education at King Abdulaziz University.

The answers you give will help me developing this proposed framework for better pre-service teachers' preparation in the future. You will be contributing to an important study, which will help in improving the quality of the Saudi education. If you have any complaints or queries about the survey and the study in general or if you would like further information about the study or a copy of the results, please contact:

Thank you very much for your help with this survey.

Section (A): General information:

1. **You current activities:** *(Please tick the appropriate box)*

□ Studying only	□ Studying and working	□ Studying with a student's faculty role

2. **Your current course load: (Hours/week)** *(Please tick the appropriate box)*

□ Less than 8 h/w	□ 8 – Less than 14 h/w	□ 14 – Less than 18 h/w	□ More than 18 h/w

Section (B): Relevant perceptions and technology expertise and familiarity:

1. **Technology expertise and familiarity:**

- **Do you have any certificates in computer use or any kind of information and communication technology training?**
  □ **Yes** □ **No**

- **Do you have computer at home?**
  □ **Yes** □ **No**

☞ **At your home, how many hours per day on average do you spend on a computer for?**

(You can tick as many as you use and complete the table)

	Uses	N/A	Less than one hour	1 – 2 hours	2 – 3 hours	3 – 4 hours	4 – 5 hours	More than 5 hours
1	**E-mail**							
2	**Banking**							
3	**News**							
4	**Forums**							
5	**Blogs**							
6	**Wikipedia**							
7	**Social Networks** *(e.g. Facebook)*							
8	**Video sharing**							
9	**Gaming**							
10	**Others:** *please specify*…………..							

☞ **At your home, how many hours per day on average do you spend on technologies other than computer?**

(Please tick as many as you use and complete the table below)

	Other technologies	N/A	Less than one hour	1 – 2 hours	2 – 3 hours	3 – 4 hours	4 – 5 hours	More than 5 hours
1	Television							
2	DVD Players							
3	Mobile Phone							
4	Video Games *(e.g. PlayStation)*							
5	Others: *please specify* ..…………...							

2. Relevant perceived concepts:

☞ **The concept: From your point of view, what does the concept of "*Technology integration*" mean?**

(Tick as many as you think)

□ Using technology in education generally	□ To be a normal part of the class	□ Others: *please specify* ……………………………………
□ implementing technology in education effectively	□ To be a normal part of the class and to be used effectively	

☞ **Awareness: Could you please describe your views on *technology integration in pre-service teacher education*?** *(Please fill the table below)*

	Statement	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
1	It is important in improving my learning approaches					
2	It is important in establishing my learning satisfaction					
3	It helps me preparing for my classes					
4	It helps me to act effectively in my classes					
5	It helps me understanding more in my classes					
6	It contributes in rising my academic performance					
7	It gives me the opportunity to prepare myself for the technology era					
8	It helps me to prepare myself to use technology effectively in my teaching approaches in the future					
9	It helps me to assess my students in the future					

☞ **Self-efficacy: In your view, would you say that you are:** *(Please fill the table below)*

	Statement	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
1	Interested in implementing ICT in my learning approaches					
2	Enjoy implementing ICT in my learning approaches					
3	Feel confident when I implement ICT in my learning approaches					
4	Feel satisfied in implementing ICT in my learning approaches					
5	Look forward to integrating ICT in my learning approaches					
6	Sure that I can integrate ICT in my learning approaches					

Section (C): Curriculum design and technology practice inside the university

1. Technology practice:

☞ **Could you access to a computer at University?**

□ **Yes** *(Please fill the table below, you can tick as many as you do)* □ **No**

□ Personal computer	□ In Classes	□ Library
□ Educational Resources Centre	□ Your department	□ Educational Technology Labs
□ University Coffee Shops and Restaurants	□ Others: *please specify* ……..……………………………………	

☞ **Inside the university, how many hours on average per day do you spend on a computer for?**

(Please complete the table below)

	Uses	N/A	Less than one hour	1 – 2 hours	2 – 3 hours	3 – 4 hours	4 – 5 hours	More than 5 hours
1	E-mail							
2	Databases							
3	News							
4	Educational forums							
5	Blogs							
6	Wikipedia							
7	Personal spaces							
8	Video sharing							
9	University website							
10	Others: *please specify* ..…………...							

☞ **Inside the university, what other types of technologies do you use?**

(Please complete the table below)

	Other devices	**Learning activities** *e.g. presentations*			
		Always	*Usually*	*Rarely*	*Never*
1	Data Projector				
2	DVD Players				
3	Smart Board				
4	Document Projector				
5	Others: *please specify* ………..………………………………				

2. **Curriculum design:**

☞ **How does curriculum present and maintain technology integration?***(Please fill the table below)*

	Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
1	They present technology integration as an important issue to improve my teaching approaches in the future					
2	They present technology integration as a serious demand for the society's technological transformation					
3	They explain how to integrate technology in my classrooms in the future					
4	They provide me with adequate training and skills to integrate technology in my classrooms in the future					
5	Technology integration goals and objectives in PSTE are clearly explained					

Section (D): Technology integration and leadership:

1. **From your point of view, how does the senior management consider the importance of technology integration?** *(Please fill the table below)*

	Statement	High Priority	Priority	Relative Priority	Poor Priority	No Priority
1	Commitment in using technology effectively in its practice					
2	Includes technology use in its mission					
3	Articulating a technology vision in addresses to the faculty and students					
4	Showcasing technology initiatives					
5	Ensuring that leader understands the importance of technology in the school					

2. **From your point of view, how does senior management consider the importance of infrastructure in terms of technology integration?** *(Please fill the table below)*

	Statement	High Priority	Priority	Relative Priority	Poor Priority	No Priority
1	Creating an environment where integrating technology is possible					
2	Students have access to appropriate technological tools (i.e. Internet)					
3	Offering technology to be available in the classrooms					
4	Offering Laptops and portable projectors for students					
5	Offering adequate technology for students (i.e. Labs, wireless access points)					
6	Offering adequate maintenance and support for technology resources					

3. **From your point of view, how does senior management consider the importance of training and support in terms of technology integration?** *(Please fill the table below)*

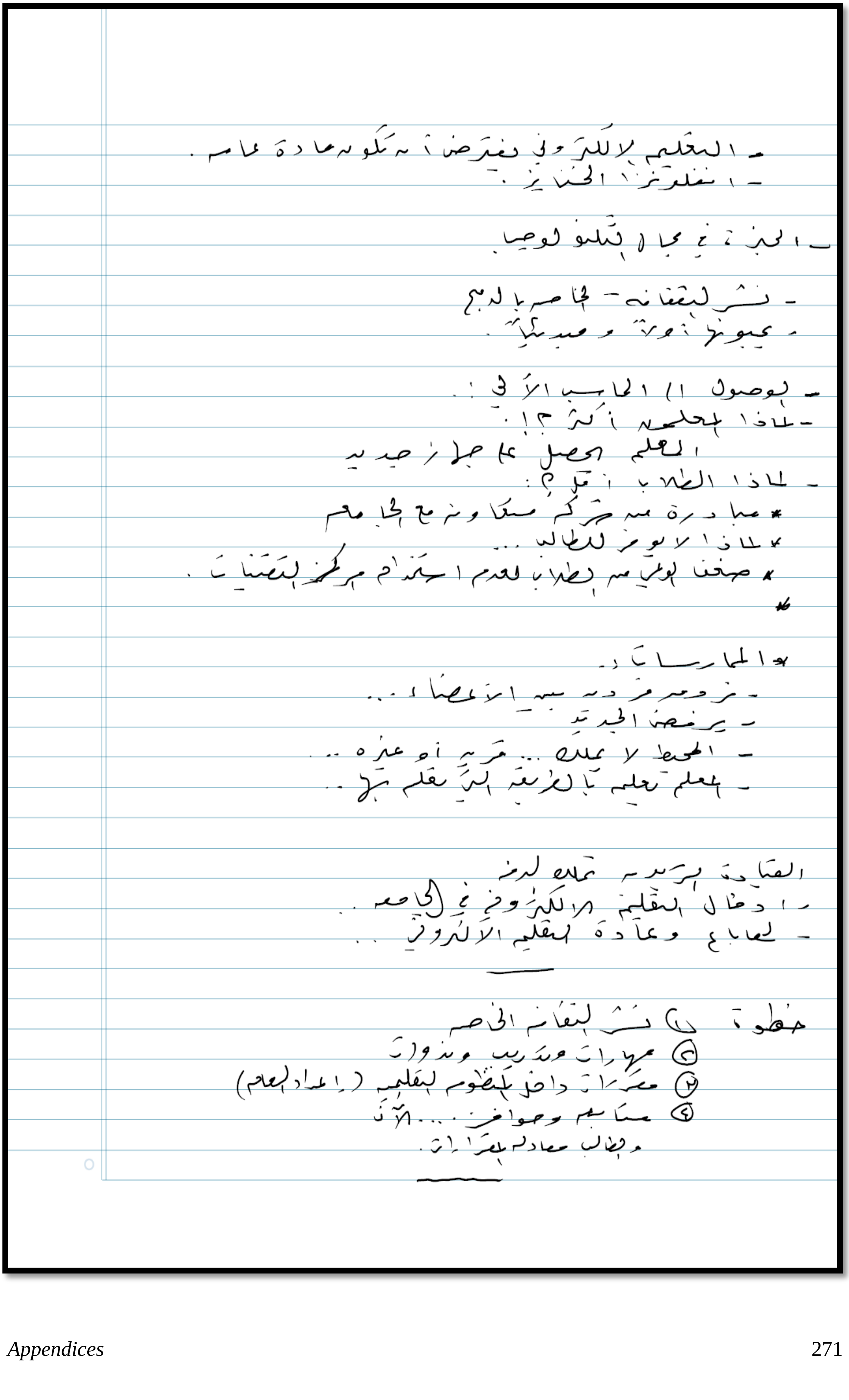
	Statement	High Priority	Priority	Relative Priority	Poor Priority	No Priority
1	Supporting students and training in specialised technologies, labs, Internet access points and resources centres that provides access to the materials needed in classrooms					
2	Offering workshops with open lab time under a supervision of specialised personnel					
3	Offering online tutorials and technical instruction during class time					
4	Offering training for students to upgrade their skills and learn new ones					

Thank you for your time and the information you have provide

Dear pre-service teacher, according to the research plan, I propose to conduct follow-up interviews. If you would like to participate voluntarily, pleases provide me with your contact details below:

Name: ……………………….	**Contact details: ………………………………………………..…**

Appendix 6: Example of the digital handwritten notes



Appendix 7: Interviews Protocol

La Trobe University

Faculty of Education

Semi-structured interview questions for policymakers, academic instructors, and pre-service teachers

Faculty of Education at King Abdulaziz University

Ministry of Higher Education in Saudi Arabia

<u>Initial interview protocol</u>

Research project title:

"Preparing pre-service teachers for effective use of educational technology in Saudi Arabia"

Purposes:

This protocol has been developed to fulfil the following purposes:

1- To provide essential details about each interview;

2- To include the interview questions and the rationale behind posing every question, a procedure necessary to prompt the interviewer's thinking of outcomes expected from every question;

3- To relate answers to the main research questions; and

4- To serve as field notes for the researcher during and after the interview.

Interviews with policymakers

Interview #	Date:	Time:	Site:	Duration:
Respondent	Age:	Education:	Department:	Responsibilities:

No	Questions (main & probing)	Rationale
1.	**How the concept of "technology integration" in pre-service teacher education (PSTE) in Saudi Arabia (SA) is perceived?** A. What is your definition of the concept of technology integration in PSTE? B. What are the factors that shaped the concept of technology integration in PSTE? C. What do you think about the concept of technology integration in PSTE? D. What is your point of view about the relationship between technology integration and the quality of education in PSTE? E. What do you do towards utilising the concept of technology integration in PSTE?	- Perceiving the term of technology integration - Definition and concept of technology integration in PSTE - Factors that shaped this concept - Attitudes towards this concept - Views about the relationship between technology integration and the quality of education in PSTE - Practices towards utilising this concept in PSTE
2.	**How do participants realise the importance of implementing technology to reach its integration in teaching and learning approaches?** A. Do you think it is important to implement technology in teaching and learning approaches? B. What do you think about implementing technology tools and materials in teaching and learning approaches (i.e. Internet, databases, and electronic books)? **C.** What do you expect from integrating technology in teaching and learning approaches?	- Level of Awareness and expectations - The importance of implementing technology in teaching and learning approaches to reach its integration - Attitudes towards implementing ICTs in teaching and learning approaches - Expectations from integrating technology in teaching and learning approaches
3.	**How do policies affect the implementing of technology in terms of technology integration in teaching and learning approaches in PSTE?** A. What are the factors affecting technology integration in PSTE? B. What are the contextual constraints to technology integration in PSTE?	- Influences of educational policies on the implementation of technology in PSTE - Factors that affect technology integration in PSTE - Contextual constraints of technology integration in PSTE?
4.	**How do curricula present and maintain the importance of technology integration in PSTE?** A. How do curricular subjects in PSTE prepare and train pre-service teachers to integrate technology in their teaching approaches in the future? B. What are the curricular subjects in PSTE that maintain to prepare and train pre-service teachers in terms of technology integration? C. How efficient are these curricular subjects in PSTE of preparing and training pre-service teachers in terms of technology integration?	- Curriculum design and technology integration in PSTE - Curricular subjects and technology integration in PSTE - The type of these curricular subjects - The efficiency of these curricular subjects
5.	**How much technology practice is available or implemented in PSTE in terms of technology integration?** A. How do instructors implement technology in their teaching approaches? B. Do instructors had or intend to have any in-service training to integrate technology in their teaching approaches?	- Technology practice in PSTE - Implementation of technology in teaching approaches - In-service training for instructors - Implementation of technology in learning approaches - Pre-service teachers and technology training

No	Questions (main & probing)	Rationale
	C. How do pre-service teachers implement technology in their learning approaches? D. Do pre-service teachers intend to have training to integrate technology in their learning approaches? E. What kind of facilities is offered to integrate technology in teaching and learning approaches in PSTE? **F.** How the facilities of the basic infrastructure are efficient to integrate technology in teaching and learning approaches in PSTE?	- Affordable technological facilities - The efficient of those facilities
6.	**How does self-efficacy influence the implementation of technology in terms of technology integration in PSTE?** A. Are you interested in integrating ICTs in teaching and learning approaches in PSTE? B. Recently, do you feel satisfied of implementing ICTs in teaching and learning approaches in PSTE? C. Do you look forward to integrating ICTs in teaching and learning approaches in PSTE? D. Are you sure that ICTs can be integrated effectively in teaching and learning approaches in PSTE?	- The influence of Self-efficacy on technology implementation in PSTE - Emotion, cognitive and self-regulatory processes, and performance
7.	**How does senior management of the college influence technology implementation in terms of technology integration in PSTE?** A. As a leader, how do you consider the importance of technology integration in PSTE? B. As a leader, how do you consider the importance of infrastructure in terms of technology integration in PSTE? C. As a leader, how do you consider the importance of training and support in terms of technology integration in PSTE? A. As a leader, how do you consider the importance of building a resource base in terms of technology integration in PSTE?	- Influences of leadership on technology integration in PSTE - Relationship between leadership and technology integration importance in PSTE - Relationship between leadership and technology infrastructure in PSTE - Relationship between leadership and technological training and support in PSTE - Relationship between leadership and technological resources bases in PSTE

Interviews with academic staff

Interview #	Date:	Time:	Site:	Duration:
Respondent	Age:	Education:	Department:	Responsibilities:

No	Questions (main & probing)	Rationale
1.	**How the concept of "technology integration" in pre-service teacher education (PSTE) in Saudi Arabia (SA) is perceived?** A. What is your definition of the concept of technology integration in PSTE? B. To you, what are the factors that shaped the concept of technology integration in PSTE? C. What do you think about the concept of technology integration in PSTE? D. What is your point of view about the relationship between technology integration and the quality of education in PSTE? E. What do you do towards utilising the concept of technology integration in PSTE?	Perceiving the term of technology integration Definition and concept of technology integration in PSTE Factors that shaped this concept Attitudes towards this concept Views about the relationship between technology integration and the quality of education in PSTE Practices towards utilising this concept in PSTE
2.	**How participants realise the importance of implementing technology to reach its integration in teaching and learning approaches in PSTE?** A. Do you think it is important to implement technology in your teaching approaches to reach its integration? B. What do you think about implementing technology tools and materials in your teaching approaches (i.e. Internet, databases, and electronic books)? C. What do you expect from integrating technology in your teaching approaches?	Level of Awareness and expectations The importance of implementing technology in teaching and learning approaches to reach its integration Attitudes towards implementing ICTs in teaching and learning approaches Expectations from integrating technology in teaching and learning approaches
3.	**How do policies affect the implementing of technology in terms of technology integration in teaching and learning approaches in PSTE?** A. To you, what are the factors affecting technology integration in PSTE? B. What are the contextual constraints to technology integration in PSTE?	Influences of educational policies on the implementation of technology in PSTE Factors that affect technology integration in PSTE Contextual constraints of technology integration in PSTE?
4.	**How do curricula present and maintain the importance of technology integration in PSTE?** A. How do curricular subjects in PSTE prepare and train pre-service teachers to integrate technology in their teaching approaches in the future? B. What are the curricular subjects in PSTE that maintain to prepare and train pre-service teachers in terms of technology integration? C. How efficient are these curricular subjects in PSTE of preparing and training pre-service teachers in terms of technology integration?	Curriculum design and technology integration in PSTE Curricular subjects and technology integration in PSTE The type of these curricular subjects The efficiency of these curricular subjects
5.	**How much technology practice is available or implemented in PSTE in terms of technology integration?** A. How do you implement technology in your teaching approaches? B. Do you had or intend to have any in-service training to integrate technology in your teaching	Technology practice in PSTE Implementation of technology in teaching approaches In-service training for instructors Implementation of technology in learning approaches Pre-service teachers and technology

No	Questions (main & probing)	Rationale
	approaches? C. How do pre-service teachers implement technology in their learning approaches? D. Do pre-service teachers intend to have training to integrate technology in their learning approaches? E. What kinds of facilities are offered to integrate technology in teaching and learning approaches in PSTE? F. How the facilities of the basic infrastructure are efficient to integrate technology in teaching and learning approaches in PSTE?	training Affordable technological facilities The efficient of those facilities
6.	**How does self-efficacy influence the implementation of technology in terms of technology integration in PSTE?** A. Are you interested in integrating ICTs in your teaching approaches? B. Recently, do you feel satisfied of implementing ICTs in your teaching approaches? C. Do you look forward to integrating ICTs in your teaching approaches? D. How sure are you that ICTs can be integrated effectively in teaching and learning approaches in PSTE?	The influence of Self-efficacy on technology implementation in PSTE Emotion, cognitive and self-regulatory processes, and performance
7.	**How does senior management of the college influence technology implementation in terms of technology integration in PSTE?** A. As an academic staff, how does senior management of the college consider the importance of technology integration in PSTE? B. As an academic staff, how does senior management of the college consider the importance of infrastructure in terms of technology integration in PSTE? C. As an academic staff, how does senior management of the college consider the importance of training and support in terms of technology integration in PSTE? D. As an academic staff, how does senior management of the college consider the importance of building a resource base in terms of technology integration in PSTE?	Influences of leadership on technology integration in PSTE Relationship between leadership and technology integration importance in PSTE Relationship between leadership and technology infrastructure in PSTE Relationship between leadership and technological training and support in PSTE Relationship between leadership and technological resources bases in PSTE

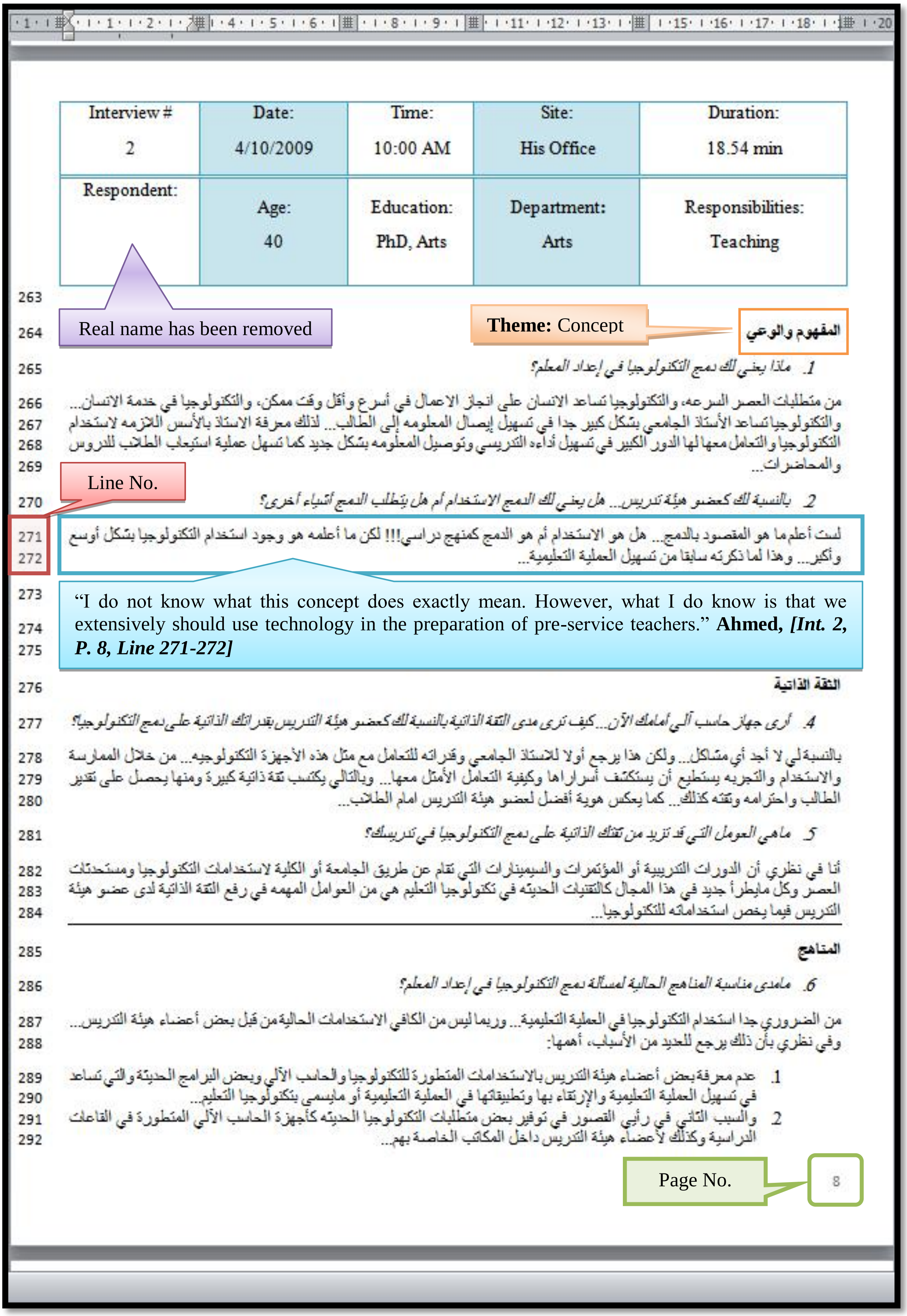
Interviews with pre-service teachers

Interview #	Date:	Time:	Site:	Duration:
Respondent	Age:	Level:	Department:	

No	Questions (main & probing)	Rationale
1.	**How the concept of "technology integration" in pre-service teacher education (PSTE) in Saudi Arabia (SA) is perceived?** A. What is your definition of the concept of technology integration in PSTE? B. To you, what are the factors that shaped the concept of technology integration in PSTE? C. What do you think about the concept of technology integration in PSTE? D. What is your point of view about the relationship between technology integration and the quality of education in PSTE? E. What do you do towards utilising the concept of technology integration in PSTE?	- Perceiving the term of technology integration - Definition and concept of technology integration in PSTE - Factors that shaped this concept - Attitudes towards this concept - Views about the relationship between technology integration and the quality of education in PSTE - Practices towards utilising this concept in PSTE
2.	**How participants realise the importance of implementing technology to reach its integration in teaching and learning approaches in PSTE?** A. Do you think it is important to implement technology in your learning approaches to reach its integration? B. What do you think about implementing technology tools and materials in your learning approaches (i.e. Internet, databases, and electronic books)? C. What do you expect from integrating technology in your learning approaches?	- Level of Awareness and expectations - The importance of implementing technology in teaching and learning approaches to reach its integration - Attitudes towards implementing ICTs in teaching and learning approaches - Expectations from integrating technology in teaching and learning approaches
3.	**How do policies affect the implementing of technology in terms of technology integration in teaching and learning approaches in PSTE?** A. What are the factors affecting technology integration in PSTE? B. What are the contextual constraints to technology integration in PSTE?	- Influences of educational policies on the implementation of technology in PSTE - Factors that affect technology integration in PSTE - Contextual constraints of technology integration in PSTE?
4.	**How do curricula present and maintain the importance of technology integration in PSTE?** A. How do curricular subjects in PSTE prepare and train pre-service teachers to integrate technology in their teaching approaches in the future? B. What are the curricular subjects in PSTE that maintain to prepare and train pre-service teachers in terms of technology integration? C. How efficient are these curricular subjects in PSTE of preparing and training pre-service teachers in terms of technology integration?	- Curriculum design and technology integration in PSTE - Curricular subjects and technology integration in PSTE - The type of these curricular subjects - The efficiency of these curricular subjects
5.	**How much technology practice is available or implemented in PSTE in terms of technology integration?** A. How do instructors implement technology in their teaching approaches? B. How do you implement technology in your	- Technology practice in PSTE - Implementation of technology in teaching approaches - In-service training for instructors - Implementation of technology in learning approaches

No	Questions (main & probing)	Rationale
	learning approaches? C. Do you had or intend to have training to integrate technology in your learning approaches? D. What kinds of facilities are offered to integrate technology in your learning approaches? E. How the facilities of the basic infrastructure are efficient to integrate technology in your learning approaches?	✚ Pre-service teachers and technology training ✚ Affordable technological facilities ✚ The efficient of those facilities
6.	**How does self-efficacy influence the implementation of technology in terms of technology integration in PSTE?** A. Are you interested in integrating ICTs in your learning approaches? B. Recently, do you feel satisfied of implementing ICTs in your learning approaches in PSTE? C. Do you look forward to integrating ICTs in your learning approaches? D. How sure are you that ICTs can be integrated effectively in teaching and learning approaches in PSTE?	✚ The influence of Self-efficacy on technology implementation in PSTE ✚ Emotion, cognitive and self-regulatory processes, and performance
7.	**How does senior management of the college influence technology implementation in terms of technology integration in PSTE?** A. As a pre-service teacher, how does senior management of the college consider the importance of technology integration in PSTE? B. As a pre-service teacher, how does senior management of the college consider the importance of infrastructure in terms of technology integration in PSTE? C. As a pre-service teacher, how does senior management of the college consider the importance of training and support in terms of technology integration in PSTE? D. Do you notice any cooperation with private sectors and other organisations in terms of supporting technology implementation in PSTE?	✚ Influences of leadership on technology integration in PSTE ✚ Relationship between leadership and technology integration importance in PSTE ✚ Relationship between leadership and technology infrastructure in PSTE ✚ Relationship between leadership and technological training and support in PSTE ✚ Relationship between leadership and technological resources bases in PSTE

Appendix 8: Example of the interviews database (instructor)



Interview #	Date:	Time:	Site:	Duration:
2	4/10/2009	10:00 AM	His Office	18.54 min
Respondent:	Age: 40	Education: PhD, Arts	Department: Arts	Responsibilities: Teaching

Real name has been removed

Theme: Concept

المفهوم والوعي

1. ماذا يعني لك دمج التكنولوجيا في إعداد المعلم؟

من متطلبات العصر السرعه، والتكنولوجيا تساعد الانسان على انجاز الاعمال في أسرع وأقل وقت ممكن، والتكنولوجيا في خدمة الانسان... والتكنولوجيا تساعد الأستاذ الجامعي بشكل كبير جدا في تسهيل إيصال المعلومه إلى الطالب... لذلك معرفة الاستاذ بالأسس اللازمه لاستخدام التكنولوجيا والتعامل معها لها الدور الكبير في تسهيل أداء التدريسي وتوصيل المعلومه بشكل جديد كما تسهل عملية استيعاب الطلاب للدروس والمحاضرات...

Line No.

2. بالنسبة لك كعضو هيئة تدريس... هل يعني لك الدمج الاستخدام أم هل يتطلب الدمج أشياء أخرى؟

لست أعلم ما هو المقصود بالدمج... هل هو الاستخدام أم هو الدمج كمنهج دراسي!!! لكن ما أعلمه هو وجود استخدام التكنولوجيا بشكل أوسع وأكبر... وهذا لما ذكرته سابقا من تسهيل العملية التعليمية...

"I do not know what this concept does exactly mean. However, what I do know is that we extensively should use technology in the preparation of pre-service teachers." **Ahmed, *[Int. 2, P. 8, Line 271-272]***

الثقة الذاتية

4. أرى جهاز حاسب آلي أمامك الآن... كيف ترى مدى الثقة الذاتية بالنسبة لك كعضو هيئة التدريس بقدراتك الذاتية على دمج التكنولوجيا؟

بالنسبة لي لا أجد أي مشاكل... ولكن هذا يرجع أولا للاستاذ الجامعي وقدراته للتعامل مع مثل هذه الأجهزة التكنولوجيه... من خلال الممارسة والاستخدام والتجربه يستطيع أن يستكشف أسرارها وكيفية التعامل الأمثل معها... وبالتالي يكتسب ثقة ذاتية كبيرة ومنها يحصل على تقدير الطالب واحترامه وثقته كذلك... كما يعكس هوية أفضل لعضو هيئة التدريس امام الطلاب...

5. ماهي العومل التي قد تزيد من ثقتك الذاتية على دمج التكنولوجيا في تدريسك؟

أنا في نظري أن الدورات التدريبية أو المؤتمرات والسيمينارات التي تقام عن طريق الجامعة أو الكلية لاستخدامات التكنولوجيا ومستحدثات العصر وكل مايطرأ جديد في هذا المجال كالتقنيات الحديثه في تكنولوجيا التعليم هي من العوامل المهمه في رفع الثقة الذاتية لدى عضو هيئة التدريس فيما يخص استخداماته للتكنولوجيا...

المناهج

6. مامدى مناسبة المناهج الحالية لمسألة دمج التكنولوجيا في إعداد المعلم؟

من الضروري جدا استخدام التكنولوجيا في العملية التعليمية... وربما ليس من الكافي الاستخدامات الحالية من قبل بعض أعضاء هيئة التدريس... وفي نظري بأن ذلك يرجع للعديد من الأسباب، أهمها:

1. عدم معرفة بعض أعضاء هيئة التدريس بالاستخدامات المتطورة للتكنولوجيا والحاسب الآلي وبعض البرامج الحديثة والتي تساعد في تسهيل العملية التعليمية والإرتقاء بها وتطبيقاتها في العملية التعليمية أو مايسمى بتكنولوجيا التعليم...
2. والسبب الثاني في رأيي القصور في توفير بعض متطلبات التكنولوجيا الحديثه كأجهزة الحاسب الآلي المتطورة في القاعات الدراسية وكذلك لأعضاء هيئة التدريس داخل المكاتب الخاصة بهم...

Page No.

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Appendix 9: Ethics approval

LA TROBE UNIVERSITY

RESEARCH AND GRADUATE STUDIES OFFICE

MEMORANDUM

To:	**Professor Margaret Robertson, Faculty of Education, LTU** **Mr Abdulrahman Mohammed M. Al-Zahrani, Faculty of Education, LTU**
From:	**Secretary, La Trobe University Human Ethics Committee**
Subject:	**Review of Human Ethics Committee Application No. 08-077**
Title:	**Preparing pre-service teachers for effective use of educational technology**
Date:	**28 July 2008**

Thank you for submitting revisions to your application for ethics approval to the La Trobe University Human Ethics Committee (UHEC) for the project referred to above. Your response was forwarded to a subcommittee of the UHEC, who has assessed the project as complying with the National Health and Medical Research Council's *National Statement on Ethical Conduct in Human Research* and with University *Human Research Ethics Guidelines*.

Your project has been granted ethics approval and you may commence the study.

The project has been approved to 31 August 2010.

Please note that your application has been reviewed by a sub-committee of the UHEC in the interest of facilitating a decision on your application before the next committee meeting. The decision to approve your project will need to be ratified by the full UHEC and consequently approval for your project may be withdrawn or conditions of approval altered. However, your project may commence prior to ratification of the approval decision. You will be notified if the approval status of your project is altered.

The following standard conditions apply to your project:

- **Complaints.** If any complaints are received or ethical issues arise during the course of the project, researchers should advise the UHEC Secretary on telephone (03) 9479 1443;
- **Limit of Approval.** Approval is limited strictly to the research proposal as submitted in your application while taking into account the conditions and approval dates advised by the UHEC;
- **Variation to Project.** As a consequence of the previous condition, any subsequent variations or modifications you may wish to make to your project must be notified formally to the UHEC. This can be done using the appropriate form (*Application for Approval of Modification to Research Project)* which is available on the internet at http://*www.latrobe.edu.au/www/rgso/ethics/ethics.htm*. If the UHEC considers that the proposed changes are significant, you may be required to submit a new application form for approval of the revised project;

P.1

- **Progress Reports.** You are required to submit a *Progress Report* form annually, on or just prior to 12 February (if your project continues for more than 12 months). The form is available on the internet (see above address). When completed, the form should be returned to the UHEC Secretary. Failure to submit a progress report will mean approval for this project will lapse. An audit may be conducted by the UHEC at any time.

A **Final Report** will be due by **28 February 2011.**

If you have any queries on the matters mentioned above or require any further clarification please contact me through the Research and Graduate Studies Department on telephone (03) 9479 1443, facsimile (03) 9479 1464 or e-mail address humanethics@latrobe.edu.au

On behalf of the UHEC, best wishes with your research!

Barbara Doherty
Administrative Officer (Research Ethics)
University Human Ethics Committee
postal details:
Research and Graduate Studies Office
La Trobe University Bundoora, Victoria 3086
P: (03) 9479 - 1443
F: (03) 9479 - 1464
http://www.latrobe.edu.au/rgso/ethics

P.2

Appendix 10: Proposal to the Ministry of Higher Education

LA TROBE UNIVERSITY AUSTRALIA

Proposal to the Ministry of Higher Education

Faculty of Education at King Abdulaziz University

Dear Sir,

My name is Abdulrahman M. Al-Zahrani. I am a Saudi Lecturer at the Faculty of Education at King Abdulaziz University, and currently a postgraduate student at La Trobe University, pursuing a PhD degree in Educational Technology. My thesis topic is **"Preparing pre-service teachers for effective use of educational technology"**.

I am seeking permission to collect my research data from your faculty. This research investigates ways of preparing pre-service teachers to use educational technology effectively, which holds a great importance in teaching and learning. Findings and recommendations of the research will be reported to the Ministry and the university to study the feasibility of executing them in the curriculum development. Due acknowledgement of your cooperation will be indicated in the research.

Data collection includes survey questionaries and interviews with the academic instructors, pre-service teachers, and some classroom observations as well as document analysis that are relevant to the topic, for example, curriculum documents, program plans, and textbooks at the Faculty of Education.

I will be most grateful if I could be granted permission. My research is expected to bring several benefits to the Saudi education generally and to the pre-service teacher preparation program particularly.

Should you require further information, please contact my research principal supervisor, Professor Margaret Robertson:

Principal supervisor contact details:
Margaret Robertson, PhD Professor of Education; Research Director Faculty of Education; La Trobe University Bundoora, Victoria 3086, AUSTRALIA Tel: +61 3 9479 5616; Fax: +61 3 9479 3070 E-mail: M.Robertson@latrobe.edu.au E-mail

Thank you in advance. I look forward to receiving your reply.

Best Regards,

Abdulrahman M. Al-Zahrani

Student researcher contact details:	
Australia: La Trobe University Faculty of Education Bundoora, Victoria 3086 Ph: +61433377476 e-mail: ammz2@hotmail.com amalzahrani@students.latrobe.edu.au	**Saudi Arabia:** King Abdulaziz University Faculty of Education P.O. Box 15758 Jeddah 21454 Saudi Arabia Ph: +966504715507

Appendix 11: Permission Letter

المملكة العربية السعودية
وزارة التعليم العالي
جامعة الملك عبد العزيز
كلية المعلمين

الرقم : ....
التاريخ : ....
المشفوعات : ....

To home it may concern

Mr. Abdulrahman M. Al-Zahrani, a PhD student at La Trobe University in Australia has been granted this letter of permission for the following:

- Visiting the Jeddah Teachars College at King Abdulaziz University to conduct survey questionnaires with academic instructors and pre-service teachers.
- Conducting interviews with academic instructors and pre-service teachers.
- Doing classrooms observations with the consent of instructors.
- Reviewing existing documents that are relevant to the research study that he is doing.

Dean/

Jeddah Teachars College

Professor, Hasan A. A. Yahya

٢٥/١٢/١٤٢٩هـ

King Abdulaziz University
Dean's Office
Teachers Training College

ص. للوكيل

ص . ب ١٥٧٥٨ جـدة ٢١٤٥٤ المملكة العربية السعودية
P.O.Box 15758 Jeddah 21454 - Saudi Arabia
تليفون : ٦٩١٦٣٤٣/٦٩١٤٦٢٠
Tel. : 6916343 / 6914620
فاكس : ٦٩١٤٢٨٦
Fax. : 6914286
الموقع الإلكتروني : www.jtc.edu.sa : Website - البريد الإلكتروني : http://webmail.jtc.edu.sa : E-mail

Note: Jeddah Teachers College became The Faculty of Education.

Appendix 12: Information Sheets

LA TROBE UNIVERSITY AUSTRALIA

<u>**Information Sheet for survey participants**</u>

Dear Sir, ***(Academic Staff / Pre-service Teacher)***

I would like to invite you to participate in this survey conducted for my research titled:

"Preparing pre-service teachers for effective use of educational technology"

This research is being carried out for the degree of Doctor of philosophy at the Faculty of Education, La Trobe University, Melbourne, Australia. The principal investigator is Professor Margaret Robertson. The student researcher is Mr Abdulrahman Al-Zahrani.

The general aim of my doctoral research is to develop a framework to prepare pre-service teachers to use technology effectively in the Saudi education system. To achieve this aim, this study examines critically the current situation of technology preparation in pre-service in the Saudi teacher education through a mixed-method research approach at Jeddah Teachers College, King Abdulaziz University.

The anticipated time to fill in this questionnaire is about 30 minutes. By participating, the responses you give will help me develop a proposed framework for better pre-service teachers' preparation in the future. In addition, you will be reflecting on your own practices and providing important views that will help in improving the quality of the Saudi education.

For your knowledge, the results of the study will be presented in my PhD thesis, which will be submitted to the Faculty of Education at La Trobe University. Further, my thesis will be placed on the educational websites in SA in PDF format and the URL to access will be given to participants, colleges and stakeholders involved via the college and the university newsletters. In addition, results will be presented at a conference and may be published in a journal.

If you consent to participate in this survey, you will not be identified in any reports from this study. Information from the survey will be kept in a secure cabinet or password-protected computer files. In addition, all such information will be destroyed by shredding five years after the end of my PhD study.

It is important to know that participation is voluntary. If you choose not to participate, you will not be subject to adverse consequences or action. You may withdraw without explanation and should you wish, you may withdraw any unprocessed information you have supplied within four weeks after your participation date.

A consent form is attached for you with your copy of the survey questionnaire to sign to indicate your participation. If you have any complaints or queries about the survey and the study in general or if you would like further information about the study or a copy of the results, please feel free to contact:

La Trobe University Human Ethics Committee (UHEC)	Principal Supervisor contact details:
The Secretary of the UHEC: Barbara Doherty Research and Graduate Studies Office La Trobe University, Victoria, 3086 Tel: +61 3 9479 1443 e-mail: humanethics@latrobe.edu.au	Margaret Robertson, PhD Professor of Education; Research Director Faculty of Education; La Trobe University Bundoora, Victoria 3086, AUSTRALIA Tel: +61 3 9479 5616; Fax: +61 3 9479 3070 E-mail: M.Robertson@latrobe.edu.au

Alternatively, you may wish to contact the head manager of the academic staff affairs at the Faculty of Education, Mr Abdullah M. Al-Omari:

Mr Abdullah M. Al-Omari contact details:
King Abdulaziz University, Jeddah Teachers' College, Saudi Arabia P.O. Box 15758, Jeddah 21454 Ph: +966 505351668; e-mail: abood-1395@hotmail.com

Thank you very much for your help with this survey.

Student Researcher

Abdulrahman M. Al-Zahrani

Student Researcher contact details:	
Australia: La Trobe University Faculty of Education Bundoora, Victoria 3086 Ph: +61433377476 e-mail: ammz2@hotmail.com; amalzahrani@students.latrobe.edu.au	Saudi Arabia: King Abdulaziz University Jeddah Teachers' College P.O. Box 15758 Jeddah 21454 Saudi Arabia Ph: +966504715507

Information sheet for interview participants

Dear Sir, ***(Policymaker / Academic Staff / Pre-service Teacher)***

I would like to invite you to participate in my study titled:

"Preparing pre-service teachers for effective use of educational technology"

This research is being carried out for the degree of Doctor of philosophy at the Faculty of Education, La Trobe University, Melbourne, Australia. The principal investigator is Professor Margaret Robertson. The student researcher is Mr Abdulrahman Al-Zahrani.

The general aim of this doctoral thesis is to develop a framework to prepare pre-service teachers to use technology effectively in Saudi education. To achieve this aim, this PhD research study examines critically the current situation of technology preparation in pre-service in the Saudi teacher education a mixed-method research approach at Jeddah Teachers College, King Abdulaziz University.

You have been contacted because you indicated in the survey your willingness to participate in the follow-up interviews. If you still interested, your participation will involve a voice-recorded interview. The anticipated time for this interview is about 30 minutes. You will be asked a number of questions about your perceptions of technology integration and attitudes towards integrating educational technology into pre-service teacher education. You will also be asked about some other related issues with pre-service teacher education programs in Saudi Arabia generally such as policymaking and leadership.

Optional questions will be asked about your educational background. The interviews will focus on ways of approaching technology integration in pre-service; and how learners practice information and communication technologies in their training.

For your knowledge, the results of the study will be presented in my PhD thesis, which will be submitted to the Faculty of Education at La Trobe University. My thesis will be placed on the educational websites in SA in PDF format and the URL to access will be given to participants, colleges and stakeholders involved via the college and the university newsletters. In addition, results will be presented at a conference and may be published in a journal.

Names of participants will not be used in reporting the results of the study to keep maximum confidentiality. All interviews' recordings and transcripts will be kept under lock and computer protected files. Data will be accessible only to researchers (subject to legal limitations of confidentiality), and will be destroyed by shredding after a period of approximately five years.

Your participation in this research is voluntary. If you choose not to participate, you will not be subject to adverse consequences or action. You are also free to withdraw your consent or withdraw any unprocessed data that you may have supplied within four weeks after your participation date.

Your participation will greatly be appreciated. If you have any complaints, question, or would like to know more about the project, please feel free to contact:

La Trobe University Human Ethics Committee (UHEC)	Principal Supervisor contact details:
The Secretary of the UHEC: Barbara Doherty Research and Graduate Studies Office La Trobe University, Victoria, 3086 Tel: +61 3 9479 1443 e-mail: humanethics@latrobe.edu.au	Margaret Robertson, PhD Professor of Education; Research Director Faculty of Education; La Trobe University Bundoora, Victoria 3086, AUSTRALIA Tel: +61 3 9479 5616; Fax: +61 3 9479 3070 E-mail: M.Robertson@latrobe.edu.au

Alternatively, you may wish to contact the head manager of the academic staff affairs at the Faculty of Education, Mr Abdullah M. Al-Omari:

Mr Abdullah M. Al-Omari contact details:
King Abdulaziz University, Jeddah Teachers' College, Saudi Arabia P.O. Box 15758, Jeddah 21454 Ph: +966 505351668; e-mail: abood-1395@hotmail.com

Thank you very much for your help with this interview.

Student Researcher

Abdulrahman M. Al-Zahrani

Student Researcher contact details:	
Australia: La Trobe University Faculty of Education Bundoora, Victoria 3086 Ph: +61433377476 e-mail: ammz2@hotmail.com; amalzahrani@students.latrobe.edu.au	Saudi Arabia: King Abdulaziz University Jeddah Teachers' College P.O. Box 15758 Jeddah 21454 Saudi Arabia Ph: +966504715507

Appendix 13: Consent forms

LA TROBE UNIVERSITY AUSTRALIA

<u>Consent form for survey participants</u>

"Preparing pre-service teachers for effective use of educational technology"

1. I have read and understood the "Information Sheet" for this study.
2. The nature and the possible effects of the study have been explained to me.
3. I understand that the study involves **completing the survey questionnaire**.
4. I understand that **participation is voluntary** and if I choose not to participate, **I will not be subject to adverse consequences or action.**
5. I understand that the following risks are involved: **if I feel anxious at any time during the survey, I may withdraw without any consequences.**
6. I understand that all research data will be securely stored in a secure cabinet or password-protected computer files and all such information will be destroyed by burning five years after or when no longer required.
7. Any questions that I have asked have been answered to my satisfaction.
8. I agree that research data gathered from me for the study may be published provided that I cannot be identified as a participant.
9. I understand that my identity will be kept confidential and that any information I supply to the researcher will be used only for the purpose of the research.
10. I agree to participate in this study and I understand that **I may withdraw any unprocessed information I have supplied within four weeks after my participation date.**
11. I understand that the results of the research will be presented in a PhD thesis, which will be submitted to the Faculty of Education at La Trobe University. It will be placed on the web in PDF format and the URL to access will be given to participants, colleges and stakeholders involved.
12. I also understand that results will be presented at a conference and may be published in a journal.

Signature:…………………………………………….…….....	Date:…………………………………….……………....

Student Researcher

Abdulrahman M. Al-Zahrani

Statement by Researcher	Yes	No
I have explained this study and the implications of participation to this volunteer. I believe that the consent is informed and that he understands the implications of participation.		
The participant has received the "Information Sheet" in which my details have been provided so that participants have the opportunity to contact me prior to them consenting to participate in this study.		

Consent form for interview participants

“Preparing pre-service teachers for effective use of educational technology”

1. I have read and understood the “Information Sheet” for this study.
2. The nature and the possible effects of the study have been explained to me.
3. I understand that the study involves **conducting a voice-recorded interview.**
4. I understand that **participation is voluntary** and if I choose not to participate, **I will not be subject to adverse consequences or action.**
5. I understand that the following risks are involved: **if I feel anxious during the interview, I may withdraw without any consequences.**
6. I understand that all research data will be securely stored in a secure cabinet or password-protected computer files and all such information will be destroyed by burning five years after or when no longer required.
7. Any questions that I have asked have been answered to my satisfaction.
8. I agree that research data gathered from me for the study may be published provided that I cannot be identified as a participant.
9. I understand that my identity will be kept confidential and that any information I supply to the researcher will be used only for the purpose of the research.
10. I agree to participate in this study and I understand that **I may withdraw any unprocessed information I have supplied within four weeks after my participation date.**
11. I understand that the results of this study will be presented in a PhD thesis, which will be submitted to the Faculty of Education at La Trobe University. It will be placed on the web in PDF format and the URL to access will be given to participants, colleges and stakeholders involved.
12. I also understand that results will be presented at a conference and may be published in a journal.
13. I agree to participate in this study and I understand that **interview will be voice-recorded**.

Signature:……………………………………..……	Date:……………………………….…………...

Student Researcher

Abdulrahman M. Al-Zahrani

Statement by Researcher	Yes	No
I have explained this study and the implications of participation to this volunteer. I believe that the consent is informed and that he understands the implications of participation.		
The participant has received the “Information Sheet” in which my details have been provided so that participants have the opportunity to contact me prior to them consenting to participate in this study.		

Appendix 14: The main goals of Saudi teacher preparation (MoE, 1980)

1. Programs of training teachers in various educational fields and levels shall be in line with the nation's basic objective in rearing up a Muslim generation that understands the Islamic creed and law in a correct way and is ready to put all its efforts in the service of its nation.

2. Islamic education and the Arabic language are given special attention in Teachers' Colleges to enable graduates to teach with a high Islamic spirit and correct Arabic language.

3. Concerned educational authorities shall give special attention to the training of scientifically and morally qualified teachers for all stages of education under a timetable aimed ultimately at self-sufficiency.

4. New courses shall be constantly introduced into Teachers' Colleges and education departments in compliance with the country's needs and in accordance with the timetable.

5. Recruitment for administrative and teaching staff in these colleges is done in line with general educational objectives as stated above, namely Islamic morality, scientific standards and educational competence.

6. Students enrolled in Teachers' Colleges are granted special financial and social privileges.

7. A special cadre is set up for teachers with the purpose of raising their standards, encouraging them to assume this educational task and perform their mission with loyalty and devotion, and ensuring their continued services in the field of education.

8. Teacher training is a continuous operation. A plan is set up to train and rehabilitate professionally disqualified ones, and another plan is set up to re-orient and improve the standard of qualified ones.

9. Teachers are given every opportunity to pursue academic training that qualifies them for higher posts in their field of specialisation. Measures to achieve this objective shall be taken by educational authorities.

10. Schooling period for elementary teachers' training shall be not less than the period needed to obtain the secondary certificate. The training of female teachers for this job is done gradually. The period for training intermediary and secondary teachers shall not be less than the period needed for obtaining a higher education degree.

(MoE, 1980, pp. 30–31)

Appendix 15: Curriculum structure in Saudi pre-service teacher education

No.	Module	Description	Accredit Units
1	Basic discipline preparation	• Pre-service teachers undertake some compulsory subjects that aim to develop basic discipline knowledge and skills. • Basic knowledge and skills vary from discipline to discipline. • Basic subjects are offered in the first four levels during pre-service teacher preparation.	70 Units of: Basic discipline preparation & Advanced-discipline preparation
2	Advanced-discipline preparation	• Pre-service teachers undertake advanced compulsory subjects that aim to develop advanced-discipline knowledge and skills. • Advanced knowledge and skills that pre-service teachers must study also vary from discipline to discipline. • Advanced subjects are offered in the final four levels during pre-service teacher preparation.	
3	Multi-disciplinary preparation	• Pre-service teachers undertake basic and compulsory subjects that aim to develop multi-discipline knowledge and skills. • Multi-discipline knowledge and skills that pre-service teachers must study do not vary from discipline to discipline. • Subjects studied from other disciplines include Islamic studies, Arabic language, Social studies, English Language, Natural Sciences such as Biology, Chemistry, and Physics, Geometrics and Maths, Computer Science and Special Education. • Multi-disciplinary subjects are offered in the first four levels during pre-service teacher preparation.	70 Units of: Multi-disciplinary preparation
4	Educational preparation	• Pre-service teachers undertake basic but compulsory subjects that aim to develop more knowledge and skills in terms of teaching proficiency. • Subjects in teaching proficiency knowledge and skills also do not vary from discipline to discipline. • These subjects include Educational Technology, Psychology, and Curriculum. • Educational subjects are offered across the eight levels of pre-service teacher preparation.	16 Units of: Educational preparation *(Including Educational Technology Units)*

Appendix 16: The main goals of the Department of Educational Technology (2010), Faculty of Education – King Abdulaziz University

1. Supporting the academic and scientific program of the Faculty of Education at King Abdulaziz University through providing the students with compulsory courses in the field of educational technology.

2. Supporting postgraduate programs in the Faculty and the university through providing Master's programs in the field of educational technology, training courses for school administrators and the Diploma of Management of Learning Resource Centres.

3. Stimulating scientific research in education generally and in educational technology in particular through participation in research, conferences, seminars, training courses and the supervision of postgraduate students in cooperation with Saudi universities that offer these degrees in the field of educational technology.

4. Evaluating and developing courses offered by the Department to keep pace with developments in the field of educational technology in terms of both theory and practice.

5. Supporting the activities and objectives of Saudi educational institutions with regard to training programs for in-service teachers in order to develop their skills in educational technology.

6. Supporting programs offered by the Centre of Training and Community Service through cooperation in the preparation and presentation of training programs and various workshops.

7. Supporting the scientific aspects in some courses that are provided through the provision of supervision, training and technical advice to the students in these courses in addition to providing materials, tools and the necessary facilities needed by the practical side in those courses.

8. Providing technical assistance to faculty members in the courses of a practical nature for the operation of devices, audio-visual presentations and practical explanations and the follow-up of student projects.

9. Providing technical assistance to faculty members in the Faculty in the design and production of drawings, photographic transparencies, slides, videos and audio tapes and computer software.

10. Providing technical assistance to educational institutions and others in the community outside the university.

[No page No., Translated into English by the student researcher]

Appendix 17: Objectives of the Educational Technology Preparation units, Faculty of Education—King Abdulaziz University

Code	Unit Objectives
TTEC 100	- Define the concept *educational technology* - Examine the historical development of the concept *educational technology* - Explore the relationship between *educational technology* and other concepts in education - Identify the purposes and justifications behind utilising educational technology in education - Understand the benefits of utilising educational technology in education - Define *instructional means* and its different classifications - Understand the standards of implementing an appropriate *instructional mean* in instruction - Explain different implementations of *instructional means* in different educational settings - Determine the importance of using *instructional means* - Explore characteristics, elements and models of *communication theory* - Clarify the concept of *instructional design* and some of its various models - Explain the main goals of Instructional Resource Centres and their components - Explain the theoretical bases of *individual learning* with its strategies and implications - Show an understanding of new developments in educational technology and its models - Understand the uses of educational computers in education - Describe multimedia and its characteristics - Determine the importance of utilising the Internet in education - Justify the implementation of e-Learning in education and its specifications - Define the term *smart class* and its specifications
TTEC 200	- Give a clear definition of the concept *instructional means* - Define the standards of using *instructional means* - Consider the main principles in using *instructional means* - Know how to manage educational activities that are similar to the students' daily activities - Determine different ways of producing various types of solid, visual and printed instructional means such as maps, graphs, charts and diagrams - Determine different ways of producing various types of educational display boards such as bill boards, story boards, mixing boards and flannel boards - Determine different ways of producing transparencies (hand-made, thermo, and computerized) - Introduction to producing PowerPoint presentations - Introduction to producing multimedia in education

Code	Unit Objectives
TTEC 201	- Introduction to the role and use of audio-visual equipment in education - Classify audio-visual equipment in terms of its use, role and historical development - Practice the technical use, procedures and safety of audio-visual equipment - Determine the physical components, elements and designing strategies of various settings of educational environments - Manage and design audio-visual environments with their elements and standards - Describe, manage, use, and maintain different types of traditional projectors such as overhead projectors, slide projectors and opaque projectors - Describe, manage, use, and maintain different types of new technology projectors such as data projectors, CDs, DVD projectors and smart boards - Describe, manage, use, and maintain other types of educational equipment such as audio equipment, video recording equipment, school broadcasting equipment and educational television
TTEC 300	- Define *instructional design* with its models, steps and benefits - Understand the various uses of *instructional design* in education - Suggest an instructional design model in light of the global instructional design models - Distinguish differences between education, learning and teaching - Describe types and uses of educational computing programs in education - Manage and use different ready-to-use educational computing programs offered by the MoE - Understand procedures of producing and introducing educational computing programs - Practice to produce simple educational computing programs in multi-disciplinary subjects

[The Educational Technology Department, 2010, No page No., Translated into English by the student researcher].

Appendix 18: Effective leadership: The instructors and pre-service teachers' views

The importance of technology integration into mission		**Instructors**								**Pre-service teachers**							
		HP%	P%	RL%	LP%	NP%	**N**	***M***	***SD***	HP%	P%	RLP%	LP%	NP%	**N**	***M***	***SD***
1	Commitment in using technology effectively in its practice	44	18	24	10	4	50	3.88	1.21	29.8	23.4	21.2	14.8	8.3	317	3.53	1.30
2	Includes technology use in its mission	34	32	20	10	4	50	3.82	1.14	24	26.8	24.6	13.5	8.3	316	3.46	1.24
3	Articulating a technology vision in addresses to the faculty and students	38	22	22	14	4	50	3.76	1.22	22.5	26.8	23.1	12.9	11.1	313	3.38	1.29
4	Ensuring that graduates and leaders understand the importance of technology in schools	36	26	8	16	12	49	3.60	1.44	31.1	20.6	17.8	15.4	12.3	316	3.44	1.40
5	Showcasing available technology initiatives	30	28	12	24	6	50	3.59	1.31	22.8	24	23.1	15.1	12.6	317	3.30	1.33
The importance of technological Infrastructure																	
1	Faculty, staff and students have access to appropriate technological tools (e.g. Internet)	34	38	18	4	4	49	3.96	1.04	28.6	23.4	18.2	15.1	12.3	317	3.42	1.38
2	Creating an environment where integrating technology is possible	40	28	16	12	2	49	3.94	1.13	32.9	23.1	19.7	14.2	7.4	316	3.62	1.29
3	Offering Laptops and portable projectors for faculty staff and students	40	26	16	8	8	49	3.84	1.28	26.5	19.7	15.4	16.0	19.1	314	3.19	1.49
4	Offering adequate maintenance and support for technology resources	26	40	16	10	6	49	3.71	1.15	27.4	19.4	15.1	18.5	16.9	316	3.22	1.47
5	Offering adequate technology for students (e.g. Labs and learning centres)	26	34	18	12	8	49	3.59	1.24	29.8	20.3	14.2	16.9	16.0	316	3.32	1.47
6	Offering technology to be available in the classrooms	22	28	20	18	10	49	3.35	1.30	22.8	24.9	15.7	18.2	15.4	315	3.22	1.40

The importance of technology training and support																	
1	Supporting students and training in specialised technologies, labs, Internet access points and resources centres that provides access to the materials needed in classrooms	42	28	6	18	4	49	3.88	1.27	39.4	16.6	17.2	14.2	10.5	318	3.62	1.40
2	Offering training for staff and students to upgrade their skills and learn new ones	28	26	28	12	4	49	3.63	1.15	30.8	18.8	18.8	13.5	15.7	317	3.36	1.45
3	Offering online tutorials and technical instruction during class time	26	22	24	16	10	49	3.39	1.32	27.1	20.0	13.2	14.5	22.5	316	3.15	1.54
4	Offering workshops with open lab time under a supervision of specialised personnel	24	26	24	10	14	49	3.37	1.35	27.7	23.7	11.4	19.4	15.1	316	3.30	1.45
The importance of building a technology resource base																	
1	Creating cooperation with private sectors and other organisations to support technology resources base	30	26	16	16	8	48	3.56	1.32	NA							
2	Finding other resources to support technology resources beyond the base budget in case of expensive technologies	30	24	20	16	8	49	3.53	1.31								
3	Creating cooperation with private sectors and other organisations in terms of training and maintenance	30	20	16	16	14	48	3.38	1.45								
4	Creating cooperation with private sectors and other organisations to share technology resources bases	32	16	16	20	12	48	3.38	1.45								

(HP= High Priority, P= Priority, RLP= Relatively Low Priority, LP= Low Priority, NP= No Priority).

Appendix 19: Comparison between the current study and other previous studies

Study	Challenges and obstacles	The current study	conclusion
Moursund and Bielefeldt (1999)	Less use of technology in teaching and learning	Lack of technology-based pedagogical practices	similar
	Pre-service teacher education program lacks adequate technology plans and models	No reference were found for the integration of technology in the pre-service teacher education curriculum structure, goals, objectives and guidelines	similar
			similar
	Lack of professional supervision of technology	Professional support for technology seems to be absent	similar
Al-Saleh (1999)	Limited role of educational technology	Educational technology is hardly used in teaching and learning	similar
	The limited role of research on pre-service teacher education	Less opportunity was found for innovation and change due to conservatism, centralisation and traditionalism	similar
Keiper, Harwood and Larson (2000)	Lack of accessibility to computers and technology	There were a lack of accessibility to computers, ICTs as well as other technology-related resources and facilities	similar
	Lack of technological abilities	High technology abilities, motivation and confidence, especially from pre-service teachers	Different
	Lack of dependability of technology	No evidence was recorded	NA
	Lack of supervision of students	There is a lack of professional supervision in technology	Similar
Pierson and McNeil (2000)	Limited access to technology	There were a clear lack of accessibility to computers and technology	Similar
	Lack of consistency between courses in pre-service teacher education	Courses are inconsistent, over multi-disciplinary and theoretically dominated	Similar and more
	Teaching technology is addressed with a single course	Teaching technology through the Educational Technology Module in which courses are considered out-dated and ineffective	Different
	Lack of self-confidence and skill with technology	High levels of self-efficacy, self-confidence, technology expertise and familiarity	Different

Study	Challenges and obstacles	The current study	conclusion
Johnston and Cooley (2001)	Lack of technical support	There is a lack of technical and professional support	Similar
	Lack of time	Pre-service teachers reported that they lack time due to the heaviness of the curriculum	Similar
Duhaney (2001)	Availability and accessibility to technology	Technology equipment seems to be affordable, but less accessible due to centralisation	Relatively similar
	Availability to resources of funding	There were some difficulties associated with funding resources due to centralisation	Similar
	Availability and accessibility to training	Both instructors and pre-service teachers lack professional training. However, instructors have more access to training	Similar
	Availability of technical support	Both instructors and pre-service teachers lack professional support in technology	Similar
	Lack of research regarding pedagogical computing	There is a paucity of research conducted on the effective integration of technology	Similar
Chao (2003)	Limited information about technology integration is available in curriculum	No references were found for the integration of technology in the curriculum structure, goals, objectives and guidelines	Similar
Bin-Taleb (2005)	Availability of technology	Lack of access to technology	Similar
	Time constraints	Lack of time due to the curriculum heaviness	Similar
	Inadequate support	There is a lack of professional support	Similar
Al-Jarf (2006)	Lack of access to computers and the Internet	There is a lack of access to computers and the Internet	Similar
	Lack of trained staff in technology	Both instructors and pre-service teachers lack professional training, but instructors were more trained in technology than pre-service teachers	Relatively similar
	Lack of support	There is a lack of professional support	Similar
Rogers (2007)	Computer anxiety among pre-service teachers	High levels of computer confidence and self-efficacy were observed	Different
	Learners' innovativeness level	Learners may have high levels of innovativeness, but are restricted by traditionalism and centralisation	Different

Study	Challenges and obstacles	The current study	conclusion
Kleiner (2007)	Competing priorities in the classroom	Traditionalism dominates classroom practices	Different
	Available technology infrastructure	Technology infrastructure seems promising, but has some accessibility issues due to centralisation	Different
	Lack of technology training	Both instructors and pre-service teachers lack professional training in technology	Similar
	Lack of time	Lack of time due to the heaviness of the curriculum	Similar
	Lack of willingness	Traditionalism is widely prevailing and less opportunity for change has been observed	Similar
Zhao and Bryant (2006)	Standardised testing and focused time of teaching	Curriculum is heavy, standardised, over multi-disciplinary and theoretically dominated	Similar and more
Zeen (2007)	Lack of technical support	There is a lack of technical support	Similar
	Lack of training opportunities	Training opportunities for both instructors and pre-service teachers were few and traditional	Similar
	Lack of computers and related technologies	Technology seems affordable, but inaccessible due to centralisation	Different
	Lack of funding and financial support	There were some financial difficulties due to centralisation	Similar
Al-Asmari (2008)	Ineffective curriculum guidelines	Curriculum guidelines lack effective goals and objectives dedicated for the effective integration of technology	Similar
	Access issues	Some access issues were identified that were related to centralisation	Similar
	The instructors' inadequate computer literacy	Instructors seem to have proper technology training as well as awareness and self-efficacy	Different
Goktas et al. (2009)	Lack of appropriate software and hardware	Technology-related resources and facilities seem to be affordable, but of limited access	Different
	Lack of technology plans	The curriculum lacks relevant technology plans	Similar