UNIVERSITY OF
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PRE-SERVICE TEACHERS' PERCEPTIONS OF THE BARRIERS TO ICT INTEGRATION IN THEIR FUTURE INSTRUCTIONAL PRACTICE IN A GULF STATE

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ABSTRACT

The purpose of this study is to assess pre-service teachers' confidence with technological pedagogical knowledge, their attitude toward ICT integration in education, intention to integrate ICT in their future career, and their evaluation of their teacher education program in terms of preparing pre-service teachers to utilize ICT in their future instructional practice. Furthermore, this study explores the relationship between TPK confidence, and the attitude toward and intent to integrate ICT among pre-service teachers. A quantitative method was employed to gather data from pre-service teachers at their senior year at their College of Education during the academic year 2014/2015. The evidence was then analyzed based on the original research questions.

The study findings show that approximately half of the participants had neither the confidence nor the intention to utilize ICT in their future instructional practice. However, the majority of them also had positive attitudes toward ICT. The results show that there is a significant relationship between confidence and intention, with participants with less confidence about ICT skills in their instructional practice having no intention to utilize it in their future instructional practice. In addition, a significant relationship was evident between attitudes and confidence as participants believe that the use of ICT in teaching leads to better student learning outcomes. Evidence is mixed as to whether teacher education programs have a positive role in pre-service teachers' preparedness to use ICT in their future instructional practice. The research, therefore, suggests the need for effort on the part of both faculty members and policy makers to improve the teacher education program in the area of technology integration.

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APPENDIX-Acronym List

CAMI	Computer Aided Math Instruction
4C's skills	Communication, collaboration, creativity, and critical thinking
ESCWA	Economic and Social Commission for Western Asia
GCC	Arab Gulf Counties
HE	Higher Education
ICT	Information and Communication Technologies
ICTDAR	ICT for Development in the Arab Region
IRIN	Integrated Regional Information Networks
IST	International Society for Technology in Education
KSA	Kingdom of Saudi Arabia
MoH	Ministry of Education
MoHE	Ministry of Higher Education
TAM	Technology Acceptance Model
TPACK	Technological Pedagogical Content Knowledge
TPK	Technological Pedagogical Knowledge
UAE	United Arab Emirate
UNDP	United Nations Development Program
UNESCWA	United Nations Economic and Social Commission for Western Asia
WAN	Wide Area Network
WWW	World Wide Web

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CHAPTER ONE

1.0   Introduction

In this chapter, I explain the background of this research study. It includes an introduction which provides an overview of the field, the technological transformation of the country in which the study was carried out, the country's education systems and policies, and the implementation of ICT in its curriculum. This part of the study also outlines the dimensions and background to the study's problems.

This overview is followed by an exposition of the objectives relevant to the study of pre-service teachers' confidence regarding their technological pedagogical knowledge alongside their attitude and intentions to integrate ICT in their future career. Moreover, I will stress the significance of the investigation, which tackles an issue of major importance to education reform in the country under study. The name of the state is anonymized for reasons that will be discussed later.

1.1   Introduction and Background of The Study

The start of the current century witnessed the rapid growth and remarkable advances in Information and Communication Technologies (ICTs) (Price & Kirkwood, 2010). Their broad proliferation in all walks of life influenced society (Iskandarani, 2008), impacted modern market demands (Vilaseca-Requena et al., 2007), while also "imposing changes on education" (Makrakis, 2005, p.1). In realizing the said influence and the need to master new skills, ICT became a focus of interest in educational environments worldwide (Ilomäki, 2008).

In turn, ICT integration in the educational environment has been a controversial issue (Jhurree, 2005; Price & Kirkwood, 2010). On the one hand, some proponents of ICT integration claim that it will make a positive change in the educational field (Osborne & Hennessy, 2003;

Townsend & Bates, 2007; Ul-Amin, 2013), as learners will become more engaged in their own learning and teachers can utilize their pedagogical and didactic expertise to improve the learning process (Hennessy et al., 2010). However, at the other extreme, opponents of the idea of integration do not see it as a magical solution to educational problems (Toyama, 2011). I find myself standing between these two poles, as I can appreciate that the integration of ICT is a double-edged sword; *if* it is utilized, implemented, and integrated properly in the educational landscape, it has the potential to enrich, enhance and develop the learning-teaching process while assisting learners to master the 4C's skills (communication, collaboration, creativity, and critical thinking) (Almalki, 2012; Mndzebele, 2013; Mingaine, 2013). In other words, integrating ICT in the education landscape is no longer a question: it is a matter of how to, effectively, integrate it so that it benefits all the parties concerned (Jhurree, 2005).

Sey et al. (2013) have reported that access to ICT can be understood as varying in significance from one country to another and from one institution to another: "This is particularly evident when comparing developing and developed societies representing a stark digital divide" (Olakulehin, 2007, p.137). Despite the fact that the integration of ICT into the education system in most developing countries has been tardy (Hennessy et al., 2010; Olakulehin, 2007), it is an opportunity to ensure that developing nations do not get left even further behind their developed counterparts in terms of education (Hennessy et al., 2010). Thus, those who fail to respond to ICT and its trends may find it hard to compete in the global economy (Miller & Atkinson, 2014). I find myself agreeing with Abadie et al.'s (2016) perspective, namely that developing countries need to invest in integrating ICT into their education systems so that they might reap the intended benefits of ICTs and participate in global development.

Given my expertise in some educational institutes in developing countries while acting as a coordinator, ICT educational advisor, and as a teacher, I believe that the situation is challenging: developing countries are in urgent need of educational reforms which include changing and improving curricula, school infrastructure, training supervisors, and preparing teachers. There is no doubt that policy makers and educators in developing countries such as the country discussed in the current study need to adopt an educational plan in order to cope with highly competitive market needs. Hennessy et al. (2010) has claimed that for ICT to serve the purposes of educational reform, it must be tied to a coherent education-wide instructional agenda. The high cost of providing schools with ICT facilities is still a major challenge in many developing states. However, the country investigated in the current study is an exception in this regard, as ICT implementation in education has enjoyed a substantial share of government expenditure.

Despite this, the integration of ICT in education there is not expanding as quickly as expected, as will be discussed later.

Elsewhere, Schleicher (2015) has claimed that

> *We have not yet become good enough at the kind of pedagogies that make the most out of technology; that adding 21st century technologies to 20th century teaching practices will just dilute the effectiveness of teaching. The impact of technology on education delivery remains sub-optimal, because we may overestimate the digital skills of both teachers and students, because of naïve policy design and implementation strategies, because of poor understanding of pedagogy, or because of the generally poor quality of educational software and courseware* (p.3).

This quote touches on the main focus of this thesis, namely regarding pre-service teachers' competence, attitudes and intention to integrate ICT in their future teaching. While the majority of teacher education programs in developing countries have attempted to develop pre-service teachers' ICT integration skills via an ICT introductory course, they often fail to address the pedagogical use of ICT in classrooms (Lim et al., 2010; Mishra & Koehler, 2009). Teacher education programs greatly influence teaching-learning processes

and methods in schools alongside the extent to which pre-service teachers integrate ICT in their teaching practices (Zhang, 2014). Mishra and Koehler (2006) have reported that ICT courses do not equip pre-service teachers with the knowledge and skills to integrate ICT in their practice and have further noted that pedagogical competency in technology integration is equally important and a significant step towards the effective use of ICT integration in education. Therefore, teacher education programs must prepare pre-service teachers to make links between technological, pedagogical and content knowledge (Mishra & Koehler, 2006).

1.2   Technological Pedagogical Content Knowledge (TPACK)

The Technological Pedagogical Content Knowledge (TPACK) model was developed to understand the integration of technology in the learning-teaching process (Baran et al., 2011), and was based on Shulman's (1986) Pedagogical Content Knowledge (PCK). Subsequently, Mishra and Koehler (2006) added technology to the original framework to produce the Technology Pedagogical Content Knowledge (TPCK) framework. Later on, the TPCK acronym became TPACK, thereby emphasizing the connection between content, pedagogical and technological knowledge respectively characterizing when teachers integrate technology into their instructional practice on the one hand and, on the other, making it easier to remember (Mishra & Thompson, 2007).

The TPACK model is composed of three main knowledge components, including content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK) (Mishra & Koehler, 2006). The interaction between the components results in four bodies of knowledge: pedagogy content knowledge (PCK), technology content knowledge (TCK), technology pedagogy knowledge (TPK), and technology pedagogy content knowledge (TPCK) (Mishra & Koehler, 2006), as shown in Figure 1. It is technological pedagogical

knowledge that pre-service teachers must master to help meet and achieve educational reforms and goals for the new era.
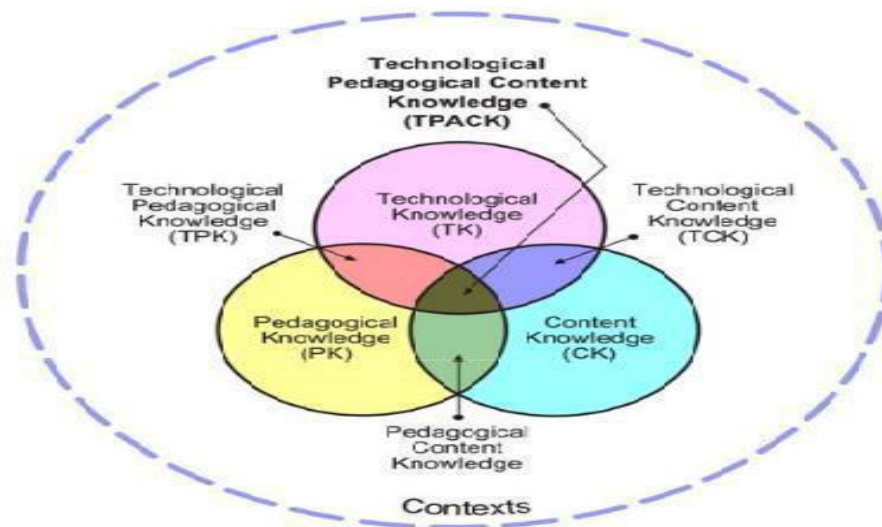
Figure 1. *TPACK Model* (Mishra & Koehler, 2006)

The figure above shows that the interaction between the three main parts of knowledge in turn generates seven other types of knowledge:

- Content Knowledge (CK): knowledge of subject matter; teachers must own knowledge of the subject matter such as physics, mathematics, history, geography and so on;

- Pedagogical Knowledge (PK): knowledge about teaching methods and classroom management;

- Technological Knowledge (TK): knowledge about technological tools (affordance, constraints, and skills) (Baran et al., 2011, p.371);

- Pedagogical Content Knowledge (PCK): knowledge that accumulates between teaching methods and subject matter. Teachers must make the subject meaningful for

the students, while taking into consideration learners' differences, abilities, and prior knowledge (Alayyar, 2011);

- Technology pedagogy knowledge (TPK): knowledge that requires dynamic equilibrium between teaching methods and the use of appropriate technology tools in order to teach;

- Technology content knowledge (TCK): knowledge that combines the subject matter and use of the appropriate technological tool to teach particular subject matter (Baran et al., 2011, p.371);

- Technology pedagogy content knowledge (TPCK): the central part of the model where the interaction between different bodies of knowledge results in Technological Pedagogical Content Knowledge (TPCK) (Koehler & Mishra, 2009) while representing the holistic capacities that teachers should possess in the 21st century.

1.2.1 TPACK and the Effective Integration of ICT in Pre-Service Teachers' Future Careers

According to the TPACK model, the effective integration of ICT into teachers' instructional practices requires a balanced inclusion of the three main bodies of knowledge, namely content, pedagogy and technology – whereas any change in one of the knowledge bodies will impact on the other two (Koehler & Mishra, 2008). The literature has reported that pre-service teachers who have acquired technological skills are motivated to implement ICT in their instructional practice, however technological skills in the classroom are only the groundwork (Koehler & Mishra, 2009). Meanwhile, integrating ICT effectively in teaching requires pre-service teachers to further develop pedagogical skills beside knowledge (Vgoot & Mckenny, 2017).

In turn, Koehler and Mishra (2009) have argued that teachers' competence in using ICT is not the same as knowing how to utilize it in their instructional practice, whereas pre-

service-teachers' limited pedagogical knowledge cannot make such a connection, even if pre-service teachers have substantial competence, technological skills and knowledge. In addition, when integrating ICT in order to optimize learner learning, pre-service teachers require content knowledge, based on which pre-service teachers can decide on the appropriate ICT tool in their future instructional practice for particular subject matter, which makes content meaningful on the one hand, and assists learners to achieve the learning goals on the other (Hughes, 2004). Chai, Koh and Tsai (2010) have concluded that "a better understanding of the relationships between TPACK constructs can inform the design of ICT programs for pre-service" (p.71). Such a contention makes this model fit the purpose of the current study.

In light of what was discussed earlier and building on Shulman's model, TPACK defines the substantive qualities of pre-service teacher knowledge required for the effective integration of ICT in classrooms and instructional practice (Baran et al., 2011). The TPACK framework goes beyond the three components as it represents cumulative knowledge that is significant for pre-service teachers' work as related to ICT integration in their instructional practice. What is required is not simply knowledge of the three components, but an understanding of the interaction between the three main bodies (Koehler & Mishra, 2006).

From my point of view, colleges of education are not merely institutions that prepare future teachers, they also instruct teachers who are responsible for preparing tomorrow's leaders. This must encourage educators and policy makers to both escape the narrow perspective of current teacher training programs and to make enormous efforts in developing pre-service teachers' training regimes concerned via technology competence, skills, knowledge and proper attitudes (Buabeng-Andoh, 2012). I have witnessed curricula change and infrastructure availability emerging – at least to some extent – in a number of

developing countries. However, schools and teachers were not ready for this change, particularly as teachers' preparation for ICT integration has not exceeded their theoretical preparation. From this vantage, I believe that teachers' preparation for this mission must be initiated at their respective college of education.

1.3   Overview of the Context and The Study Background

This section provides general information relevant to the study context and the implementation of technology in the same milieu. It also discusses technological transformation in relation to education.

1.3.1   General Background

The Gulf states union includes six countries: The Kingdom of Bahrain, the Kingdom of Saudi Arabia, the Sultanates of Oman, and the states of Kuwait, Qatar, and the United Arab Emirates. This study was carried out in a prestigious university in one of the Gulf states mentioned above. The name of the state is anonymized to serve the purpose of the study as the thesis was carried out a culture in which it is not easy to mention anything critical.

The state is an Arab Gulf state with a coastline on the Arabian Gulf. After the discovery of natural gas and petroleum, the country became one of the highest-income countries worldwide (World Bank, 2014).

1.3.2   The Technological Transformation of The Country

At the beginning of the current century, the country under study joined other countries worldwide and the Gulf states in particular in their race to utilise and adopt ICT as a tool for transforming the state into an information society (Alshawaf & William, 2002). The state's leaders have devoted much effort to adopting new technologies across all

governmental sectors in order to keep pace with global enhanced technological developments (Alshawaf & William, 2002). The United Nations Development Program (UNDP) published an *ICT for Development in the Arab Region* (ICTDAR) strategy in 2003 "to build, develop, sustain knowledge acquisition and utilization" by the means of ICT usage (United Nations Development Program, 2005, para.6).

At the time, the regional report showed that the Arab states had the lowest level of ICT usage compared with other regions across the world. According to the Integrated Regional Information Networks (IRIN, 2005) report, the development of ICT in Europe was estimated to be two years ahead of the Middle East and Arab states, while the United States of America was said to be three to four years in front. The report also recommended the Arab states to see ICT development as tied to the growth of all fields, including educational, in order to foster citizens who could compete in the global market.

Figure 2 shows how ICT is expected to produce profound changes in individuals' lives, education, interaction, and development (UNDP, 2001).
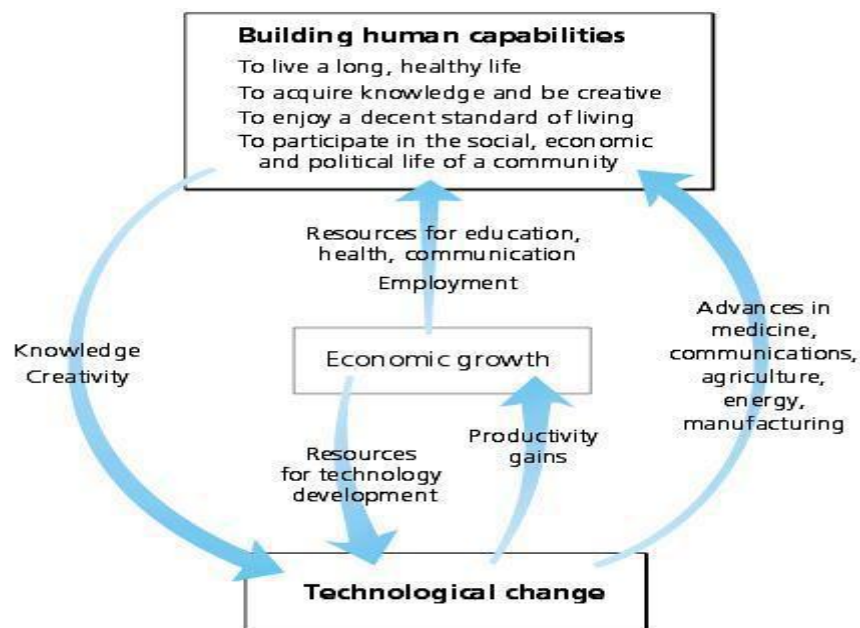
Figure 2. *Linkage between ICT and individuals' development* (UNDP, 2001, p.28)

In their attempt to assess the country's profile, the United Nations Economic and Social Commission for Western Asia reports (ESCWA, 2003, 2009; UNESCWA, 2013) described the progress of the information society in the state over several years. The reports assessed ICT area maturity with regard to the role of government in building up the information society, ICT capacity, and the ICT sector respectively. In the following paragraphs, I will compare the progress of the study country's profile based on ICT area maturity over the years 2003, 2009, and 2013.

Role of government in building the information society

By 2003, the country lacked a cohesive and detailed national ICT strategy, while e-government progress was relatively low compared with other regional countries. On the other hand, the country's key industrial sector used a highly advanced ICT system. The country was considered to be one of the leading countries in the software field, and scored third place in the ICT Use Index in the Arab world.

By 2009, the country developed a national IT electronic strategy in order to assist individuals through the use of ICT-based applications, services, products and networks. The plan included the public, education, health, trade and industrial sectors respectively. By 2013, the country had a clear and updated national ICT strategy that supported an implementation plan.

ICT capacity building

By 2003, plans and strategies to modernize the country were set up, but details remained undisclosed (ESCWA, 2003).

- Awareness and education. "Pilot UNESCO'S team educational framework"(p.18) which focused on science and technology engagement at all educational levels, with human development plans and provision of network infrastructure;

- Computers in schools. Achieve a ratio of one computer per eight learners in public schools;

- Vocational training. Vocational training in ICT with certificates in Cisco, Microsoft, and Oracle. By 2009, all parties were interested in the eradication of informational illiteracy:

- ICT in education and training. Universities and public schools were connected to the Internet. Projects to convert the curricula into e-books and the use of smart boards in higher education were set up;

- E-literacy skills for all. "The National IT Awareness Program" aimed to increase technology awareness among the country's citizens (ESCWA, 2009). By 2013, the first phases of ICT implementation in schools were completed, with the widespread computer lab-based use of ICT in schools and universities.

Building the ICT sector

At this level, investment in the state's ICT sector is still limited and focused mainly on extending telecommunications services and the dissemination of e-government services through the upgrading of the ICT infrastructure (ESCWA, 2013).

From my point of view, from the description of the country's technological transformation in relation to ICT, it can be observed that an increased awareness of ICT implementation is evident in the governmental sectors in general and in the education sector in particular. Providing and implementing ICT infrastructure in all sectors, including education, is now a governmental commitment, which is intended to develop the country's different sectors, thereby supporting its position among the other developed states. However, progress has been slow over the past decade due to various barriers that resulted in slowing the momentum of ICT implementation. Therefore, there is a need for a study that assesses the current situation of ICT implementation and compares it with the strategic

plan's timeframe, thus supporting the government, Ministry of Education (MoE), and Ministry of Higher Education (MoHE) achieving their aims regarding ICT implementation in the country within the scheduled timeframe.

1.3.3   Overview of The Study Country's Education System and Policies

The national education system has been improved on a continuous basis to accommodate cultural, demographic, political, and economic changes (Mohammed, 2014). In 1912, the first school was opened in the country, and by 1921 the first school to offer English was initiated by the Education Department (Mohammed, 2014). Officially, the Education Department became the MoE in 1962 (Mohammed, 2014). The education system is administered jointly by the MoHE, responsible for post-high school education, and the MoE, which has established a regulated approach to private and public schools (MoE, 2013).

Schooling in the country is compulsory for all students from age six to 14, with basic education divided into three levels, consisting of four years each respectively of primary (grades one to four), intermediate (grades five to eight), and secondary (grade nine to 12) education. Schools are segregated according to gender at all levels.

The school year consists of thirty-four working weeks at the primary level and thirty working weeks at the secondary and preparatory levels. All public education levels, including higher education, are free.
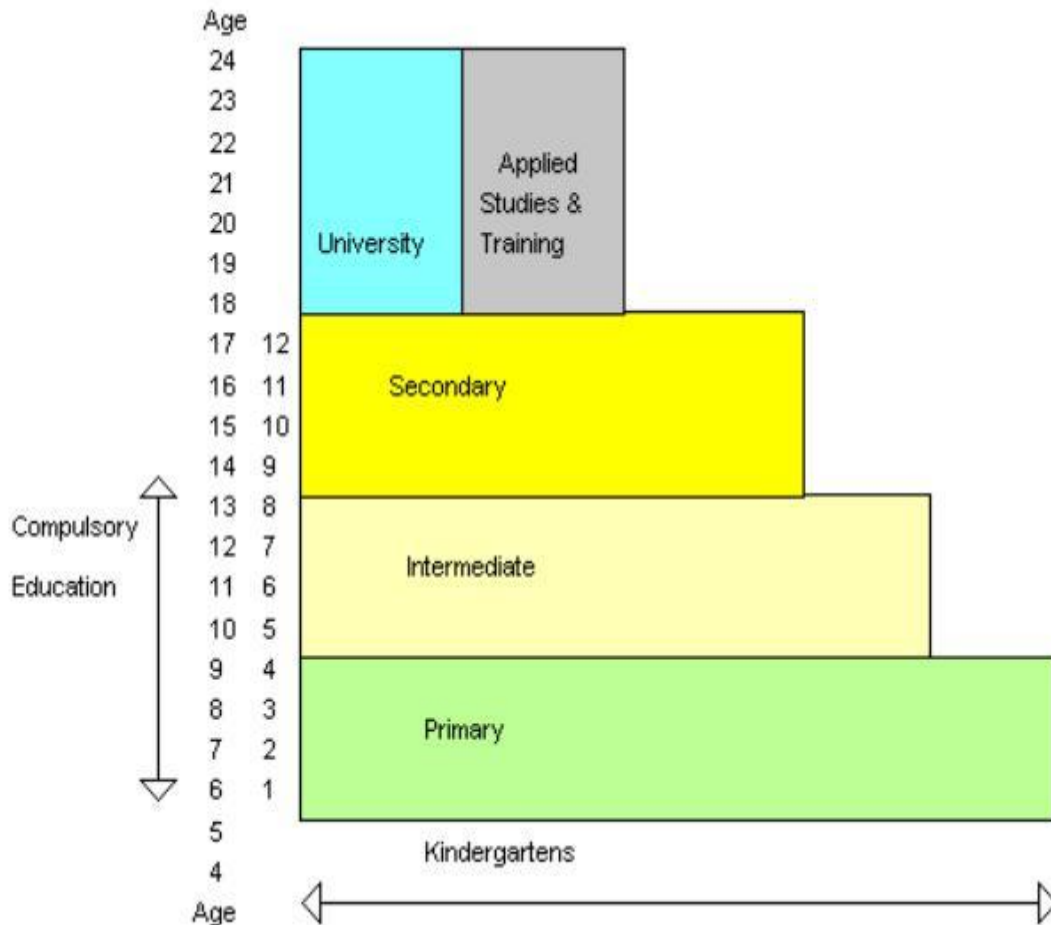
Figure3. *Structure of the Education System* (UNESCO, 2010/11, p.6)

Across the state, the education system is comprised of public as well as private sectors. These sectors differ drastically regarding the language and methods used in teaching-learning, ICT availability and quality, cultures, and teachers' backgrounds (Mohamed, 2014). Public schools follow an MoE-designed curriculum, wherein the content and final exams are standardised while the appropriate teaching methodology is at the discretion of the individual teacher. However, the country's private schools and universities are co-educational and follow their mother country's academic syllabus, including British, American, Indian, Pakistani, and Arabic syllabi. English is the language of learning in private schools and universities and Arabic is used in the public ones. This gives rise to

private school teachers and students' preference to use ICT tools and websites as most of them are in English.

Currently, there are 664 public schools and 491 private schools (MoE, 2013). However, private school teachers and students are multinational and largely from developed countries. Most public school teachers come from different developing countries such as Egypt, Lebanon, Syria and Jordan, however, the majority of the teachers of Arabic and Islam are citizens of the study country (MoE, 2013). Public schools are restricted to the children of citizens and a few non-citizens such as the children of teachers who work for the MoE.

Another significant difference between the two sectors is the method of teaching; teachers in public schools are subject to meeting pre-specified lesson objectives to cover the curriculum content before examinations are held, therefore they are inhibited from using innovative methods. However, private school teachers have more opportunities to utilise ICT in their teaching as it is a job requirement. Public school teachers are also less ready to utilise ICT in their teaching as half of the schools lack appropriate ICT tools while the teachers lack the confidence and skills to use it in their lessons (Alawidi & Aldhfeeri, 2017). Finally, public schools are often conservative in nature, as schools are segregated by gender, with boys' schools taught by male teachers and girls' schools taught by female teachers. On the other hand, most foreign private schools have a mixed gender staff with different nationalities and cultures; the attitudes of the students stem from this diversity.

With the deterioration of the effectiveness and quality of public school education in the country, private education has increased in significance as it is aligned with the direction of the country's development and has the capacity to cope with new market demands (Al-Duwaila, 2012).

In the country, there are nine private higher education institutes and one public institution, the latter being the focus of this study. The private higher education sector is educating more than half of school graduates (MoE, 2013). It is worth mentioning that the numbers of students graduating from high schools are much higher than the state university can take in, therefore, the government offers scholarship programs to support students who are accepted to study in British, Australian, and US universities. These graduates return to the country with a passion to pursue change, however, change needs more than passion.

Comparing the private and the public educational sectors in the country, students in the private sector seem to be more ready to utilise ICT in their future profession as, on the one hand, they are expected to have had more exposure to innovative teaching methods based on the use of ICT tools. On the other hand, they have had good experience drawn from interaction between different cultures (especially in relation to developed ones). It is therefore likely that these two sectors will differ in terms of their graduates' intention to utilise ICT in their future profession. The significance of this to this study is that public school teachers are unlikely to be ready to integrate ICT in their practice, both technically and pedagogically, due to many barriers. Thereby, articulating and validating their opinions and comments regarding their preparation at the College of Education might minimise the gap between theory and practice in schools and at the College. My study will provide a contemporary understanding of the barriers that influence pre-service teachers' intentions to utilise ICT in their future instructional practice. Therefore, the MoE and MoHE might direct their attention toward these barriers that hinder the development of ICT integration in education.

1.3.4   Challenges to Develop National Pre-Service Teachers

Studies of the contemporary educational system in the country's public schools show that there are many problems, of which low quality teachers is the most important issue (Alawidi & Aldhafeeri, 2017) and for the following reasons:

First, as the majority of the public school teachers are drawn from developing countries, the majority of them lack the knowledge and skills needed to in utilise ICT in their lessons, and instead they focus on traditional teaching methods (Alawidi & Aldhafeeri, 2017);

Secondly, all public school teachers are subject to meeting pre-specified lesson objectives to cover the examination syllabus. This is because the education system is centralised and dominated by the MoE, which regards teacher success in terms of covering the material prescribed (Alawidi & Aldhafeeri, 2017). From my point of view, I do not blame the teachers as they have a short period of time to finish the curriculum;

Thirdly, and as mentioned earlier, the majority of public school teachers are expatriates from developing countries, and the government has a goal to replace them with nationals, however, the College of Education currently lacks registered pre-service teachers in science subjects. The MoE has to encourage nationals to join scientific streams as trainee teachers;

Fourthly, and also as mentioned earlier, half of schools lack essential ICT tools (Mohammed, 2014) while teachers lack the skills and the knowledge to utilise ICT in their subject matter (Alawidi & Aldhafeeri, 2017).

Finally, the country's government assumed that by building schools, hiring foreign teachers and adopting an established curriculum, success was ensured. Unfortunately, this policy has backfired in some ways. For example, the curriculum they adopted was imbued

other cultures' beliefs and attitudes (Alobaid, 2006). In addition, schools as such are not equipped with the necessary ICT infrastructure (Alawidi & Aldhfeeri, 2017).

In addition, the education system has been criticised for its quality, with the World Economic Forum's Global Competitiveness report (2015-2016) ranking the country's education system relatively low and considering it as the weakest of the Gulf states (Schwab et al., 2016) despite the increased funding of education. Education in the country is thus an issue, "and is considered a thorn in the side especially given its status as a major oil producing country that enjoys significant spending in other areas of the national budget, yet is unable to provide for an outstanding education infrastructure " (Alelyan, 2016, p.1). In addition, the majority of the budget allocated to the state university or public schools goes to paying salaries (Alelyan, 2016).

The country has also taken a long term interest in preparing pre-service teachers since it sent a first group of pre-service teachers to Baghdad and Cairo in order to prepare them to teach in the public schools. In addition, the first higher education institute was established in 1966. The MoE has attempted, since its inception, to prepare pre-service teachers to teach in public schools. As the state university is the only university in the country to prepare pre-service teachers, this study focuses on this institution in order to illuminate the first and second order barriers that influence pre-service teachers' intentions to utilise ICT in their teaching profession. Clearly, there is an urgent need for the country to improve the quality of teaching to enhance students' outcomes on the one hand and prepare students to cope with new market demands on the other.

1.3.5 Education Aims in The Study Country

Following the conference on school curricula held in 1972,

The MoE worked on developing an educational policy that aims to adapt appropriate opportunities to assist students attain comprehensive

integrated development spiritually, ethically, intellectually, socially and physically as far as allowed by their attitudes and capacities in light of the nature, philosophy and aspirations of the society as well as in light of the principles of Islam, Arab heritage and the contemporary culture in a way that ensures the balance between the students' realization of their selves and preparing them for constructive participation in the advancement of the society in particular and the Arab and World Community in general (MoE, 2003, p.12).

As this text reveals, the comprehensive aim of the state's educational policy implies that educational policies have emerged in the context of the given society's social, culture, and religious identity (Al-Kandari, 2013). The MoE formulated a main goal derived from the comprehensive aim, thereby aligning its education system with global market needs and new social demands. However, from 1972 until the millennium, no serious implementation steps took place (Alharbi, 2014).

1.3.6   The Implementation of Education-Related ICT

The sudden influx of ICT developments brings to the fore the need for ICT's effective integration in the curriculum. According to Al-Sharija (2012), the global ICT revolution has pushed the leaders of the study country to embark on a 25-year strategic plan to restructure and modernize the education system. This plan included twenty-eight projects with an emphasis on public school reforms. The projects' main goal was the activation of the national strategy outlined in the *National Report on the Development of Education, 2004-2008* concerning the use of ICT in education (UNESCO**,** 2008) in the following areas: linking public schools with the MoE through a designated network – namely the Education Gate Portal – and the provision of large scale WAN (Wide Area Network), a data center, electronic content, and smart classrooms (Mohammed, 2014), alongside an e-portfolio in order to introduce electronic books (UNESCO, 2008). At the strategy's inauguration, the Minister of Education pledged to make the country an ICT leader, not a follower, through its promotion in the educational field.
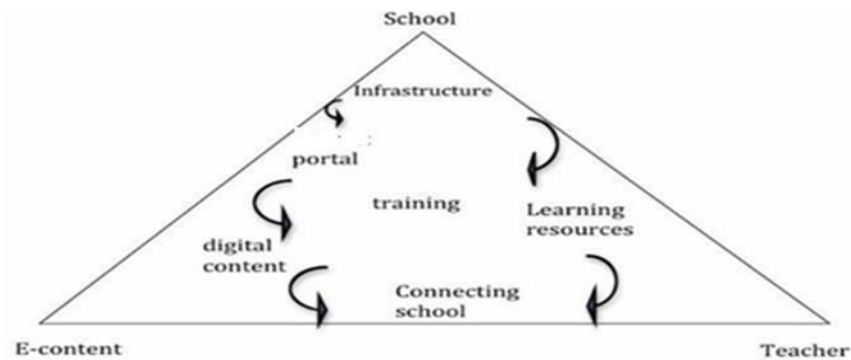
Figure 4. Linking the schools and the Ministry through a network (Mohammed, 2014, p.371).

In 2008, the Minister announced a project to provide all public schools with the infrastructure needed to implement ICT across the curriculum (MoE, 2008), and this was carried out with the collaboration of Microsoft in 2010 (Al-Sharija, 2012). For example, the MoE has committed to a comprehensive program to provide public schools with computer labs in order to bridge the gap between personal use of computers and the use of computers in education (MoE, 2002). The second stage of the program was to hire secondary school teachers with BSc degrees in Computer Science to teach computing as a curriculum subject (MoE, 2002). In 2011, the MoE launched the Education Gate Portal (Al-Sharija, 2012, p.21). By the end of 2011, 320 out of 664 public schools were provided with the infrastructure essential for ICT adoption (International Bureau of Education, 2011). However, despite the availability of interactive boards in one of the schools, they are used in a very traditional manner. The country's education system has been criticised for its traditional teaching, which focuses on theory over practice, and commonplace methods where the teacher is at the centre of the teaching-learning process rather than deploying innovative ICT use, thereby actively engaging students in the learning process (Aldhafeeri et al., 2006). In addition, the education system has been criticized for its quality; the curriculum has been censured as often not matching national and international modern market demands. In addition, the *World Economic Forum's Global Competitiveness* report

(2015-2016) ranked the country's education system relatively low and considered it as the weakest of the Gulf countries (Schwab et al., 2016). In conclusion, there is still a gap between the reality and the broad aims outlined in the strategic plan for ICT integration in education (Alharbi, 2014; Alkandari, 2013).

In addition, higher education institutes have become connected to the internet, as in the case of the country's main university, where the majority of its colleges are now connected to a wireless network (ESCWA, 2009, p.7). Both the MoE and the MoHE in their *Development of Education* report emphasised the significance of integrating ICT in education to provide an opportunity for the country's citizens to access employability, build human capital, offer openness to the world, and contribute to the realization of their aspirations (UNESCO, 2008). Thus, well-prepared citizens will assist in developing all facets of life across various fields.

In regard to teachers' development, the MoE issued a decree that stressed the essential need to develop teachers' instructional practice, thereby meeting global standards of learning and teaching in the digital era, particularly as the teacher plays a crucial role in the reform process (Borko, 2004). The main idea was to prepare future school teachers to build up their skills and knowledge, thus adopting "ICT in a social constructivist environment" (Mohammad et al., 2011, p. 2599). An early initiative to expose public school teachers to the advantages of ICT in education was conducted via a distance course between the MoE and the English Department at Oregon University in the United States. The course included using the computer as an effective tool in teacher instructional practice, in addition to increasing teachers' ability to choose appropriate English language instructional web-based resources and materials.

In part, the motivation behind this research is born from this, that is it undertakes a specific investigation into the way pre-service teachers are prepared, how well prepared they

are to make effective use of ICT in their teaching practices, and ICT integration's potential barriers and enablers.

1.4   Primary Interest in The Area

With all the advancements the millennium witnessed and also given the 21st century ICT revolution, implementing ICT in the Arab states' education sectors had garnered my attention, particularly in relation to the development of academic programs relevant to market requirements.

The motivation to conduct this research stemmed from my experience in different educational systems in Arab states, where the traditional instructional pedagogies had long been associated with teaching practices in classrooms, and there was a lack of innovative methods to utilize ICT in teaching. In addition, education has been severely criticized on the grounds of quantity and quality (Makrakis, 2005), as mentioned previously, where teachers are focused on meeting pre-specified learning objectives and covering the content over a very short time period.

At the threshold of the millennium, I became interested in the utilization of ICT in education while my pedagogical thoughts and beliefs changed after engaging in a postgraduate program focused on teaching methods. The program provided me with the opportunity to research those social and economic dimensions that hinder ICT integration in the education system in Arab countries. Subsequently, my interest in this area was heavily influenced by my role as a UNESCO research assistant investigating the implementation of ICT in education in one of the Arab states.

By 2005, I was teaching in one of the most modern and prestigious academic institutes in the Gulf States, a location which believed that utilizing ICT in education is a necessity. From this experience I developed my pedagogical methods of teaching and

confidence in harnessing ICT for educational purposes. Then in 2010, I moved to another Arab Gulf state. Given my five years' experience as a subject coordinator in one of the country's schools and taking into account my attending several subject classes for teachers, I had the opportunity to meet and discuss the uptake of ICT with teachers on various occasions. The majority of teachers in the country did not express concerns about using ICT in their instructional practice because they do not believe that ICT would enhance students' achievements in the matriculation exams. They reported that the integration of ICT in the study country's schools was limited to supporting traditional methods of teaching such as preparing lesson plans and homework sheets in Word and entering students' grades using an Excel spreadsheet.

Working as an educational counsellor for the Computer Aided Math Instruction (CAMI) company, my role was summarized as designing online mathematics courses according to the school curriculum which were required to meet students' academic needs (namely strength and growth). As the MoE was promoting technology, they promised to study the CAMI project by disseminating it through the elementary public school system. However, on the one hand the majority of schools lacked the required infrastructure, therefore the project was not realized. On the other hand, through discussion with teachers I understood that they rejected the idea as they lacked the skills, were restricted by time constraints given the need to cover the curriculum while also lacking technical support.

These experiences motivated me to explore the topic of pre-service teachers' preparation and development in relation to the use of ICT in teaching.

1.5   Problem Statement

The potential for ICT integration in education often seems to be extremely optimistic compared to its permeation in different facets of life. However, the reality reveals a certain

level of disillusionment if the integration barriers have not been solved. There are numerous research studies suggesting that many factors influence ICT integration in different education and curricular settings (Almekhlafi & Almeqdadi, 2010; Gulbahar, 2008; Light, 2010; Yusuf & Balogun, 2011; Zhao et al., 2002). The majority of these research studies show that factors such as lack of appropriate infrastructure, untrained academic staff (Sureshramana, 2007), pre-service teachers' attitudes toward ICT, confidence in the effective use of ICT, and technological pedagogical knowledge (TPK) (Almekhlafi & Almeqdadi, 2010; Gülbahar & Güven, 2008; Mills & Roblyer, 2002) determine the extent to which pre-service teachers integrate ICT in their future teaching practice. These factors not only have an impact on the utilization of ICT in general but are also interrelated as they can influence one another (Bingimals, 2009). ICT infrastructure is said to be useless in classrooms when barriers impact pre-service teachers' intention to utilize it. However, with negative attitudes and a lack of TPK confidence and skills, the likelihood of pre-service teachers intending to integrate ICT in their future instructional practice is remote (Gülbahar & Güven, 2008). Therefore, the current study will investigate these factors in the context of the study country.

The results of recent research studies (Al-Awidi & Aldhafeeri, 2017; Alharbi, 2014; Mohammed, 2014), which indicate a clear gap between teacher readiness to integrate ICT in the study country's public schools and strategies of ICT implementation, was the main motive for undertaking this study. In spite of the increased awareness of the significance of teaching using ICT, the latter's available infrastructure in half of public schools (International Bureau of Education, 2011), progress in the ICT sector regarding education has often been disappointing. While the government drive and the MoE continue to promote and support ICT integration in classrooms, it is ultimately the teacher him/herself who determines the method of using ICT (or not) in the classroom. Therefore, pre-service

teachers need professional development to integrate ICT in their future instructional practice, and they have to be taught how to manage classroom activities, select appropriate resources for each lesson, and structure lessons using ICT tools (Light, 2010).

This is evident in a recent study carried out by Al-Awidi and Aldhafeeri (2017) to investigate *Teachers' readiness to implement digital curriculum in the country public schools*. The study concluded that public school teachers' lack of knowledge, skills, time to integrate ICT in their subject matter (they have to cover pre-specified lesson objectives within a given timeframe as mentioned earlier), alongside the absence of suitable infrastructure in half of public schools, were barriers to implementation. In addition, Alfelaij's (2016) study *Why integrating ICT has been unsuccessful in the country* has illuminated the challenges behind unsuccessful attempts to integrate ICT in the study country's schools and higher education institutes. Therefore, the research question is: Are pre-service teachers effectively prepared to integrate ICT in instructional practice? While traditional approaches in pedagogy are still prevalent in the country studied here (MoE, 2010), fewer opportunities for the effective integration of ICT are presented (Alharbi, 2014).

There is always a need for more research, especially regarding the efficacy of, respectively, teachers' integration and utilization of ICT tools in their instructional practice as well as education programs' curricula in relation to preparing future teachers for ICT integration. This represents a significant gap in the literature when it comes to the relationship between pre-service teachers' perceived ICT skills and attitudes and the intent to integrate ICT in their future instructional practice career including the effectiveness of the teacher education curriculum. In essence, there is a lack of research examining the extent to which the national goal for educational reform is being realized. My rationale for

conducting this research stems from the MoE's plans to reform education at every level (UNESCO, 2008), a plan in which ICT integration plays a crucial part.

1.6   Purpose and Research Questions

Given the stated problem, the purpose of this study is to assess pre-service teachers' respective confidence with technological pedagogical knowledge, attitude to ICT integration in education, intention to integrate ICT in their future career, and their assessment of the teacher education program in terms of in preparing pre-service them to utilize ICT in their future instructional practice. Furthermore, this study explores the relationship between TPK confidence, and the attitude toward and intent to integrate ICT among pre-service teachers.

Consistent with the purpose of the study, the following research sub-questions guided this study:

1. How confident are pre-service teachers about their TPK?

2. What are pre-service teachers' attitudes toward integration of ICT in education?

3. Do pre-service teachers intend to integrate ICT in their future career as teachers? What are the reasons why they do or do not plan to integrate ICT?

4. What is the relationship between TPK confidence and the attitude to the integration of ICT in education among pre-service teacher education students?

5. What is the relationship between TPK confidence and the intention to integrate ICT in education among pre-service education students?

6. How do pre-service teachers assess their educational experience?

1.7   Significance of the Study

In light of what has been mentioned earlier, the proliferation of technology and the popularization of the internet have informed the ICT revolution, which is having an overwhelming impact on learning-teaching process internationally and locally. The

government mandated a reform of various facets of the educational field (UNESCO, 2008) in order to invest in human resource capacities and capabilities in an attempt to meet the labour market's changing needs. Therefore, they have allocated a large amount of funding for this purpose. However, because of the MoE's inertia as well as the lack of knowledge and skills on the part of ministry supervisors, public school teachers in the study country are not quite sure how to utilize ICT in their instructional practice effectively. Therefore, it is essential to prepare in- and pre-service teachers to carry out this mission so as to achieve the national goal of creating an education system that contributes to the society's development and modernization (UNESCO, 2008).

For the effective integration of ICT in schools, ICT barriers and enablers should be studied (Zhao et al., 2002). Yusuf (2011) has indicated that teachers' attitudes toward the role of ICT in learning and teaching and teachers' ICT competence are significant factors that influence whether or not they integrate ICT in their instructional practice. In addition, Zhao et al. (2002) emphasize that teachers' technological knowledge could be added to the previous factors. All the previously mentioned factors can be classified as second-order barriers that play a crucial role in hindering the integration process.

Therefore, it is considered that the study is potentially of considerable significance, for a number of reasons:

Firstly, this study hopes to make a genuine contribution to the larger knowledge base regarding pre-service teachers' attitudes toward ICT in developing countries, the intention to utilize ICT in future instructional practice, confidence about their TPK competencies, possible enablers and potential barriers, and the effectiveness of ICT-related courses in colleges of education. The lack of research in this area may create obstacles to the advancement of ICT utilization, implementation, and integration in schools, as well as impeding the effective preparation of pre-service teachers. Educators and policy makers,

among others, can benefit from the results of the present study as they design, implement and deliver ICT-related courses and training for pre-service teachers.

Secondly, while there is a considerable literature on pre-service teacher readiness to integrate ICT in their future instructional practice (Singer & Maher, 2007), the majority of these research studies were carried out in developed countries (Light, 2010). Research that has been conducted in relation to ICT implementation in education in the study country is very limited and focuses mostly on the barriers that obstruct subject teachers from integrating ICT in their practice. The phase of adopting ICT in education has already passed and the MoE has realised the significant and vital role that it plays in education; the question now is: what obstructs in- and pre-service teachers from the effective use of ICT in teaching? And to what extent do colleges of education provide effective training for pre-service teachers in order to integrate ICT in their future teaching? Therefore, this study fills a gap in the national and regional literature, and the results have the potential to provide valuable information about developing and Arab countries. In addition, the study's findings may be useful for other countries such as Gulf states that share the same language and a similar culture and policies.

Thirdly, as the MoE is encountering a shortage of citizen teachers in public schools for scientific subjects, the Ministry has introduced 'expat' teachers from neighboring countries as a temporary solution. However, most of these non-national teachers lack the skills to incorporate ICT in their teaching, therefore the MoE strives to bridge this gap by encouraging citizens to follow training programs at colleges of education. Meanwhile, as the number of citizens at such colleges is increasing yearly, this is considered as an opportunity for these colleges to achieve the national goal by preparing pre-service teachers to teach using technology.

Finally, the present study may have additional significance and interest for the MoE. The timing of this research is noteworthy as it takes place nine years after the release of the national strategic projects in 2008. Thus, the MoE may find it useful to investigate possible enablers of and the main barriers to ICT integration, so that working on these factors can be directed optimally. In turn, this serves the MoE's national strategies and plans to reform education through integrating ICT in public schools, thereby preparing pre- and in-service teachers to cope with this development between 2005 and 2025 (UNESCO, 2008).

CHAPTER TWO

2.0   Review of the Related Literature

This literature review explores barriers that influence pre-service teachers' intentions to utilize ICT in their instructional practice. There is substantial research internationally about this subject. However, this problem is under-researched in the country examined in the current study. This study seeks to establish whether pre-service teachers' intentions, confidence, attitude to utilizing ICT in their instructional practice, and the learning environment at the College of Education are sufficient for ICT's full integration. To prepare the pre-service teachers and the learning environment is the first step, as the failure of ICT integration in classrooms may be due to inadequate preparation of the pre-service teachers, rather than the simple issue of whether or not ICT is being integrated. Moreover, the study explores the relationship between confidence to integrate ICT, and attitude toward and intention to integrate ICT. The research problem is also centred on the main barriers or the possible enablers of pre-service teachers' intentions to integrate ICT into their future practice.

In order to develop a theoretical framework to inform the study, this chapter reviews and covers the international and country pertinent literature tackling the relevant issues that lead directly to the development of the research questions. This literature is discussed under four headings:

-        ICT integration in education;

-        First order barriers of pre-service teachers' intents to integrate ICT;

-        Second order barriers of pre-service teachers' intent to integrate ICT;

-        Relationship between the variables.

The chapter ends with a summary of what we can conclude from a review of the literature.

2.1   ICT Integration in Education

2.1.1   Broad meaning of ICT

The introduction of the term ICT refers to the threshold of the 1990s (Tlhoalle, 2005), when the virtual World Wide Web (www) was introduced to the educational field (Ul-Amin, 2013). According to Goktas (2006, p.15), ICT implies the use of a computer and the internet, and it includes all the services and equipment implied by information technology, internet, libraries, telecommunications, and network-based information, as mentioned in the United Nations Report (Ul-Amin, 2013). Following on from UNESCO's *World Communication and Information Report* (1999-2000), Blurton (1999) takes ICT to refer to a "set of technological tools and resources used to communicate, create, manage, disseminate and store information" (p.1). However, the International Society for Technology in Education (ISTE) uses the term to refer to all the equipment and the devices "that convert information into general digital formats" (Moursund & Bieleffeldt, 1999, p.12). Parallel to the above, UNESCO (2002) has characterized ICT as a union of communication and informatics technologies. These technologies involve capturing technology, storage technology, display technology, and processing technology (Torero & Braun, 2006). Therefore – and due to the broad definition of ICT that ranges from traditional technologies to modern technologies – this study focuses on computer-related technology software, internet and communications features (Kalanda, 2005; Ministry of Education, 1998).

2.1.2   ICT in Arab Gulf Countries

With the last decade's revolution regarding ICT integration in education and with the year 2018 approaching, it is the appropriate moment for developing countries to assess their past performance in technological development and consider the progress (if any) of the available strategic plans in this regard. In recent years the majority of Arab Gulf countries have shown some progress and accommodated new technologies in their

education system. In spite of the progress shown, some of these policies or projects' formulated objectives in Arab Gulf countries have been postponed or not translated into practice yet (UNESCO, 2013). Usually, educators and policy makers are rather enthusiastic and make optimistic promises to make a difference in this area (namely ICT implementation in education), however, they never achieve what they have announced on time (Alharbi, 2014), as is the case in the current study.

As mentioned earlier, the MoE announced 28 projects in their 2008 strategic plan to implement ICT in education, however, there is still a gap between the reality and the broad aims outlined in the plan (Alharbi, 2014; Alkandari, 2013). Ideally, the integration of ICT in education strategic plans includes: vision and mission statements; broad aims; objectives; ICT standards; ICT models for instructional practice; staff development; budget; technical support; and timelines. As I reviewed, the written strategic plan for ICT integration in education, all of the above elements existed and were explained in detail. However, a gap still exists between the reality and the desired objectives as many research studies have reported (Alharbi, 2014; Al-Awidi & Aldhafeeri, 2017). Part of this research will assist the MoE to pinpoint this gap, whereby they might address this through reviewing where setbacks have occurred.

Some of the Arab Gulf countries (GCC) have started projects to integrate ICT in the public school environment, such as the Kingdom of Saudi Arabia (KSA), the United Arab Emirates (UAE), Kingdom of Bahrain, and the State of Kuwait. Indeed, KSA has not been left behind, with the Prince Abdullah Bin Abdulaziz Project attempting to provide all public schools with the appropriate ICT infrastructure. There has been a considerable investment committed to the integration of ICT within the school curriculum, approx. USD 45.5 billion (Al-Mofarreh, 2016). However, in spite of the heavy investment in the ICT field, KSA still lags behind developed countries in terms of

ICT integration and use in education. Elsewhere, Albugami and Ahmed (2015) have underlined a clear gap between methods of ICT integration in teacher instructional practice and its availability in classrooms (p.37).

Several contemporary research studies associated with ICT integration in KSA investigated the current situation of ICT in schools, such as Oyaid's (2009) mixed method study to assess Saudi secondary school teachers' ICT usage and its relation to the ICT educational policy launched earlier. Analysis of the questionnaire and the interviews indicated two major barriers to the effective integration of ICT in teachers' instructional practice, namely those relating to time constraints and teachers' lack of adequate technological skills.

Alyami (2014) in his research *Educational reform in KSA*: *Smart schools as a unit of development* has reached the significant conclusion that the level of learners' achievement has not changed despite ICT implementation in classrooms. This has been attributed to teachers' resistance to change their method of instruction as they considered ICT as an additional burden. Another study by Al-Mulhim (2014) has shown that lack of access to ICT, time, and training respectively are barriers that deter KSA teachers from utilizing ICT in their instructional practice. In addition, the results have shown that ICT availability in the classroom does not necessarily translate into enhancing learners' academic achievement. Al-Mofarreh's (2016) research study findings have revealed that several factors hindered the implementation of ICT policies in KSA public schools including inadequate infrastructure, teachers' poor skills and knowledge, lack of technical support, lack of coordination, teachers' attitudes, and time constraints.

From my perspective, good progress was made to promulgate ICT in public schools in KSA, however, teachers' preparation to integrate this in their instructional practice seems to be crucial to achieve effective integration. As mentioned earlier in Chapter 1, ICT tools as

devices by themselves are not likely to have much, if any, impact on the learning-teaching process unless teachers believe in the significance of these tools in students' learning (Wastaiu et al., 2013; Toyama, 2011).

In 2017, UAE launched the Vision 2021 project, the second phase of the national education strategy wherein a part of this project will concentrate on education reforms (Rogers, 2017). The UAE Government allocated USD 15 billion of the education sector budget to invest in ICT in education (Rogers, 2017) in order to take steps towards creating a more innovative future for citizens by enhancing the use of ICT in the teaching-learning process in public schools (Watt, 2012). For example, more than two decades ago, model schools were inaugurated in the Emirates of Abu-Dhabi. These schools had an advantage in infrastructure and teacher professional development activities (Almekhlafi & Almeqdadi, 2010, p.173). The literature in this area revealed that the Emirates of Dubai and Abu-Dhabi respectively had achieved effective integration of ICT in their education system, but they had to pay more attention to teachers' professional training in terms of how to enhance the teaching-learning process via the use of ICT (Iran, 2011; Tamim, 2013).

However, the Emirate of Sharjah has experienced different challenges regarding the integration of ICT in schools, such as the inability of teachers to cope with the continuous production of ICT tools, and a respective lack of skilled teachers and funding (Alsaleh, 2014, p.7). It is worth mentioning that UAE has seven emirates, and each emirate has a different ruler, therefore they have different policies, strategies, and education budget allocations. Meanwhile, the State of Kuwait is no different from other Gulf countries in terms of education reform and ICT policy implementation. A national strategy was launched in 2008 to implement ICT in the Kuwait education system through the development of curriculum, technical support, infrastructure, human resources, and financial support (KMoE, 2008).

Although one of the strategies aims was to promote 21st century educational skills according to global challenges as envisaged by the ruler of the State, "still the outcomes of the educational system do not live up to governmental ambitions" (Mohammed, 2014, p.60). The school teachers convey knowledge to the students orally in a traditional method with the former as the centre of the teaching-learning process. Therefore, students are not able to translate what they have learned into practice in their own context or to solve life problems. Mohammed (2014) proposes that there is a dysfunction in the public school teachers' professional development and in the teacher education programs at the country's colleges of education. Literature in this area, such as Alharbi's (2012) qualitative study investigating the quality of ICT professional development provided to in-service teachers in Kuwaiti public schools, revealed that these teachers lacked the skills and the knowledge to utilize ICT in their instructional practice as the professional ICT training provided is insufficient.

In regards to pre-service teachers, Alayyar's (2011) study assessed pre-service science teachers' perceptions at the Public Authority of Applied Education and Training in Kuwait toward ICT use, their associated training needs, and their perceptions of the current curriculum in relation to ICT. Results attributed the inability of pre-service teachers to utilize ICT in their instructional practice to a number of barriers including: ineffective ICT courses; dependence on traditional methods of teaching; and a lack of modelling and integration of ICT in the wider program.

In addition, Al-Menaifi's (2012) study at the Public Authority of Applied Education of the education program's technological courses found that: firstly, ICT tools in computer labs are old and not up-to-date, therefore, the latest version of ICT tools designed to cope with the global advance of educational technology are required; secondly, pre-service teachers take only two mandatory introductory ICT courses while the other technological courses are optional to them. Al-Menaifi's (2012) recommendations to the

College of Education are to consider the integration of ICT and pedagogical courses at horizontal and vertical levels during the program. In addition, they should increase the quality and quantity of the educational technology courses. Arguably, the researcher's suggestions apply in equal measure to education programs in other universities, where pre-service teachers are not being prepared to utilize ICT in their instructional practice as Al-Menaifi has claimed. Indeed, more research is needed to investigate in-service and pre-service teachers' competence and confidence in integrating ICT in their instructional practice in Kuwait.

In the Kingdom of Bahrain, there is a national project to implement ICT in education: the government has planned its 2005-2020 objectives in terms of funding, infrastructure, legalization of content sharing, textbooks, evaluation mechanisms, and teacher capacity. The government vision was to develop a quality education system to produce a high level of creativity and excellence. To realize the said vision, the MoE worked on developing teachers' performance in integrating ICT in their subject matter, thereby enhancing students' learning outcomes.

Among many actions undertaken, King Hamad launched The Future School project in 2005 (Alkhater et al., 2016). The project's mission was to integrate ICT in education in order to provide the youth with the necessary skills and behaviors to transform the society into a "knowledge-based economy" (BMoE, 2015, p.9). The project has two phases: the first (2005-2010) included providing the schools with infrastructure, such as networking and learning resources, namely: e-books and educational software; allocating the schools technical support teams of technicians and specialists in the educational technology; and, finally, training teachers to integrate ICT in their instructional practice. The second phase (2011-2016) focused on engaging the students in the process. All the schools were provided

with electronic boards, laptops, and visual labs. Therefore, students are expected to simulate science experiments at this stage (MoE, 2015).

However, the implementation process encountered some major problems, including: internet connectivity speed, access to educational content, and availability of digital devices; secondly, there were issues of cost of content production, establishment of linguistic relevance, and copyright and licensing. According to my information, no evidence-based impacts have yet been reported to assess the project's progress.

In a study analyzing ICT in education in five Arab States, namely the Sultanate of Oman and the states of Qatar, Jordan, Egypt and Palestine, the researchers collected data on ICT in education policy, school infrastructure, teacher training and preparedness, curriculum and teachers' use of ICT in education (UNESCO, 2013). The results showed that the five aforementioned countries have developed policies related to integration of ICT in education. However, these policies have not been translated into practice. Furthermore, the results showed that Oman, Jordan, and Qatar have a higher level of school infrastructure, internet connectivity, and ICT-related courses in primary and secondary schools compared to Palestine and Egypt. However, in regard to the integration of ICT in teachers' instructional practice, the results indicated that a minority of them are prepared to teach basic computer skills at the secondary level compared with the primary level, while only Palestinian and Omani teachers are trained to teach students using ICT facilities. Therefore, as I focus on GCC countries, I can conclude from the comparison between the countries that despite the availability of ICT infrastructure in schools in the Sultanate of Oman and the State of Qatar, their ICT policies do not translate into practice. However, Omani teachers do have the ability and the competence to utilize ICT in the classroom.

From reviewing the erstwhile literature, one can see that most of the Arab Gulf countries' governments are investing heavily in education, as most of the countries have

doubled or increased budget allocations for reforming the education sector through implementing ICT in education over the current decade. However, from my perspective, the high overall spend does not necessarily result in effective implementation or students' improved achievement. Ministries of Education in Arab Gulf countries need to focus on human capital (teachers) as most of the literature findings in the region attributed the ineffective integration of ICT to teachers as they lack the knowledge and competence regarding how to utilize ICT in order to enhance students' achievement. In other words, even though there are many stakeholders who have an interest in the idea of ICT integration in curriculum and classroom practices, the responsibility for ICT integration in the classroom falls on the teacher. How confident and skilled the teacher is in the use of ICT could contribute to their adoption of ICT in the case of the latter's availability in the classroom.

As some Arab Gulf cities or emirates are still witnessing low levels of ICT resources, teachers' lack of technological skill, knowledge, and effective development programs, could be the cause of ICT integration in education struggling with both extrinsic and intrinsic constraints while relevant policies are not translated into practice. Thus, I believe that educators and policy makers in Arab Gulf countries need to take active steps towards overcoming these extrinsic and intrinsic barriers, starting with colleges of education.

2.1.3   Difficulties Facing ICT Implementation in The Study Country

Studies undertaken by researchers over recent years in the study country have investigated the effective implementation of ICT in public schools, in the process identifying a gap between the MoE policies and efforts to implement ICT, while – and as mentioned earlier – in reality the gap is still substantial (Alajmi, 2011; Alharbi, 2014;

Alshemmari, 2015). This situation can be observed by examining the syllabus issued by MoE educators and is also evident when visiting the majority of public schools as Alharbi (2014, p.71) has pointed out in his study. The majority of the teachers and administrators at public schools have the International Computer Driving License (ICDL) qualification and have attended ICT training courses, however, the ICDL course and training are not useful since the curriculum and the teacher's textbook guide does not give direction to teachers regarding how to integrate ICT in their lessons (Alharbi, 2014; Alsharija, 2011).

Furthermore, MoE mentors and supervisors lack the experience in ICT integration in subject classes, and as a result they do not encourage teachers to integrate it in their lessons (Alharbi, 2014; Al-shemmiri, 2015). Other limitations facing ICT integration in teachers' instructional practice concern the time required, as the teachers have to cover the curriculum according to the MoE's syllabus plan, as all the country's public schools are subject to the same examination questions and correction criteria (Alajami, 2011; Al-shemmiri, 2015).

A few recent studies have investigated the current status of ICT integration in schools such as Alharbi's (2014) study. This study researched the use of ICT in teaching in secondary schools. Alharbi has shown that teachers in this study cited inadequate provision of technological infrastructure as one of the main barriers to their classroom use of ICT. Interviewees asserted that the College of Education does not include adequate ICT training in their program to prepare teachers to effectively integrate ICT in their subject lessons.

Meanwhile, Al-shemmari's (2015) study found that the use of ICT was influenced by external and internal barriers which may obstruct teachers from integrating ICT in their instructional practice. For example, there was a lack of appropriate and modern ICT in the classroom, technical support, and MoE mentors' encouragement respectively. Moreover, Al-shemmari found that teachers' intentions toward ICT integration in their instructional

practice was affected by confidence in using ICT in the same context, ease of use, while their attitudes were affected by both ease of use and subjective norms.

In the same vein, Al-ajami's (2011) research study findings indicated the MoE's strong intention to integrate ICT in schools, but according to the strategic plan they have executed few practical steps (p.6). However, schools are not ready to welcome ICT integration while the policy in this regard shows a "lack of clear vision" (p.6). In turn, Mohammed (2014) has indicated that the current policy adopted educational reforms that focus on curriculum change only, however teachers' professional development receives less attention. As the reform plans do not cover all of the substantial components of educational change, the majority of those plans started by the MoE in the study country ended before they had achieved their aims and objectives. An example of this was the adoption from Malaysia, Singapore, the UK, and the USA of the smart school experiment as part of educational reforms. However, the MoE does not have "the capacity related to teachers' competence, skill, and knowledge" (p.91), therefore, they adopted the surface of the experiment only, but not the method of instructional practice.

As the study country is pursuing education reforms through integrating ICT in all sectors, this present research covers an area related to pre-service teachers' readiness to integrate ICT in their future instructional practice. More studies are required to cover other areas and issues in detail, such as teacher education programs' role in preparing pre-service teachers, instructors' roles, levels of technology implementation in schools, and technocentrism in future schools.

Another study by Alawidi and Aldhafeeri (2017) involved 532 public school teachers, investigating their readiness to implement a digital curriculum in their main subject classes (Arabic, English, mathematics, science, and social studies) across grade levels (primary, intermediate, and secondary). The study's major findings were that teachers

are not yet ready for this step technically and pedagogically, due to barriers related to technical support, time constraints, infrastructure, competence, and knowledge. In a follow-up study the researchers recommended an investigation of the effectiveness of the national teacher education program in preparing pre-service teachers to integrate digital curriculums.

From reading the previous literature and given my experience of the study country's education system, it can be inferred that various obstructions are slowing the momentum of ICT integration and need to be investigated in order to support the national policy to reform education through implementing ICT in MoE schools and MoHE institutes' attempt to achieve the policy's broad aims. Financing, visualizing, and planning are elementary elements for a long-term ICT strategy to successfully achieve the broad aims outlined. Strategies need to be created in terms of partnerships between school supervisors, mentors, principals, the community, teachers, learners, and the MoE, particularly since each of the stakeholders has a significant role in collaboratively accomplishing the school vision, broad aims, and mission regarding ICT integration.

At this point, it is highly significant whether recent studies concerned with ICT in education are presented to the MoE and MoHE in the study country as they plan to implement the Connecting Schools, Smart School, and Laptops for High School Students Projects respectively as well as smart boards for each class in public schools. Recently, many researchers have focused on ICT in education in the study country as mentioned earlier. Thus, before executing any ICT plan, the MoE needs to consider the results of the current study and the aforementioned research studies on effective ICT implementation.

2.2   Factors That Affect Pre-Service Teachers' Intention to Integrate ICT

While the inclusion of technology in education may have the potential to result in positive changes in educational environments, the question of practicability is complex.

Barriers or enablers to ICT's incorporation in classrooms differ from one context to another, depending on the quality of teacher preparation programs, infrastructure availability and reliability, students' ICT skill levels, teachers' skills and knowledge, and the given society's vision (Bingimlas, 2009). Through the examination of the existing literature, two sets of barriers have been found to hinder the integration of ICT in schools, namely, first and second order barriers respectively (Keengwe & Onchwari, 2008).

According to Snoeyink and Ertmer (2001), first order barriers (which are also termed 'extrinsic barriers') include lack of technology infrastructure (hardware and software), lack of technical support, access to computers and the internet respectively, insufficient time, ineffective training, and limited resources. From Semenov's (2005) point of view, the technological equipment cost can be added to first order barriers, since providing teachers and learners with proper information and communication technology tools for classroom instruction is expensive.

By contrast, second order barriers (intrinsic barriers) are focused on teachers' readiness and openness to change (Khan et al., 2012). As has been noted, "second order barriers to ICT integration in classroom are more directly *related* to human stakeholders in the integration process" (Almofarreh, 2016, p. 51). Selwyn (1997) has underlined that teacher resistance to change is related to technology anxiety, where teacher beliefs and attitudes toward the technology and the skill level required play a crucial role in their acceptance of it. In other words, first order barriers include those that are beyond the teachers' control, while second order barriers include constraints that are created by the teacher him or herself, such as attitudes, confidence, and competence (Akcaoglu, 2008; Al-Sulaimani, 2010).

Ertmer (1999) has claimed that, while first order barriers can be eliminated by providing educational institutions with hardware, second order barriers elimination requires

changing pre-service and in-service teachers' belief systems. Second order barriers are less tangible than first order barriers as they are deeply ingrained, and created by the person's belief system, an aspect that makes them harder to overcome. On the same lines, Zhao et al. (2002) have indicated that second order barriers play a more significant role than first order barriers as their strength may eliminate or magnify the effect of first order barriers.

Jones (2004) has also argued that there are multifaceted relationships between first and second order barriers; some barriers such as lack of teacher confidence and competence respectively, technology anxiety, teacher efficiency, teacher efficacy, teacher resistance to change, and negative attitudes toward ICT are second order barriers which appear to be closely related to first order barriers such as lack of accessibility, poor training, time constraints and the absence of technical support. For example, pre-service teachers' lack of training reduces the opportunity to integrate ICT in their future instructional practice (Agyei & Voogt, 2011), while – and despite the availability of ICT tools – teachers do not feel confident enough to integrate ICT in their instructional practice due to lack of technological skills, knowledge, and training in how to integrate these tools (Bingimlas, 2009).

In this regard, one could claim that if pre- or in-service teachers have positive attitudes toward ICT integration (Awan, 2011), and strong ICT skills for teaching purposes (Sime & Priestley, 2005; Lucas, 2005), then the integration process has a better opportunity to succeed. In addition to the aforementioned barriers, the current study will investigate pre-service teachers' confidence about their skills and attitudes concerning the integration of ICT in their future instructional practice. In addition, this research will explore the obstacles that might influence pre-service teachers' intentions to integrate ICT in their future practice.

2.2.1 First Order Barriers

In contrast to the paucity of literature on novice teachers' utilisation and integration of ICT, the literature focusing on pre-service teachers' preparation to adopt ICT effectively in their future instructional practice is prolific (Elliot, 2011). However, much of this existing literature suggests "there are no easy replies for the question how best to prepare pre-service teachers to utilize ICT in their future instructional practices" (p.35). Rather, the literature focuses on a number of factors that influence pre-service teachers' readiness to integrate ICT in their future instructional practice, such as pre-service teachers' competence and technology skill standards, modelling of ICT use by instructors, and the practicum (Elliot, 2011).

For the purposes of this study, some first order barriers will be highlighted. More specifically, ICT modelling, practicum, ICT competence and experience, ICT-related courses, technical support, and infrastructure availability will be discussed. These barriers are of great importance in enabling me to answer the research questions as follows.

2.2.1.1 *ICT Modelling*

Pope et al. (2012) conceptualise modelling of ICT practices as an opportunity for pre-service teachers to develop creative approaches to methods. Instructors on teacher education programs rarely model or use ICT when introducing pedagogical or content knowledge in their instruction (Chang et al., 2012). Furthermore, research indicates that how educators on teacher education programs model ICT practices influences pre-service teachers' confidence levels (Pope et al., 2002), ICT skills, and attitudes toward the integration of ICT in their future instructional practice (Grove et al., 2004).

In his review of 68 refereed journal articles, Kay (2006) proposed ten key themes to prepare pre-service teachers to utilize and integrate ICT in their future instructional practice in light of their capacity to implement it. The key strategies focused on included:

> …modelling how to utilize ICT; mentoring of teachers utilizing ICT in their classrooms; modelling ICT integration by instructors; pre-service teachers' practicing of ICT in their field; improving collaboration among pre-service teachers and instructors; pre-service easy access to hardware and software; offering ICT integration workshops; integrating technology to all education courses and programs delivering ICT-related courses and using multimedia in the College of Education (p.46).

On the same track, Tondeur et al.'s (2011) study has proposed twelve strategies to prepare pre-service teachers to utilise ICT, as shown in Fig.5:

- aligning theory with practice;
- modelling of ICT by teacher educators at the college of education;
- changing pre-service teachers' attitudes toward ICT integration in their instructional practice;
- learning technology by design;
- access to resources;
- ICT planning and leadership;
- scaffolding authentic ICT experiences;
- systematic and systemic change efforts;
- collaborating with peers;
- faculty members' continuous development;
- moving from traditional assessment to continuous feedback;
- co-operation within and between institutions.
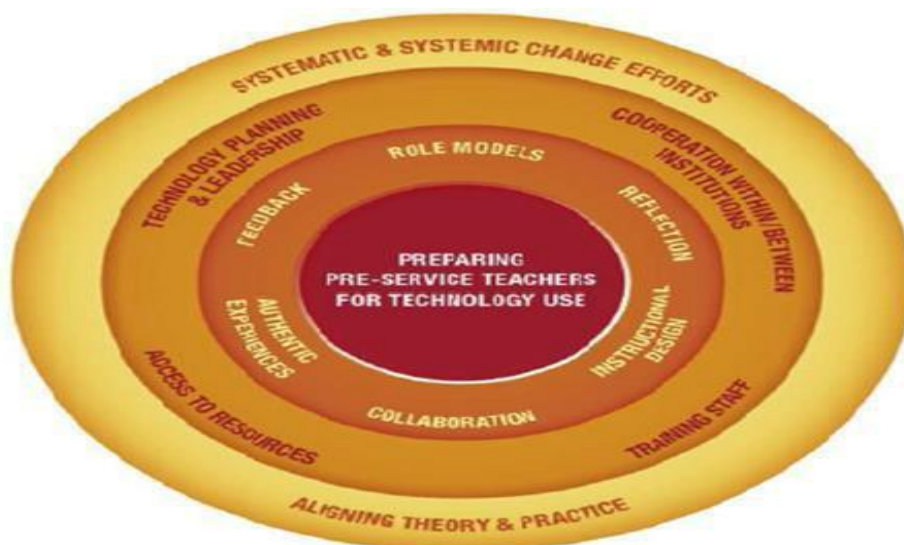
Fig. 5. *Model to prepare pre-service teachers for future ICT use* (Tondeur et al., 2011).

It is obvious from the key themes proposed by Kay and Tondeur et al. (2011) that the modelling of ICT by a faculty member seems to be an issue for the effective preparedness of pre-service teachers for integration of ICT in schools.

Recent studies carried out in Australia, such as Gill et al. (2015) and Sweeney and Drummond (2013), have shown that instructors' modelling of ICT increased pre-service teachers' confidence level regarding their intentions to integrate ICT in their future practice. In the same vein, Admiraala et al.'s (2017) study in the Netherlands has suggested that the effective integration of ICT in schools is conditional and based on the quality of how ICT is addressed, modelled, and practised in the teacher education program.

From an educational point of view, ICT modelling either at schools or a college of education is regarded as a valuable cornerstone in pre-service teachers' intentions and the use of ICT in their future practice. Schoolteachers and college of education tutors' modelling is therefore responsible for the production of knowledgeable teachers who will play a vital role in ensuring that education develops.

As such, there is a gap in the literature concerning the impact of lecturer modelling in colleges of education as well as pre-teachers' intentions to integrate ICT in their instructional practice in the Arab Gulf states. More studies are required to investigate this issue in this region.

2.2.1.2 *Practicum*

Tuli and File (2009) have noted that pre-service teachers' practicum (teaching field experience) is an opportunity to develop thoughtful approaches to teaching methods within a supportive context, and under the guidance of their instructors (Cheng, 2012; Ralph &

Noonan, 2004; Scott et al., 2014; Yaman & Özdemir, 2012). This experience allows the opportunity for pre-service teachers to test their content, pedagogical, and pedagogical content knowledge respectively (Cheng, 2012). The quality of how ICT is addressed during the practicum is one of the significant conditions for how pre-service teachers apply technology later in their future instructional practice (Birch & Irvine, 2009). Since ICT receives little attention in the practicums of developing countries' teacher preparation programs, neither as support for pedagogy nor in terms of how it can be used in classrooms (Chien et al., 2012), it is not unreasonable to argue that these programs as a whole risk failing in their mission to prepare pre-service teachers to integrate ICT in their future instructional practice (Henderson et al., 2013). Many researchers have suggested that the preparation of pre-service teachers to teach using ICT should be situated in the practicum rather than in an ICT course at a given college of education (Choy et al., 2008). Therefore, teacher education programs should grant pre-service teachers the opportunity to practice their skills and knowledge in order to utilise ICT during the practicum (Lee et al., 2007).

Much of the international literature tends to be critical of the contribution of the practicum to the pre-service teachers' intentions to utilise ICT in their future practice. For example, Andrews, Crossland and Lovelace (2010) investigated seven female pre-service teachers' perceptions after the practicum toward ICT integration in their instructional practice at Missouri State University's program in the USA. A questionnaire was administered to the participants the semester prior to their practicum and after the practicum to measure the change in their intentions to employ ICT in their future instructional practice. The results reported statistically significant changes in pre-service teachers' post-practicum intentions, thereby demonstrating the positive impact of practicum experience on pre-service teachers' intentions to utilise ICT for instructional practice.

This has also been demonstrated in Wright and Wilson's (2011) longitudinal study at Alabama University, and Sadaf's (2013) mixed methods sequential explanatory study in a midwestern university in the second phase of his study in the USA. Wright and Wilson (2011) purposively selected 10 pre-service teachers through their teacher education program. They were required to demonstrate and integrate ICT in their teaching at the practicum and were assessed by their supervisors based on this criteria. In Sadaf's (2013) study, a total of 14 pre-service teachers participated and six interviews were conducted. The results of both studies showed that pre-service teachers were able to translate their positive intentions into practice during their practicum teaching experience.

In Australia, Gill and Dalgarno (2010), Henderson et al. (2013), and Gill et al. (2015) have investigated pre-service teachers' post-practicum intentions toward ICT utilisation in their future instructional practice. Gill and Dalgarno's (2010) qualitative study results illustrated that pre-service teachers developed over time and, upon evaluation, this development seemed to be influenced by ICT usage in the practicum, including observing instructors modelling ICTs in teaching in tandem with using technological skill and knowledge. Gill et al.'s (2015) study showed a direct relationship between the practicum and participants' intentions. The more pre-service teachers were given the opportunity to observe and integrate ICT in their teaching and learning process within the practicum, the more intention they had to integrate it in their future instructional practice. However, Henderson et al.'s (2013) study in Australia showed "explicit instruction in ICT skills is more effective than practicum experience in ensuring that pre-service teachers become knowledgeable about ICT pedagogical integration" (p.69).

In Turkey, Akbulut et al. (2011) and Merc (2015) have also addressed the effect of practicum experience on pre-service teachers' decision to employ ICT.

Akbulut et al.'s, (2011) study reported that the teacher-training programs did not provide pre-service teachers with the opportunity to experience the integration of ICT for instructional purposes, as well as citing the faculty members' failure to demonstrate or model ICT integration in their lectures, and a lack of technical support for both faculty members and pre-service teachers. Merc (2015) focused on 86 senior pre-service teachers' preparedness to utilise ICT in their future instructional practice on an English Language Teaching program at a college of education.

Data analysis by Akbulut et al. (2011) and Merc (2015) have shown that practicum schools were found to be poor in respect of ICT tools' availability for pre-service teachers to use in their instructional practice. In both studies, although pre-service teachers had practicum experience, it is difficult to say that this was good enough for them to use ICT in their practice within the practicum, a factor that might have influenced their future intentions. Therefore, the negative effect of a mismatch between the real classroom teaching and the teacher education program practice in respect to ICT integration should encourage the college to coordinate with the school.

For the same reasons, in Singapore Choy et al.'s (2008) study investigated a sample consisting of 108 pre-service teachers participating in three surveys, namely "pre-ICT course, post-ICT course, and post-practicum" (p. 6) to obtain quantitative data, while 10 pre-service teachers were purposefully selected for interviews to obtain qualitative data. The research findings showed that ICT-related courses were insufficient to assist pre-service teachers in utilising and integrating ICT in their future teaching in comparison with the practicum's impact.

Three years later, Choy et al.'s (2011) study included 327 pre-service teachers who were required to complete an ICT pedagogy course and two practicum attachments. The first practicum attachment was held after the first year, where pre-service teachers were sent

to different schools to observe a teacher working for two weeks, and then commenced teaching for three weeks under their supervisors' oversight. At the end of their teacher education program, pre-service teachers had to teach for ten weeks independently. Data were collected at four different stages in the study, before and after the ICT pedagogy course, after the first practicum, and at the end of the second practicum. The results indicated the presence of positive intentions among pre-service teachers within the study population after the completion of the ICT pedagogy course and the second practicum as they gained more autonomy to integrate the technology. However, pre-service teachers' intentions decreased significantly after the first practicum attachment. This result was interpreted as being due to a lack of time to utilise ICT within the teaching practice.

Similarly, at a South African university, mixed methods – a TPACK survey, focus group interviews and lesson plan analysis – were used to investigate 103 pre-service teachers' intentions to utilise ICT in their instruction. With respect to the practicum, Jita (2016) found significant variations in pre-service teachers' competence to utilise ICT in their future practice based on a single teacher education program. These variations accrued mainly from the uneven opportunities arising from pre-service teachers' distribution to schools during the practicum, where some pre-service teachers were assigned to schools with no opportunities to utilise ICT or assigned to in-service teachers who were not adept users of ICT in their instructional practice.

In a recent study, Admiraal et al. (2017) examined the influence of the practicum experience on pre-service teachers' intention to integrate ICT in their practice. They surveyed 52 pre-service teachers in one of the teacher education programs in the Netherlands and identified the importance of practicum experience in the development of pre-service teachers' knowledge and competence to utilise ICT in their future instruction. In addition, the practicum gave pre-service teachers the opportunity to ask students in class to

provide feedback about how they evaluated the integration of ICT within subject teaching. At the end, pre-service teachers expressed their positive intention to utilise ICT.

In a multinational study, Tondeur et al. (2012) reviewed 19 qualitative studies that incorporated data from pre-service teachers, faculty members and faculty educators. The studies were conducted in Cyprus, Finland, Taiwan, Turkey, the United Kingdom, and the United States. Research questions were drafted to lift the veil concerning the effects of the teacher education program on pre-service teachers' intentions to utilise ICT in their instructional practice. The study results showed that observation and experience of the pedagogical integration of ICT throughout the curriculum in specific content areas during the practicum positively influenced pre-service teachers' intentions to utilise it in their instructional practice.

All of the aforementioned studies unanimously showed the influence of practicum experience on pre-service teachers' intentions to utilise ICT in their instructional practice regardless of the study context, except for the Henderson study where the practicum had no influence on pre-service teachers' intentions. The practicum is a significant phase to prepare pre-service teachers through technology-enriched teaching methodologies (Tavil, 2014) and this, in turn, may contribute to developing an understanding of technology utilisation and inclusion in terms of pre-service teachers' future instructional practice and classrooms.

From an educational perspective, I reject the view that the practicum is the site where pre-service teachers apply theoretical methods of teaching that have been advocated during their progress in the program. Pre-service teachers need more opportunities and support in using ICT during the practicum, so that they can identify the possibilities for themselves while finding methods to model ICT in their own instructional practice in a real context.

2.2.1.3 *ICT Competence and Experience*

The demand for teachers to utilise ICT in their teaching is increasing (Jung, 2005), accordingly, teachers with high levels of competence, skills and knowledge are required (European Commission, 2013). Goktas, Yildirim and Yildirim (2009) have categorised teacher ICT competence and skills into two clusters, namely basic and advanced skills. Basic skills are related to rudimentary operation of computers and the World Wide Web (www), while advanced skills extend to adopting essential operational skills in teaching. To determine the level of skill and competence, the ISTE has suggested six standards concerning the performance of technology integration in education, namely: human, social, legal, and ethical issues; teaching-learning and curriculum; ICT operations and concepts; professional practice and productivity; assessment and evaluation; and planning and designing learning environments (NCATE, 2000, 2002, 2003). These standards define essential competences, skills, attitudes, knowledge, and intentions for ICT integration in classroom contexts. Table 1 summarises performance indicators for the technology integration standards for pre-service teachers.

Table 1. *The Performance indicator of the technology integration standards* (ISTE, 2003).

Technology Standards	Performance Indicator
Human, social, legal and ethical issues	- The utilisation of ICT resources that affirm diversity - Facilitate equitable access to ICT resources for all the learners - Apply ICT resources to prepare students for digital market demands - Promote safe utilisation of ICT resources - Teach and perform ethical practices related to ICT usage

Teaching learning and curriculum	Pre-service teachers are expected to use and integrate ICT in classroom and their instructional practice in order to:
	  - Manage classrooms activities.
	  - Facilitate student-centred strategies supported.
	  - Developing learners' creativity, collaboration, problem solving and higher order thinking skills

ICT operations	Demonstrate basic general knowledge and skills

and concepts	of computer and related technology for students as described by ISTE standards.
Professional practice and productivity	Pre-Service teachers are expected to employ ICT resources to: - Enhance students' performance and productivity. - Engage in life-long learning and professional development. - Collaborate with parents and colleagues to nurture student learning.
Assessment and evaluation	Pre-service teachers are expected to employ ICT to: - maximise and assess students learning. - Improve their teaching.
Planning and designing learning environments	Pre-service teachers are expected to employ ICT to: - Design learning environment to support learners' diversity. - Evaluate the suitability of the resources for the learning environment.

The ISTE (2003) has also identified three principles for ICT integration in pre-service teacher programs in order to prepare teachers to incorporate ICT in their teaching effectively:

(1)   ICT should be integrated throughout teacher education programs: Limiting technology to ICT-related courses does not emphasise the preparation of pre-service teachers to incorporate ICT in their instructional practice. Education programs should be geared toward integrating ICT in all education courses in order to provide pre-service teachers with the opportunity to experience the interplay between pedagogy, subject matter, and technological skills.

(2)   ICT should be introduced in an educational context: It is expected that educational programs should introduce technology integration in the practicum (field experience), where pre-service teachers can be mentored in terms of teachers' integration of ICT in their classrooms, with instructors modelling utilisation of ICT, while they can also be offered the opportunity and experience to integrate ICT in their instructional practice during the practicum.

(3)   Pre-service teachers should experience an innovative environment that supports their learning within the education program: When pre-service teachers pass through learning experiences transformed by different methods of technology incorporation, then they may incorporate technology in their future instructional practice more effectively. For example, instructors in education programs should employ a combination of conventional teaching and ICT such as a lecture supported by PowerPoint or any other multimedia.

With the increasing calls for education development through ICT-oriented learning environments, use of ICT resources has become an important research topic worldwide. A significant body of research exists in the area of the impact of pre-service teachers' ICT competence and skills on the integration or the utilisation of ICT in their future instructional practice. Some essential studies are summarised here:

In Kisalama's (2012) study, it was attempted to determine whether the pre-service teachers at Makerere and Dar-es-Salaam Colleges of Education from Tanzania and Uganda respectively successfully acquired the skills related to ICT integration in education. As a part of the study, a questionnaire was distributed to 3,350 pre-service teachers and 175 academic staff. The results showed that pre-service teachers had poor or limited abilities to integrate ICTs in their instruction. The researcher attributed this to the lecturers' incompetence in using ICTs in teaching as well as the poor structure of the ICT course offered by the education department. The results of Kisalama's study have several implications for Makerere and Dar-es-Salaam Colleges. First, the colleges should provide lecturers with training for the use of ICT in teaching and learning environments. Second, international scholarships should be offered to the lecturers so that they can enhance themselves in the new fields of ICT integration in education. Finally, the structure of the

ICT courses offered should be redesigned so that pre-service teachers have the opportunity to practice their teaching qualifications during the practicum.

In Australia, Gill et al.'s (2015) qualitative study focussed on 11 pre-service teachers' preparedness to use ICT in their instructional practice. Pre-service teachers' progress was measured in respect to six stages over the course of the four-year program. The study's findings indicated that a lack of prior ICT experience among pre-service teachers deterred them from developing an awareness of utilising ICT in instructional practice.

In Turkey, Aslan and Zhu (2015) found that pre-service teachers encountered some obstacles in using ICT in their instructional practice due to a lack of ICT skills, knowledge and experience. Participants used ICT at a basic level, and they lacked the capability, skill and knowledge to develop an interplay between pedagogy, content and ICT. In addition, the results implied that faculty members should be more competent in order to utilise ICT in their teaching. In light of these results, the researchers suggested some changes in respect to the ICT course, classroom size, and the ICT infrastructure.

To summarise, the problems due to the lack of ICT competencies and their impact on education are still one of the first order barriers that influence pre-service teachers' intentions in the majority of developing countries. On the other hand, most developing countries' teacher education programs, including the study country, perceive ICT in education favourably and are eager to expand their teachers' competencies in terms of employing ICT in their profession.

In my experience, in the current study country, given observations of some teachers' classrooms and discussions with them, I have noticed that few teachers in private and public schools or lecturers at the State University have been able to utilise ICT in their instructional practice, but I was unsure whether they had the skill and the competence to engage with it in their students' learning. Alharbi (2014) has noted that, even though ICT and its related

technologies are almost ubiquitous in most developed countries' classrooms, in the current study country there are still some impediments that hinder teachers from using ICT in their teaching, which impact on pre-service teachers' intention to use it in their future teaching.

2.2.1.4 *ICT-Related Courses*

Although ICT competence and skills are necessary, as mentioned earlier it is very necessary for pre-service teachers to accumulate the three different bodies of knowledge (content, technology, and pedagogy) in the ICT-related course (Koehler & Mishra, 2009). As part of a teacher education program, ICT-related courses must have components that deal with ICT integration as a pedagogical practice (Chai et al., 2010). Thus, having control over various ICT resources and tools requires being technology literate, so that pre-service teachers' intentions to integrate ICT in their future instruction might have the opportunity to flourish. In essence, pre-service teachers' competence in using ICT is not the same as knowing how to utilise it in their instructional practice. The implication is that pre-service teachers should be provided, not only with ICT skills courses, but with a combination of content, pedagogical and technological knowledge to ensure an effective use of ICT, as mentioned in Chapter 1.

Many studies report on the impact of ICT courses on pre-service teacher intentions regarding ICT integration in their future instructional practice as follows:

In Singapore, Choy, Wong and Gao (2009, 2011), Chai et al. (2010), and Koh et al. (2013) investigated the influence of ICT-related courses on pre-service teachers' intentions to utilise ICT in their instructional practice. Choy, Wong and Gao (2009) researched the influence at three different stages of the program, namely "pre-ICT course, post-ICT course, and post-practicum" (p.718). A cohort of 118 participants completed a five-point Likert scale survey. The research findings showed that the ICT course significantly increased the pre-service teachers' intention to adopt ICT in their

teaching practice. However, despite these positive intentions, pre-service teachers were unable to translate these into practice during the practicum. Meanwhile, inexperienced pre-service teachers commented that they were overwhelmed with "non-teaching duties" (p.190), and lacked sufficient pedagogical knowledge and competence to utilise ICT during the practicum attachment. Therefore – and rather unsurprisingly – pre-service teachers' intentions to utilise ICT in their future instructional practice decreased significantly compared with their intentions immediately after the ICT course. Researchers recommended that instructors model the planning process for technology-enhanced lessons at the college of education. After two years, the researchers conducted another study, discovering that pre-service teachers' intentions to integrate ICT increased significantly after the ICT pedagogy course and the second practicum as mentioned earlier.

Chai et al.'s (2010) study has examined the perceived development of pre-service teachers in terms of their TPACK before and after attending an ICT course. The sample consisted of 889 pre-service teachers from different postgraduate diploma programs, including Chemistry, Mathematics, Physics, Chinese, and English. The pre- and post-course surveys found pedagogical knowledge to have the largest influence on pre-service teachers' TPACK. This could be because the ICT-related course had components that instructed on ICT integration as a pedagogical practice. Pre-service teachers' intentions to integrate ICT in their future instructional practice could flourish if they possessed a strong pedagogical knowledge base.

In turn, Koh et al. (2013) evaluated an ICT-related course based on the TPACK pre-service teachers gained throughout the course. The study sample consisted of 869 preservice teachers who took an ICT-related course during their education program. The study's findings showed that the ICT-related course experience impacted on pre-service teachers'

intentions to utilise ICT in their future instruction. Furthermore, the findings showed that TPACK was impacted by pre-service teachers' perceptions of the course experience supported by the development of TPACK knowledge components.

In China, two case studies were carried out to explore pre-service teachers' preparedness to integrate and use ICT in their future practice. Zhou et al. (2011a) surveyed a total of 390 pre-service teachers from different teachers' programs. Although the education programs offered a compulsory ICT course to pre-service teachers, the results confirmed that the latter were not well prepared to integrate ICT in their future instructional practice. The interpretation of this result referred to the lag of the technology course compared with current advanced technology, a slow campus network, limited access to IT labs, and the lack of a practical course preparing pre-service teachers to incorporate ICTs in their subjects as well as their classrooms.

In contrast, Lim et al.'s (2015) study distributed a questionnaire to 600 pre-service teachers and interviewed 12 of them. The results of the study showed that the ICT-related course in this study "improved the pre-service teachers' cognition of effective teaching using ICT, widened their teaching horizons with ICT, and developed their ICT competence and knowledge" (p.20). Therefore, pre-service teachers developed positive intentions toward ICT integration in their instructional practice. Moreover, Lim et al. have recommended that educators at the university develop the content of the ICT course to be more connected with the subject areas.

In Greece, Kounenou et al. (2015) and Fokides (2016) have shown that pre-service teachers there had negative intentions concerning ICT integration in their instructional practice. In the first study, the 109 pre-service teachers attributed their negative intentions after the ICT course to the massive amount of information presented in the course, which made them feel hesitant to implement all of this information in practice. In the second study,

the 754 senior pre-service teachers attributed their negative intentions to the ICT content, where they reported that the course contributed to knowledge acquisition in regard to computer skills in general but had not focused on preparing pre-service teachers to utilise ICT in their instructional practice.

In one of the leading Arab Gulf universities, Serhan's (2009) study attempted to measure pre-service teachers' attitudes as well as their intentions toward the integration of ICT in their future instructional practice. The study sample consisted of 54 female pre-service teachers enrolled on an educational technology course within the education program. The results of this study underlined that pre-service teachers' abilities and skills to integrate ICT in their future instructional practice enhanced and developed after the ICT course. They developed positive attitudes and expressed good intentions to integrate ICT in their future instructional practice after completion of the educational technology course.

In Ghana, Agyei and Voogt's (2011) study explored the barriers for 120 pre-service teachers at the University of Cape Coast alongside 60 in-service teachers' intentions to integrate ICT in their practice. The results showed a number of barriers to be reasons why in-service and pre-service teachers have no intention to utilise ICT in practice. These barriers included a lack of ICT infrastructure, training, knowledge, and an ICT course to use ICT effectively in their instructional practice. Pre-service teachers reported how instructional methods in the education program were based mainly on lectures while the program did not prepare them to utilise ICT in their practice. This means that pre-service teachers' experience of utilising ICT in their program practice was almost non-existent as the program neglected practical experience.

For the same purpose, Chen (2015) distributed a questionnaire to 600 Taiwanese pre-service and in-service teachers in an Early Childhood program. The results demonstrated support for the hypothesis that the ICT-related course had a positive impact on

pre-service teachers' intention and attitudes toward ICT integration in their future instructional practice.

In a quantitative study, Fook et al. (2011) investigated pre-service teachers' attitudes and preparedness to utilise and integrate ICT in their future instructional practice after their practicum experience. A total of 70 pre-service teachers in their senior year in a Malaysian university's faculty of education participated in this study. The results showed that ICT-related courses were sufficient to prepare pre-service teachers to utilise ICT in their future practice.

Meanwhile, the purpose of Banas and York's (2014) study was to explore the impact of authentic learning exercises regarding pre-service teachers' intention to integrate ICT in their future instructional practice. The participants were 104 pre-service teachers enrolled in a methods course in a US health education department, all of whom indicated that they were novices in instructing and integrating ICT. The results of the study showed that positive change in perceived TK predicted the positive change in pre-service teachers' intentions to integrate ICT in their future instructional practice. This means pre-service teachers' positive intentions to integrate ICT in their future instructional practice is mirrored by improvement in their perceived TK. Study results also found authentic learning exercises have positively influenced pre-service teachers' intentions to integrate ICT in their instructional practice (p.739).

Kojima (2014) has provided evidence based on whether the competence that pre-service teachers perceived regarding an ICT course aligned with National Standards of in-service teachers' ICT competence. The study involved 67 pre-service teachers in a Japanese education college and explored pre-service teachers' intentions to utilise ICT in their instructional practice after a 'Media Tools' course. The results showed that "pre-service teachers improved only one skill, to use presentation software to create teaching material,

throughout the ICT course" (p.87). Regarding the National Standards, pre-service teachers reported that the ICT course "does not provide them with meaningful practice to achieve the National Standards of in-service teacher's competence in ICT pre their future instructional practice" (p.87). Therefore, they have no intentions to utilise ICT in their instructional practice. It appears that even in a developed country such as Japan, a college of education's ICT course provided traditional computer skills but not the necessary skills and experience for pre-service teachers to integrate ICT in their instructional practice and throughout the curriculum.

Mumcu (2017) has provided a recent study investigating the preparedness of pre-service teachers for ICT use in their future practice. The study involved 60 pre-service teachers who had attended a professional ICT course titled 'Computer Supported Mathematics Teaching' in the final year of their Turkish pre-service preparation program. The study's results found that pre-service teachers' intentions to utilise ICT in their instructional practice shifted from a teacher-centred to a student-centred approach respectively at the end of the ICT course. This is another study demonstrating the significant role of the ICT course provided by a college of education to equip pre-service teachers with ICT integration training so they can effectively utilise ICT in their instructional practice.

Gill and Dalgarno's (2008) qualitative study focused on exploring intention barriers. This emerged in their study of eight pre-service teachers enrolled in an undergraduate teacher education program at a leading Sydney university. It is worth mentioning that the participants were enrolled in the ICT in Educational Studies course (p.334) when the study was conducted. The majority of the participants had a moderate amount of experience with computers and the internet before commencing their studies. The participants commented that *they really enjoy using technology either for daily use*

or for future instructional practice, and they believe that technology may assist them to learn new methods related to teaching, and improving their teaching practice as well. The study's findings attributed pre-service teachers' good intentions to utilise ICT in their future instruction to a number of factors such as attitudes, perceived competence, confidence about ICT competence, motivation, social factors, and learning styles.

In summary, from surveying the literature, the results showed that ICT courses provided by colleges of education in both the developed or developing contexts were strong factors influencing pre-service teachers' positive or negative intentions to utilise ICT in their instructional practice. That is, if the ICT course content is focused on teaching pre-service teachers how to effectively utilise ICT for their subject matter, then they will utilise ICT in their instructional practice: if not, they will not. Without neglecting the significance of other factors such as ICT infrastructure availability at schools and technical support, it seems that it is easy for ICT-related course instructors to neglect the development of pre-service teachers' pedagogical and technological knowledge if they are more focused on lecturing how to utilise a particular ICT tool, or for methodology course instructors to neglect technological knowledge by never offering ICT as an instructional tool.

The argument that emerges here is that colleges of education need to be aware of and take steps to address all the possible impediments concerning the professional preparation program. By integrating methodology and practice, pre-service teachers' professional training programs can be assured they are addressing the vital preparation required for ICT integration in future practice, while more keenly focusing on pre-service teachers' confidence and competence that greatly influences their intentions to utilise ICT in their future instruction. This leads us to a significant question as to whether pre-service teachers' post-graduation are sufficiently prepared to integrate ICT

in their future instructional practice or whether they will follow their instructors in using traditional methods of teaching. I believe more studies should be carried out to investigate the current situation of teacher education programs and their capacity to prepare pre-service teachers to integrate ICT in their subject matter.

2.2.1.5 Technical Support

Pre-service teachers would be reluctant to integrate ICT in their practice if they believed that there would be no technical support when they experienced ICT-related technical problems (Bingimlas, 2009; Wong et al., 2008). Albugami and Ahmed (2015) have suggested that schools provide teachers with "ongoing technical training" (p.8) as well as technical support services whenever they are required. Research conducted in different educational institutes in developed countries demonstrate the significance of technical support in pre-service teachers' intent to integrate ICT in their instructional practice (Hüsing & Korte, 2007). Studies report the impact of technical support on pre-service teacher intentions toward ICT integration in their future instruction as follows.

In a cross-sectional study, Akbulut et al. (2011) attempted to explore the factors that influence pre-service teachers' intentions to utilise ICTs in their future practice. The data collection tool was administered to 2,515 pre-service teachers in their senior year at six main educational faculties in Turkey. The findings indicated that lack of technical support for both faculty members and pre-service teachers was one of many obstacles that could deter pre-service teachers from using ICTs in their future instructional practice. Furthermore, Akbulut et al. have recommended providing teachers with technical troubleshooting strategies and skills in order to overcome issues while they integrate ICT in their instructional practice.

Another study carried out in Turkey by Baydas and Goktas (2016) has investigated influential barriers/enablers concerning pre-service teachers' intention to integrate ICT in their practice. Using a stratified sample, at least one university was selected from each of Turkey's 12 regions. Data were collected from 2,904 pre-service teachers in their final year at 16 universities across the country. The results detailed that a lack of technical support in schools appears to be one of the main barriers preventing pre-service teachers from utilising ICT in their instruction.

Moving away from Turkey, another study has investigated the factors that influence Serbian pre-service teachers' intention to utilise ICT in their instructional practice (Teo & Milutinovic, 2015). The researchers surveyed 313 pre-service teachers attending education programs in two universities. The results demonstrate a positive relationship between technical support and intentions to utilise ICT in classrooms. Pre-service teachers expressed their willingness to utilise ICT in their instructional practice and considered that ICT was easy to use in class and a useful tool in the presence of technical support.

Providing schools with ICT tools is relatively easy in a country such as the one under current study, however using them is a greater challenge. In conclusion, it seems from the aforementioned literature that, in general, pre-service teachers who know that they will be provided with ICT-related technical support appear to have greater intention to use it in their instructional practice.

2.2.1.6 Technology Infrastructure in Schools

A number of research studies have indicated that many developing countries lack adequate school ICT infrastructure (Masino & Niño-Zarazúa, 2016). The literature in this area identifies a relationship between the availability of ICT infrastructure in schools and pre-service teachers' intentions to utilise it in their future instructional practice. In a study

carried out in Australia, Kaur (2011) emphasised that the lack of proper school infrastructure is one of the barriers behind the intimidation experienced by pre-service teachers in using ICT in their future instructional practice. Similarly, according to Chen (2015), the analysis of a questionnaire distributed to a sample of 600 pre-service teachers from three Taiwanese universities showed that their intention to utilise ICT in their future instructional practice was impacted by the availability of ICT in schools.

In Ghana, the situation is no different: Gymafi's (2016) study results indicate a lack of ICT infrastructure as one of the barriers identified as to why in-service and pre-service teachers have no intention to utilise ICT in their instructional practice. According to Aslan and Zhu (2015), in Turkey, the majority of pre-service teachers stated that the inadequate state of ICT infrastructure in classrooms influenced their intention to utilise ICT in their instructional practice and prohibited them from utilising ICT in the practicum. Finally, Burden and Hopkins (2016) in the United Kingdom report that a lack of ICT infrastructure is one of the major barriers that influence pre-service teachers' intention to utilise ICT in their instructional practice.

In the case of the country under current study, one of the most common barriers concerning the use of ICT in teachers' instructional practice is the lack of classroom infrastructure (Alharbi, 2014). As mentioned earlier, a recent study carried out by Alawadi and Aldhafeeri (2017) found that teachers in the study country have heavy workloads and experience a lack of infrastructure, technical support, time, knowledge and competence in utilising ICT in their instructional practice. Thus, these are major barriers that hinder them from utilising ICT in their classrooms. The analysis of the interviews found that more than 50% of teachers indicated such a lack of resources as a main barrier that hinders their use of ICT. Examples of interview responses include: *"there is no internet connections in classroom, this make it difficult to present the data show especially in the case of presenting*

internet material". In other schools, "*although the internet connection is available, however, it is poor*". Other teachers reported that they "*did not use ICT in their instructional practice as there were no electrical outlets in the classroom*". In some cases, teachers commented that they "*had to bring their personal laptop to classroom to present the material as the school lack of computers.*"

Similarly, Alshimmari's (2015) study investigating teachers' use of ICT in their instructional practice in the study country showed that a lack of internet connection, computers, resources, and up-to-date ICT tools were the main external barriers that influenced teachers' use of ICT in their teaching. Mohammed (2014), researching in the study country, has claimed that despite the availability of ICT infrastructure in some schools, they are not part of the subject matter in the classroom while teachers are in urgent need of developing their technological and pedagogical skills.

In conclusion and, based on the literature, it appears that teachers in the country investigated here are not ready yet to utilise ICT in their teaching due to many factors, one of which is the lack of adequate relevant school infrastructure.

2.2.1.7 *Gender*

There exist international researches to determine gender influence on teachers and pre-service teachers' intentions to utilise ICT in their teaching (Alharbi, 2014; Aslan & Zhu, 2016; Wong et al., 2012), however, the result of these researches showed mixed results. From my point of view, the gender magnitude influence on pre-service teachers' intentions may vary across cultures.

Through reviewing the literature, a good portion of the research studies showed no significant difference in pre-service teachers' intentions is attributed to gender, such as Aslan and Zhu (2016), Karaka (2015), Sarıçoban's (2013) and Baydas and Goktas's (2016)

research in Turkey, Jamieson-Proctor et al. (2010) in Australia, Li et al.'s (2016) study conducted in a midwestern university, Sang et al.'s. (2009) qualitative study on Chinese pre-service teachers, and Teo et al.'s (2015) research on Serbian pre-service teachers.

However, there are other studies that identify differences in pre-service teachers' intentions to integrate ICT in their profession as females are less interested or have different intentions than males, such as, Kounenou et al.'s (2015) study (Greece), Wong et al. (2012) (Malaysia), and Tezci (2011) (Turkey).

Despite this, I will not investigate gender issue in this study for the following reasons:

1)   Three-fourth of the sample is female pre-service teachers. This is normal, since females are more likely than males to have teaching as a profession, particularly in the Arab world. In addition, the majority of teachers in boys' primary public schools in the country are female. Therefore, investigating gender differences in this environment is seems to be biased if it is not thoroughly explored from my point of view.

2)   In addition, the majority of the studies that investigated gender differences, gender was a major aim of the study such as Alrasssedi's (2009) research that investigated the effect of teachers' gender on their intentions to utilise ICT in their profession in the country of the current study, Wong et al. (2012) study that examined the influence of gender on ICT acceptance among pre-service teachers. Thus, and from my perspective, exploring gender differences related to intention to utilise ICT professionally must be thoroughly explored in a study devoted to determining the influence of gender on a particular factor.

2.2.2   Second Order Barriers

Of all the second order barriers, this study focuses on the influence of confidence and attitudes on pre-service teachers' intentions to utilise ICT in their future instructional practice.

2.2.2.1 *Pre-Service Teachers' Attitudes Toward ICT Integration*

As one of the key components of this study, attitudes can be defined as "enduring systems of beliefs" (Hogg & Vaughan, 2005) that are composed of three different components, namely: behaviour, affect and cognition:

- The cognitive component is the thinking component – pre-service teachers' beliefs that technology integration in their future instructional practice is beneficial;

- Affect is the feeling component – pre-service teachers' emotional feelings are stimulated by their experience of the technology;

- Behaviour is an intent component; pre-service teachers are ready to take an action to utilise the technology in their future instructional practice (Fazio & Roskos-Ewoldsen, 2005): intent is difficult to measure but is tied to behaviour.

Teachers' attitudes toward ICT integration in their instructional practice are based on their belief about the usefulness of ICT in teaching (Shirvani, 2014). In this respect, one could argue that pre-service teachers' positive beliefs regarding ICT usefulness in the classroom might in turn lead to changes in their attitude toward ICT integration in their future instructional practice. Researchers have found pre-service teachers' positive attitudes toward ICT is the most significant incentive for ICT integration in their future instructional practice (Tondeur et al., 2012). In addition, Goktas et al. (2009) have claimed that changing

the attitudes of pre-service teachers could remove some potential barriers to effectual ICT integration in their teaching practice.

In this section, the literature revealing the most influential predictors of pre-service attitudes toward ICT integration will be discussed. There have been a number of significant studies exploring pre-service teacher attitudes toward ICT integration in future instructional practice. First, Chai et al.'s (2009) study collected data through questionnaire responses from 108 Singaporean and Taiwanese pre-service teachers regarding attitudes about ICT use in their practice. Pre-service teachers showed moderately positive attitudes toward ICT use in their instruction, while the results also detected no influence derived from pre-service teachers' epistemological and pedagogical beliefs respectively concerning their attitudes toward the use of ICT in their practice.

In one of the Arab Gulf States in the same year, Serhan's (2009) study found that pre-service teachers had developed positive attitudes toward ICT integration in education after completing an educational technology course as mentioned earlier. Furthermore, Bower and Wittmann (2009) surveyed 70 pre-service teachers from the Education Department at Macquarie University in Australia regarding their perceptions of the integration of particular technological tools (LAMS and Moodle) and their intention to utilise them in their future practice. Pre-service teachers were chosen based on having taken the ICT course at the Education Department. The course included "digital literacies, technology affordance, collaborative learning theory, framework for learning design, multimedia learning principles, and two-hour lab" (p.30), the 'lab' being intended to practice the course's learned concept. The survey questioned the advantages and limitations when designing learning experiences using the tools, and the preference for creating online activities using the same aids.

The results showed that pre-service teachers have positive intentions to use technological tools in their future instructional practice that were guided by the anticipated teaching context, technology affordance in classrooms, and their suitability for the lesson and students' engagement respectively. In addition, the survey results indicated that pre-service teachers displayed positive attitudes toward the utilisation of technological tools in their future instruction, believing that it leads to meaningful learning, makes the subject more interesting, while allowing the student to construct knowledge that results in better student learning outcomes. They also commented that the tools are flexible to use, especially after gaining lesson-designing skills.

Another study carried out in Australia by Kaur (2011) has examined pre-service teachers' attitudes toward ICT integration in their future practice and the factors leading to these same attitudes. A questionnaire and semi-structured interview respectively were used to collect data from 32 participants pre- and post-practicum in order to measure any changes in attitudes. The study's data analysis showed that 100% of the participants had access to computers, 94% had internet access and used the internet daily, 53% of them showed a moderately competent level in using different types of technology, 41% were highly competent, and 6% chose a novice level. These findings indicated that pre-service teachers appeared to be competent in using technology and had generally positive attitudes toward ICT integration in their future practice.

However, a very crucial finding here was that 18% of the pre-service teachers revealed that they lacked the skills required to use interactive white boards while also having unfavourable attitudes toward their use. On the basis of these findings, Kaur (2011) identified some elements behind the intimidation felt by pre-service teachers when using ICT in their future practice, such as lack of general knowledge and skills affecting possible use of ICT in future instruction, lack of practical experience to utilise ICT in teaching during

the practicum, and the absence of proper infrastructure. In a similar context, Gill and Dalgarno's (2008) study's results have shown that pre-service teachers could develop positive attitudes toward ICT use in their future instruction as their skills developed within the ICT educational studies course as mentioned earlier.

In another developed context, Lei (2009) examined pre-service teachers' ICT experience, skills and knowledge respectively, as well as beliefs and attitudes toward ICT integration in their future practice. The study's survey findings reported a positive attitude toward ICT. Pre-service teachers viewed ICT as a tool that can improve their instructional practice while leading to better student learning outcomes. However, their attitudes toward ICT integration in their future instruction were qualified: pre-service teachers' reserved attitudes, on the one hand, showed that integrating and utilising ICT in their practice is essential, while on the other revealing they might not be active users of ICT in their future instruction.

The study also found that pre-service teachers were proficient with the use of basic ICTs for social activities, but they lacked the experience in utilising more advanced ICT for instructional purposes. In regard to the teacher education program, the results showed that pre-service teachers lacked experience with "subject-specific technologies" (p.92). In light of the aforementioned results, the researcher (Lei) recommended teacher education programs pay attention to the following issues: emphasising the use of subject-specific technologies; providing pre-service teachers with the skills and knowledge required in order to make effective connections between ICT and their instructional practice; and exposing them to a variety of ICT tools that can be used in their instruction.

In a comparative study including two groups of senior year pre-service teachers, Shirvani (2014) investigated the difference in attitudes toward the use of ICT in pre-service teachers' future practice. Shirvani's study used a questionnaire completed by 62 participants

in their senior year at a southern US university. The average of group one age was around 22, and that of group two was around 30. The findings showed that the older group of preservice teachers had better attitudes toward ICT integration in their instructional practice on almost all questions, while a significant difference was found on only three out of 29 questions. These questions concerned the need to prepare and train teachers to use and integrate ICT in their classrooms effectively, how the rapid change of technology must be accompanied by effective support, and technology's influence in the classroom. The researcher attributed older respondents having better attitudes to their having more experience with the technology and its uses in the classroom.

In Singapore, Teo (2008) examined 139 pre-service teachers' attitudes regarding the integration of computers in their future instructional practice in relation to a number of variables, namely age, computer experience, and confidence about competence. The five-point Likert scale questionnaire used measured demographic background, computer attitude, computer experience, and perceived confidence in their own competence. The findings showed a significant difference in pre-service teachers' attitudes regarding computer use in their future practice, which were attributed to computer experience and confidence regarding competence.

In addition, So et al. (2010) based the aims of their study on the implementation of several ICT policies in Korean and Singaporean education over the previous decade. Recipients of such policy initiatives had developed their beliefs, attitudes, skills, and knowledge about ICT integration in education from their experience as school students. Hence, the aim of this study was to examine the attitudes of 218 pre-service teachers in their first year of a teacher education program. Of these participants, 163 were Korean and 55 were Singaporean. Survey findings showed that Singaporean pre-service teachers scored higher for positive attitudes toward ICT use in instructional practice than their Korean

counterparts. The researchers attributed this finding to their ICT past experience and more positive attitudes to learning and teaching with technology before entering the education program than the Korean pre-service teachers showed.

Sharing the same focus, but in a Malaysian context, Fook et al.'s (2011) study indicates that pre-service teachers had positive attitudes toward ICT integration in their future practice and showed moderate competency levels. The results also demonstrated that ICT-related courses were sufficient to prepare pre-service teachers to utilise ICT in their future instructional practice (details of the study were outlined in Section 2.2.1.4).

In Turkey, Akbulut et al. (2011) showed that, from their data, pre-service teachers had negative attitudes toward ICT integration due to the ineffective and limited demonstration of ICT utilisation for future instructional practice purposes during the education program as mentioned earlier. In a similar context in Turkey, Sarıçoban's (2013) study investigated pre-service teachers' attitudes toward ICT use in their instruction in three main universities. A questionnaire was distributed to 95 participants, 82 female and 13 male. The results revealed that pre-service teachers had positive attitudes toward ICT use in instructional practice while the study also found a significant negative correlation between attitudes and perceived usefulness. The more positive the pre-service teachers' attitudes toward ICT, the more their beliefs about its perceived usefulness in their future instructional practice decreased. Another finding indicated significant differences between pre-service teachers' general attitudes and their attitudes to subject-specific technology. Pre-service teachers differed in how they felt about ICT, how useful they believed ICT could be in their specialisation, and their intention to utilise ICT in their future practice. Ultimately, the study showed no significant relationship between pre-service teachers' ICT-related courses (taken/not taken), and their attitudes toward ICT use in instruction.

Similar to the previous study, Aslan and Zhu (2015) designed their qualitative study to investigate pre-service teachers' attitudes to the integration of ICT in their practice in three state universities in Turkey. A total of 782 Turkish pre-service teachers participated in the study, and 15 of them were interviewed. From the analysis of the coding, three themes emerged, namely the perceived influence of pre-service teachers' attitudes toward ICT integration in their future instruction, pre-service teachers' attitudes toward ICT integration, and conditions for ICT integration. The findings of this study found that pre-service teachers' prior experience with ICT and their belief in the importance of ICT in education made a positive contribution to their attitudes toward integrating ICT in their future practice.

In South Asia, particularly in India, Padmavathi's (2016) study has analyseed pre-service teachers' attitudes towards the integration of ICT in their practice. The influence of pre-service teachers' intentions, years of experience in using computers, ICT competence and subject area influence on attitudes toward the integration of ICT were also examined. A questionnaire was distributed to 110 female pre-service teachers in their final year at a college of education, while these teachers had also completed the practicum and all related courses. The major findings of the study showed: (1) pre-service teachers had positive attitudes toward the integration of ICT in their instructional practice; (2) a strong positive correlation between years of experience in using computers and attitude; and (3) significant differences between subject areas and respective attitudes.

In summary, the aforementioned studies demonstrated that pre-service teachers' attitudes are influenced by a number of factors such as their belief in the positive influence of ICT on education, ICT-related courses offered by the teacher training program, perceived ICT usefulness, competence and skills, prior ICT experience, and ineffective teacher training programs. To translate pre-service teachers' attitudes into practice and facilitate the judicious integration of ICT in their instructional practice, from an examination of the

literature one can conclude that pre-service teachers need to learn how to integrate ICT for pedagogical purposes through the practicum.

2.2.2.2 *Pre-Service Teachers' Confidence Regarding ICT Integration*

Several researchers have indicated that limitations in pre-service teachers' ICT skills make them feel anxious about engaging with ICT in their teaching, thus they are not confident dealing with the technology in classrooms (Cowie & Jones, 2005). Similarly, Balanskat, Blamire and Kefala (2006) have pointed that one of the most significant barriers that hinder pre-service teachers or in-service teachers from utilising ICT in their practice is a lack of confidence about their competence to do so. In particular, pre-service teachers who do not feel confident about their ICT competence are less likely to utilise it in their future instruction (Balanskat et al., 2006; Bingimla, 2009; Cowie & Jones, 2006; Osborne & Hennessy, 2003).

The literature also features many studies on the impact of pre-service teachers' confidence regarding the integration or the utilisation of ICT in their future instructional practice. Firstly, and in a Malaysian context, one of the goals of Fook et al.'s (2011) study was to examine pre-service teachers' competence and confidence to utilise ICT in their future practice. The results showed that pre-service teachers gained more confidence after completing the ICT course, as the course provided them with the opportunity to practice their skills and knowledge of ICT integration in teaching. Still in an Asian context, Yeung, Lim, Lam-Chiang and Hui (2012) conducted a survey to measure pre-service teachers' confidence about their competence in using ICT in their instruction. In total, 394 pre-service teachers in a postgraduate diploma in education program and 244 pre-service teachers in their senior year in an undergraduate education program in Singapore participated in the study. Results showed that confidence correlated significantly with perceived competence,

where participants who have perceived competence in using ICT are more likely to integrate it in their future practice. Similarly, in their study, Choy, Wong and Gao (2008) explored 108 pre-service teachers' confidence about their technological competence in Singapore as mentioned earlier. The findings indicated an increase in pre-service teachers' confidence about their knowledge and skill to integrate ICT in their future instructional practice during the practicum experience.

Far from the Asian context, four studies carried out in Australia by Jamieson-Proctor, Finger, and Albion (2010, 2011), and Gill and Dalgarno (2008, 2010) measure pre-service teachers' confidence in their competence regarding the integration of ICT in their future instructional practice. According to Jamieson-Proctor, Finger, and Albion (2010), 345 pre-service teachers from two main universities were chosen to participate in an online TPACK confidence questionnaire. The questionnaire items measured ICT use in the curriculum (TK and PK), ICT access, perceived TK competence and ICT applications on a four-point Likert scale. The questionnaire also provided the pre-service teachers with an opportunity to compose open-ended responses to questions seeking feedback concerning the role of teacher education programs in developing pre-service teachers' confidence and competence to engage with ICT in their future practice.

The study's findings indicated a low level of perceived competence (TK) among pre-service teachers in general. However, they reported a high level of competence with a limited range of ICT applications such as using e-mails, web browsing and word processing, and low levels of competence with less commonly used applications such as web page development, video editing, and Web 2.0 applications. A year later, Albion, Jamieson-Proctor and Finger (2011) conducted another study as an extension of their previous work. The study investigated pre-service teachers' level of confidence utilising a variety of ICT applications in their teaching. A total of 3,200 pre-service teachers from two teacher

education programs were chosen to participate in the TPACK confidence survey. Analysis revealed that there were significant differences attributable to year of study regarding level of confidence, whereby students in their program senior year reported higher mean levels of confidence. However, this study, along with the previous research, found that pre-service teachers tended to be confident to very confident with a limited range of ICT applications, such as using e-mails, web browsing, and word processing, while they reported lower confidence with less commonly used applications such as multimedia, video editing, PowerPoint, Excel spreadsheets, web page development, and databases. These results deserve further investigation to determine to what extent teacher-education programs prepare graduates to engage with ICT in their future instruction.

In a study previously mentioned, Gill and Dalgarno (2008) showed that the majority of their participants had moderate experience with computers and the internet before commencing their studies, while all of them had heard of blogs and Wikipedia, yet none of them contributed to the latter or developed their own blogs. In this environment, the participants developed their skills with ICTs, and showed at least a degree of confidence utilising them in their teaching, and while this confidence increased as they progressed in their course, younger participants showed more confidence utilising ICTs compared to older participants. Two years later, Gill and Dalgarno's (2010) qualitative research investigated eight pre-service teachers' confidence, attitudes, and intentions regarding ICT utilisation in their future instruction post-practicum. The study findings showed that pre-service teachers' confidence developed throughout the practicum and was influenced by faculty members' modelling of ICTs in teaching.

From Australia to the opposite side of the world, namely the USA, Kessler and Plakans (2008) and Ward and Overall (2013) have measured pre-service teachers' confidence in their competence regarding the integration of ICT in their future practice. In

their study, Kessler and Plakans (2008) tracked and interviewed seven pre-service teachers at two significant US universities. The study sought to provide further evidence of the influence of pre-service teachers' ICT skills on their confidence deploying ICT in their future instructional practice. The researchers interviewed pre-service teachers periodically in order to categorise them as highly confident, contextually confident, and less confident integrating ICT in their future practice. The study results indicated that pre-service teachers who had perceived competence in using ICT were highly confident and more likely to integrate it in their practice.

Ward and Overall (2013) measured pre-service teachers' confidence in their competence regarding the integration of ICT in their future instruction as follows. Data collection in the University of Maine consisted of five self-report questionnaires utilised to measure pre-service teachers' confidence in their ICT-related competence. The self-report questionnaires covered the following areas: "stages of adoption, the Apple classroom of tomorrow, technology proficiency self-assessment instrument, level of utilisation, and concerns based adoption model" (p.4). As it was a time series study, data gathering took place at four different points, such as before and after a 12-credit practicum in their second year, and the data were gathered again pre and post a mathematics methods course in the pre-service teachers' fourth year. The researcher used the data gathered in the second year (post-practicum) and the fourth year data (pre-mathematics methods course) as it helped determine any change in the pre-service teachers' confidence about their competence in their third year.

The findings showed a general increase in confidence in utilising ICT in future instructional practice among the seven pre-service teachers in the practicum and in the mathematics methods course. However, the findings reported a decrease in pre-service teachers' confidence about their integration skills in the time frame between the two courses

(third year). As the researchers discussed the results, they attributed this decrease in confidence to the education courses not having a technology emphasis during the third year.

Moving to the Middle East, Bozdoğan and Ozen (2014) used a mixed method approach in a Turkish context to explore factors affecting pre-service teachers' confidence about their technological competence integrating ICT in their future practice. The study sample was comprised of 241 pre-service teachers enrolled in an education program. Analysis of the survey results indicated the positive influence of the experience gained during the practicum on the pre-service teachers' confidence, attitudes, and intentions to integrate ICT in their future instruction.

The purpose of Afful et al.'s (2017) study was to examine pre-service teachers' readiness to integrate ICT in their future practice. A total of 172 Ghanaian pre-service teachers participated in the study, and 24 of them were interviewed. The results showed a disparity between quantitative and qualitative data in regard to the pre-service teachers' competence to integrate ICT in their practice. The quantitative data analysis showed that pre-service teachers had high levels of competence, confidence and readiness, however, the qualitative data did not support this assertion. Afful et al. (2017) have commented on this disparity, namely that pre-service teachers had not been provided with the opportunity to utilise ICT in their instruction during the program.

In summary, pre-service teachers' competence and skill is key. No matter whether in developing or developed countries, the discussion of the aforementioned literature shows that with an increase in confidence level, it is more likely that pre-service teachers will have an intention to utilise ICT in their instructional practice and to develop their skill level. Pre-service teachers' confidence about ICT integration in their future practice is evidently influenced by a number of factors such as level of technological competence, experience gained from the practicum and related to ICT integration, experience gained from ICT-

related courses, and faculty members' modelling of ICT in lectures. Therefore, if we agree that our confidence turns into a set of practices, then teacher education faculties should focus overwhelmingly on the factors the influence pre-service teachers' ICT confidence.

2.3 Relationship between the variables

As the study focuses on pre-service teachers' intention, confidence and attitudes, in the following section, I review those studies which discuss the relationship between intention and second order barriers.

2.3.1 Relationship Between Attitudes and Intentions to Integrate ICT

According to Zimbardo et al. (1977), there are two different lines of understanding in regard to the influence of attitudes on intentions to behave in a certain way. One is that attitudes influence intentional behaviour when behaviours are stable so that individuals may reconstruct them spontaneously, the other suggests attitudes influence intentional behaviour when individuals recall them from memory. Factors that strengthen or weaken the relationship between attitudes and intentional behaviour in both lines are motivation, beliefs, experiences, knowledge, and recollected attitudes (Player-Koro, 2012).

In turn, Glasman et al. (2006) have defined two types of relationship that correlate attitudes with intentions, namely, general or particular attitudes to a particular intentional behaviour. In the case of general attitudes, the relationship between the two variables weakens as there is no close correspondence between attitude and intentional behaviour. On the other hand, with particular attitudes, the relationship between the two variables improves as attitudes respond closely to the intentional behaviour.

The literature on pre-service teachers' attitudes toward and intention to use ICT in their future instructional practice has been researched extensively. Sang et al.'s (2009) qualitative study has explored the impact of attitudes, beliefs, and self-efficacy on 727

Chinese pre-service teachers' intentions to utilise ICT in their practice. The findings showed that pre-service teachers' intentions are influenced by positive attitudes, ICT self-efficacy, beliefs and strong teaching efficacy.

Some researchers have undertaken a more holistic approach when investigating whether attitudes are the best predictor of pre-service teachers' intentions to utilise ICT in their future instruction. For example, So et al. (2010) have examined the relationship between ICT past experience, computer efficacy, attitudes, and intentions to integrate ICT in instructional practice. The study's participants were made up of 163 Korean and 55 Singaporean pre-service teachers, as mentioned earlier. High correlations were found between attitudes, computer efficacy and intentions to use ICT in future instructional practice in both samples.

Two years later, So et al. (2012) was concerned mainly with identifying…the complexity of past experience with ICT, ICT efficacy, constructivist beliefs, personal ICT use, and attitudes toward ICT in learning and teaching that the digital generation pre-service teachers have about their intention to utilize ICT in their instructional practice (p.1234).

The study sample included 225 pre-service teachers in their first and second year in a college of education in Korea and Singapore respectively. The findings revealed that pre-service teachers in both groups tended to hold positive attitudes toward ICT in terms of learning and teaching. Furthermore, the findings provided empirical evidence that pre-service teachers who show positive attitudes toward the use of ICT in their teaching have more intention to deploy it in their future practice.

In an effort to prepare pre-service teachers to utilise ICT effectively in their future instruction, Anderson and Groulx's (2011) study identified the relationship between pre-service teachers' ICT-related abilities, attitudes, and intentions to utilise ICT in their

practice. The study sample consisted of 217 pre-service teachers enrolled in an introductory educational technology course at a US university. Results indicated that, among the other variables, attitudes were the best predictor. Self-efficacy and constructivist beliefs showed a moderate correlation. However, abilities had a weak positive correlation with, and contributed significantly to, the prediction of intentions with regard to the usage of ICT in future instruction.

In another US-based study, Sadaf (2013) used a mixed methods sequential explanatory approach to explore factors related to pre-service teachers' intentions to utilise ICT in their future practice at a midwestern university. In the first phase, a total of 189 pre-service teachers participated in this study and 12 interviews were conducted.

Results of a path analysis showed pre-service teachers' attitudes toward ICT as the strongest determinant of their intention to utilise ICT in their future practice. Perceived usefulness, in turn, had the strongest impact on attitudes.

Wong et al.'s (2013) study examined the validity of TAM (Technology Acceptance Model). The results of the study indicated that the TAM represented Malaysian pre-service teachers' intentions to utilise ICT in their future instruction. Moreover, the results showed that attitudes and perceived usefulness were the most dominant determinants of pre-service teachers' intentions to utilise ICT in their practice. However, attitudes showed less variance compared to perceived usefulness. The researchers attributed this to the curricula used at the college of education, as pre-service teachers were exposed to ICT integration in their practice at different levels and subjects. Regarding these results, Wong et al.'s study recommended colleges of education to work on enhancing pre-service teachers' beliefs and knowledge about the usefulness of ICT in teaching practice and learning in addition to what they recommended earlier.

As mentioned previously, Sarıçoban's (2013) study conducted in Turkey showed a significant positive correlation between attitudes and intentions on the one hand, with a significant negative correlation between perceived usefulness and intention to integrate ICT in future practice. The researcher attributed this to the fact that pre-service teachers lacked the skill and knowledge regarding how to utilise ICT in their instruction. Another finding revealed a significant relationship between pre-service teachers' age and their intentions to utilise ICT in their future practice. In the same context, Baydas and Goktas's (2016) study had an identical result as their study showed that utilising ICT in teaching increases pre-service teachers' interest and makes lessons more entertaining. Attitudes influence pre-service teachers' intention to integrate ICT in their instruction.

In Serbia, a case study was conducted by Teo and Milutinovic (2015) to examine variables that influence pre-service teachers' intentions to utilise ICT in their practice. The study was based on data collected from 313 pre-service teachers using a questionnaire. In addition, the results demonstrated that pre-service attitudes were the only predictor of intentions to utilise ICT. In a similar vein, Burden and Hopkins (2016) in the UK examined the attitudes of pre-service teachers utilising ICT for their instructional practice during the practicum. This study used a mixed methods design to collect data through focus groups and a questionnaire, and involved a sample of 117 pre-service teachers. The results showed how pre-service teachers' attitudes are a significant factor in determining their intention to integrate ICT in their teaching. In addition, the study found that some first order barriers such as lack of infrastructure, competence, and training are diminishing as significant factors for ICT integration in pre-service teachers' instructional practice.

In a descriptive study, Gyamfi (2016) explores the factors that influence pre-service teachers' intentions to utilise ICTs in their future instructional practice. A cross sectional survey questionnaire was administrated to 400 pre-service teachers in their senior year at

two education institutions in Ghana. Study findings indicated that pre-service teachers' attitudes toward ICT use are a significant determinant of their intentions to utilise ICT in their practice.

In Greece, self-reported data was gathered from 325 pre-service teachers to investigate their intentions toward ICT use in their future instructional practice (Fokides, 2017). It was found that a strong direct relationship existed between attitudes and intentions to utilise ICT in pre-service teachers' instructional practice. As ICT tools were in continuous development and everyday new tools came into service, pre-service teachers could experience difficulties in dealing with other ICT tools and develop a negative attitude toward such new tools. Therefore, Fokides recommended a longitudinal study to trace pre-service teachers' behaviour changes when they became in-service teachers.

2.3.2 Relationship Between Confidence and Intentions to Integrate ICT

A variety of psychological factors are known to be interlinked with the use of technology. Wong et al. (2012) have mentioned, among other factors, that a particularly significant issue is teachers' confidence in their competence in using technology, and its influence on their intention to integrate ICT in teaching. Pynoo et al. (2011) have added attitudes toward ICT as a significant factor to be considered when investigating pre-service teachers' intentions.

The literature features a considerable number of studies exploring the relationship between perceived confidence and intention regarding the integration of ICT in education among pre-service teachers. In the USA, as mentioned earlier, Andrews et al.'s (2010) study also examined the relationship between pre-service teacher confidence about their ICT skills and their intention to integrate ICT in their future instructional practice. The results indicate a positive correlation between competence and intentions, where pre-service teachers with a

high level of competence were more confident, and had strong intentions in terms of use of ICT in their future practice.

In Australia, Kaur's (2011) research attempted to answer one of the study's questions regarding the relationship between ICT skills, confidence and intention to use ICT in future instructional practice. Data analysis showed that pre-service teachers appeared to be competent and confident in using technology, therefore, they had good intentions to utilise it in their future instruction as mentioned earlier. In the same context, Gill and Dalgarno's (2008) study showed a significant and direct relationship between confidence and intention: as pre-service teachers' confidence about their ICT skills increased during the teacher education program, their intention to integrate ICT in their practice also rose.

Meanwhile, Baydas and Goktas's (2016) study results in Turkey found that pre-service teachers hesitated to utilise ICT in their future practice as they lacked confidence and skills as mentioned earlier while, concerning the practicum, Jita (2016), researching in South Africa, found that the majority of pre-service teachers have negative intentions to utilise ICT as they lack the competence to deploy it in their instructional practice.

Based on the aforementioned literature, there appears to be a positive correlation between intentions and confidence. Where pre-service teachers have a high level of confidence regarding their competence, they have good intentions toward ICT integration in their future practice.

2.3.3 Relationship Between Confidence and Attitudes Toward ICT Integration.

According to Ertmer (2005), perceptions follow behaviours and in turn cause an increase in the occurrence of those same behaviours, which highlights the significance of developing pre-service teachers' confidence through effective "experiences with small instructional changes before trying larger changes" (p.33). The literature has demonstrated

that in a diversity of learning environments, pre-service teachers' sense of their skill and knowledge has a significant influence "on subsequent behaviours" (Yeung et al., 2012, p.1319). Hence, if pre-service teachers have confidence regarding their perceived skills in using and integrating ICT in their teaching, then they will utilise it in their future practice. Pre-service teachers' educational beliefs, confidence, and competence greatly influence their subsequent instructional practices (Liu, 2012). Furthermore, Allsopp, McHatton and Cranston-Gingras (2009) offer three critical factors concerning the integration of ICT in pre-service teachers' future instructional practice: positive attitudes toward ICT integration; ICT competence and skills; and confidence about their perceived ICT competence.

The literature has a considerable number of studies exploring the relationship between perceived confidence and attitudes toward integration of ICT in education among pre-service teachers (Andrews, Crossland, & Lovelace, 2010; Kaur, 2011; Teo, 2008; Valtonen et al., 2015). In the USA, as mentioned earlier, Andrews et al.'s (2010) study showed a positive correlation between attitudes and confidence to utilise ICT, where pre-service teachers with a high level of competence were more confident, had more positive attitudes, and better intentions in terms of using ICT in their future practice. This result shows parallels with Kaur's (2011) study of Australian pre-service teachers.

In Finland, Valtonen et al. (2015) conducted a quasi-experimental study to investigate how experience of the education program can influence pre-service teachers' intention to use ICT in their instruction before and after the ICT course, while the results showed a statistically significant change in pre-service teachers' confidence to engage with ICT in their practice. In addition, differences in the relationship between confidence and attitudes were identified before and after the ICT course.

In his quantitative study, Teo (2008) showed that the pre-service teachers' confidence in their perceived computer skills was positively correlated with their attitudes

toward using ICT in their future instruction. Overall, and based on the body of the aforementioned literature, there appears to be a positive correlation between attitudes and confidence.

2.4   Theoretical Framework

A theoretical framework is said to

…explain either graphically or in narrative form, the main things to be studied, the key factors, concepts, or variables, and presumed relationships among them (Miles & Huberman, 1994, p.18).

Educational researchers are directed towards either the use of available models or the development of new ones that suit the phenomena in a better way (Bekele, 2009). Thus, the selection of a suitable theoretical framework for a particular study requires deep understanding of the research problem, its significance and objectives, and the research questions. The current study investigated pre-service teachers' intentions to integrate ICT in their future teaching and first and second order barriers that obstruct the integration process. Therefore, I reviewed most of the models, theories, and assumptions that underlie technology integration in education, and found that the barriers, enablers and contextual influences of technology integration noted in the literature are considered to be basic elements to develop the theoretical framework guiding the current study. In this regard, a theoretical model that shapes the research was developed. This section proposes a theoretical framework that serves as the study's foundation.

Although to some extent some underlying issues regarding barriers that influence pre-service teachers' intentions to utilise ICT in their future practice might be different from one country to another, the main criteria for first and second order barriers do not vary significantly as shown by the results of the literature reviewed in developed and developing countries (Bingimlas, 2009; AlMulhim, 2014).

The literature review revealed that while the inclusion of technology in education may have the potential to make positive changes in educational environments, this practicability is complex. Contextualising the current situation of pre-service teachers' readiness to integrate ICT in their future career and in light of what was found in different studies has assisted in identifying gaps in the literature and the current research's rationale. The majority of the studies refer to limited equipment, time constraints, lack of software and ineffective training as the most common barriers to technology integration (Gülbahar, 2007; Kisalama, 2012; Johnson, 2012; Semenov, 2005; Snoeyink & Ertmer, 2001; Zhou et al., 2011a). In addition, researchers have attempted to find appropriate methods that would help in overcoming the barriers to ICT integration's in education (Schoepp, 2005). For instance, Sherman and Howard's (2012) previously mentioned study found that first-order barriers remain a significant challenge for pre-service teachers attempting to integrate ICT in their future teaching for the following reasons:

First, ICT professional training, when it is available in the education program and courses, typically provides students with basic theoretical knowledge about the methods they should use to operate the computer and the software, not knowledge accompanied by practical training on how to integrate it into instruction (Johnson, 2012; Liu, 2012). In the current study country, Mohammed (2014) has claimed that a teacher's professional training is based on a theoretical workshop, whereby teachers add the certificate they gain from the training to their CVs, as it only influences their annual report not their instructional practice (a teacher's progress report measures progress by the number of workshops they have attended, not by their actual teaching progress). Mohammed also adds that teachers in the country need to be provided with practical training to integrate ICT into their instructional practice.

Secondly, teachers resist change (Sureshramana, 2007); pre-service and in-service teachers may resist the utilisation of ICT in their instructional practice due to their doubts about the efficacy of ICT to improve learning outcomes in addition to the lack of technical support at schools, unsupportive administration, loss of control and management, and increased time and effort (Snoeyink & Ertmer, 2001). In the country of the current study, teachers usually resist change because of the overloaded curriculum, as teachers' main role is to prepare students for the matriculation exams.

Moreover, pre-service teachers' beliefs (high self-confidence and self-efficacy in using technology) (Fu, 2013; Lin et al., 2012) are related to their intentions to integrate ICT in their future career. Sang et al. (2009) have indicated that pre-service teachers with high levels of self-confidence and belief have stronger intentions to utilise ICT in their future instructional practices. Davis (1989) claimed that pre-service teachers' intentions to utilise ICT in their career is generally determined by their attitude toward ICT and its perceived ease of use. That is, their attitude toward ICT makes them believe that through the use of ICT their work performance may improve, and its perceived ease of use means that pre-service teachers' confidence in utilising ICT would result in less effort required accomplishing the given job. Changing education practices in the country of the current study to meet 21st century demands means we need to understand pre-service and in-service teachers' beliefs and attitudes as well as how to change them positively in order to achieve ICT integration in instructional practice.

2.4.1 The Current Study's Proposed Theoretical Framework

The current study was able to develop a theoretical framework to be evaluated in the study context. The theoretical framework has two main themes. The first concerns first order barriers, which were discussed earlier in this chapter. The second relates to

second order barriers, which are presented in this study as attitudes and confidence. The study will explore the influence of these themes on the pre-service teachers' intention to integrate ICT in their future practice as shown below.
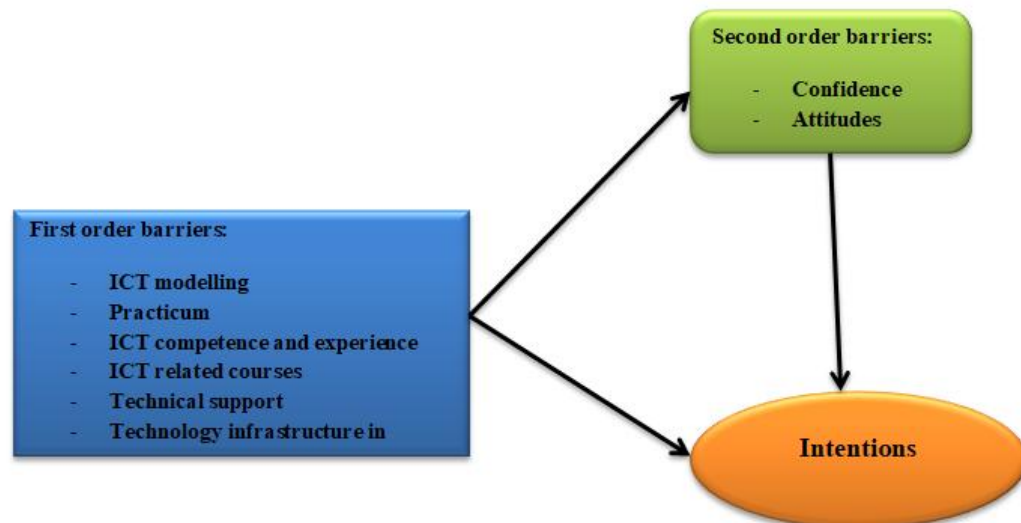
Fig. 6. *Barriers to pre-service teachers' intentions to integrate ICT in their instructional practice*

While barriers to pre-service teachers' ICT use are, in general, fairly well studied in ICT-rich environments (Tavil, 2014) and in the developed countries (Bingimlas, 2009; AlMulhim, 2014), only a few research studies have investigated the barriers to pre-service teachers' use of ICT in their future instructional practice in developing countries (AlMulhim, 2014). The theoretical framework developed in this study consists of three constructs: first order barriers, second order barriers, and intentions. The model above shows a causal relationship between intentions and the other constructs. The model assumes that first order barriers identified by researchers working in this area (Almofarreh, 2016; Bingimlas, 2009; Keengwe & Onchwari, 2008) include: ICT modelling at practicum, practicum, ICT competence and experience, ICT-related courses, technical support, and technology infrastructure in schools. In relation to the second order barriers, I will explore

the influence of attitude and confidence on pre-service teachers' intentions to utilise ICT in their future instructional practice. In addition, the existence of first order barriers has an influence on whether or not they will use ICT to teach. It also assumes a direct correlation between confidence and attitudes, first order barriers and confidence, and first order barriers with attitudes. Correlations between these variables were found in the literature (AkcAl-Sulaimani, 201.0, 2008; Almofarreh, 2016; Al-Sulaimani, 2010; Bingimlas, 2009).

2.5   Chapter Summary

This chapter has explored the literature that was used to develop a theoretical framework to inform the current study's investigation of the relationship between pre-service teachers' confidence, attitudes and intentions toward ICT integration in future instructional practice, alongside barriers to such integration among the study country's pre-service teachers at a state university's College of Education. In addition, the chapter has presented literature relevant to the study objectives.

Although policies in the study country are in place, however – and as shown by the reviewed literature – there is a clear gap between ICT policy implementation and the reality in schools. The chapter has looked at first and second order barriers and how these influence pre-service teachers' intentions to integrate ICT in their instructional practice. The researcher has examined the relevant literature in developing and developed countries and, to some extent, the result of the studies showed no differences attributable to the geographical site (namely either a developed or developing country). In addition, the reviewed literature exhibited great similarities between barriers that influence pre-service teachers' intentions to integrate ICT in their instructional practice in developing and developed countries. Without addressing these barriers or undertaking actions and

procedures in the study country's MoE policy to overcome these barriers, translating pre-service teachers' intentions to integrate ICT into practice will remain elusive.

CHAPTER THREE

3.0   Research Design and Methodology

When ICT is effectively and successfully integrated in teacher education programs, it can have the potential to prepare pre-service teachers to teach in the digital century. In turn, this may offer 21st century students the opportunity to gain the required competence and knowledge to cope in the digital age, thereby meeting workforce requirements and demands as mentioned earlier.

Pre-service teacher: in this study this term refers to a student teacher in an education department at a tertiary institution who seeks to complete his/her teaching qualifications (knowledge and training) under the supervision of a qualified mentor (Australian Capital Territory, 2009).

3.1   Research Purpose and Questions

Informed by the literature review, I set out to explore the factors that contribute to and limit pre-service teachers' confidence about their TPK, positive attitude toward ICT integration in education, and intention to integrate ICT in their future professional practice, all in relation to the study country. In addition, this study explored the relationships between pre-service teachers' intention to utilize ICT in their future instructional practice and their confidence about TPK and attitudes toward ICT integration, as well as their evaluation of the teacher education program they experienced in preparing pre-service teachers to utilize ICT in their future instructional practice. Therefore, six main questions are investigated, which are linked to the research purpose:

1.   How confident are pre-service teachers in the study country regarding their TPK?

2.   What are pre-service teachers' attitudes toward the integration of ICT in education?

3. Do pre-service teachers intend to integrate ICT in their future teaching careers? What are the reasons behind their decision to either plan or not plan to integrate ICT?

4. What is the relationship between TPK confidence and attitude toward ICT integration in education among pre-service teacher education students?

5. Among pre-service teacher education students, what is the relationship between TPK confidence and the intention to integrate ICT in education?

6. How do pre-service teachers assess their educational experience?

The chapter begins by setting out the research questions as well as the merits of qualitative versus quantitative research methods. A brief account is then given of each method in turn, including the rationale for the selected data collection methods. This is followed by details of the research context, ICT courses taken by the pre-service teachers at the education faculty, selection of the relevant sample, and the development of the research instrument. A discussion is then presented regarding validity, ethical considerations and also the statistical techniques used here to analyze the data.

3.2 Study Design

Regarding underlying different methods of investigation, there are two basic approaches to educational research, namely quantitative and qualitative approaches (Harwell, 2011), and it is often difficult to choose between these two. At times, researchers may decide on a given method because they are familiar or more comfortable with it, while a colleague might also have recommended a particular method. Importantly, choosing an appropriate research methodology helps the researcher to gather appropriate data to answer the questions posed (Lowhorn, 2007).

According to Crotty (1998, p.13), there are four conditions that must be taken into consideration when selecting research design, namely the epistemology; philosophical posture underlying the methodology in question (constructivism, post-positivism, advocacy/ participatory, pragmatism); method; and finally the methodology. Yin (2009, p.8) describes three key features to consider in a research design: 1) type of research questions; 2) the degree of control over actual behavioural events; and 3) the extent of the focus on contemporary phenomena. Therefore, from my point of view choosing the most appropriate design is central to identify the most pertinent data collection techniques in order to successfully address the research questions. In other words, and as Yin (2009) has indicated, a good research design is an inclusive plan that specifies the research route, from the questions to the conclusions extracted from the data.

A brief review of different research designs enables the selection of the most appropriate study design. Therefore, the following discussion of the methodology is intended to provide a rationale for the research design.

3.2.1 Quantitative Versus Qualitative Research Methods

While often seen as mutually exclusive methods of carrying out educational research, quantitative and qualitative designs are increasingly seen as interwoven (Niglass, 2000). Indeed, as Creswell (2009) has explained, both designs assist researchers to make significant discoveries, especially when they are utilized alongside each other in the same research study. There has been widespread debate about the relative merits of quantitative and qualitative strategies for educational research (Creswell, 1994; Punch, 1998). Quantitative educational research depends on the gathering of data, which is then subject to quantitative analysis (Harwell, 2011), while it follows the "confirmatory scientific method since it focuses on hypothesis testing" (Johnson & Christensen, 2012, p.33). It is used to

investigate phenomena to draw significant conclusions about populations through studying a representative population sample (Creswell, 2003), thereby allowing the researcher to generate theories (Johnson & Christensen, 2012). On the other hand, qualitative research gathers non-numerical (often word-based) data, and it follows an "exploratory scientific method" (p.33). This research approach is also used to study particular phenomena in their contexts (Baxter & Jack, 2008).

Qualitative and quantitative methods are distinguished by different perspectives on individuals' behavior. In qualitative research, it is assumed that individuals' behaviour changes according to time and place. In relation to this view, the results' generalizability will never reach beyond the study population. In contrast, quantitative research often views individuals' behavior as predictable, whereby all events have probabilistic causes that allow one to generalize the outcomes (Johnson & Christensen, 2012).

By contrast, quantitative research utilizes a "narrow angle lens" (Johnson & Christensen, 2012, p.35) since the research focuses on a few causal factors simultaneously. Creswell (2009) has characterized quantitative research as research that assesses the relationship between study variables. The researcher in this type of research often directs particular and narrow questions, gathers quantifiable data from the study sample, and uses statistics for data analysis (Creswell, 2008). However, qualitative research utilizes a "wide and deep angle lens" (Johnson & Christensen, 2012, p. 35) which examines individuals' behavior in contextual detail as it occurs naturally.

Quantitative researchers attempt to remain objective, neutral, and avoid bias as much as possible. The aim of quantitative research "is to measure phenomena so that they can be transformed into numbers. Once the phenomena have been quantified, they lend themselves to analysis through statistical procedures" (Denscombe, 2007, p.248). In contrast to quantitative researchers, qualitative researchers accept subjectivity; indeed, they contend

that "reality is socially constructed" (Johnson & Christensen, 2012, p.36). Researchers here ask the questions, interview and observe the participants, record the data, and make interpretations. In contrast, quantitative researchers collect data by utilizing a structured validated instrument such as a questionnaire (Johnson & Christensen, 2012).

Quantitative research often falls into one of two categories, non-experimental or experimental. The purpose of experimental research is to determine if independent variables have an effect on the dependent variables (Campbell & Stanley, 1963). This is considered the strongest identifier of cause and effect relationships, which is the main characteristic of experimental research. The research allows the researcher to manipulate the independent variables and then observe what happens. It can be argued that educational research is never truly experimental as variables cannot be fully controlled while experimental designs are often seen as educationally unethical. Non-experimental research or descriptive research involves no manipulation of independent variables and no random assignment of groups (Johnson & Christensen, 2012).

According to Johnson and Christensen (2012, p.48), qualitative research has five major types: phenomenology, ethnography, case studies, grounded theory, and narrative research respectively. Phenomenology is a type of research in which the researcher attempts to understand how individuals experience phenomena. Ethnographic research attempts to describe and discover "the culture of a group of people" (p.48). Case study research provides a detailed description of one or more cases. Grounded research develops a theory from the gathered data, and finally, narrative research concerns places, individuals, and events which occurred in the past.

By examining the current study's problem and the research questions, I can decide on which design and methods to choose. The choice of a particular method is often impacted by the research objectives, the number of participants, and the given context (Creswell,

2009). In pursuit of this investigation, a cross-sectional quantitative non-experimental research design was therefore used based on the context sensitivity and study objectives.

As Creswell (1994) states, one of the fundamental reasons for carrying out a quantitative study is that certain studies focus on causal or correlational relationship between the variables, and use either an experimental or non-experimental design, such as a questionnaire, to examine these relationships. Such quantitative approaches have traditionally been popular in educational technology research (Creswell, 1994; Kurt et al., 2009; Simsek et al., 2009; Gulbahar & Alper, 2009). Therefore, in this study, because I sought to understand pre-service teachers' intentions in their context by measuring and analysing the correlations between variables such as intentions, first order and second order barriers (namely attitudes and confidence), thereby a quantitative approach appeared to be appropriate.

In addition, because the study was organized around a given setting and body of participants, there were sensitivities regarding choosing quantitative methods that "played a critical role in the method of data collection, analysis techniques, and in the representation of data" (Sandelowski, 1999, p. 79). As the Dean's secretary commented to me when I asked for permission to conduct the study, pre-service teachers at the College of Education in the study country had some reservations about participating in face-to-face and recorded interviews due to personal concerns related to time constraints and the country's conservative culture.

Using questionnaires in the current study will help me as a researcher to remain objective, neutral, and avoid bias as I will not interact with the participants (whom I may know), while also protecting their anonymity; this will also be more acceptable to them as a data gathering method. Therefore, in order to complete this study a questionnaire was used to ensure participants' confidentiality and anonymity. By taking this decision (namely using

a quantitative method), I am aware that any potential weakness in collecting data through the questionnaire will not be compensated for by other methods, such as interviews. In addition, in the case of this study, investigating barriers to pre-service teachers' utilization of ICT in their future instructional practice by another method – such as interviews – might have provided me with more confident interpretations as it would have supported findings with strong evidence when comparing the findings of the questionnaire and the interviews.

Finally, due to the uncertainties in terms of gaining the cooperation of faculty members and the need to use a colleague's assistance in collecting data, the data will be gathered at one particular moment during the lecture in order to save the lecturer, colleague, and the participants time. Fraenkel and Wallen (1996) have observed that most common questionnaires utilize a cross-sectional technique whereby participants are asked questions at one point in time as happened in this study.

A non-experimental research design was chosen due to the logistical and ethical concerns associated with conducting experimental research. In the current study, participants' identities are anonymous, and I will not meet or hand any participants a questionnaire to ensure their anonymity and confidentiality as the Virtual Program Ethics Committee (VPREC) of the University of Liverpool requested and as mentioned later in this chapter. In this respect, I believe that a quantitative approach embraces this study's objectives. Finally, through studying the whole population including all pre-service teachers in their senior year, outcomes might be generalized to similar populations in other Gulf states.

3.3   Research Context

The current study's state university opened in 1966, with an enrolment of 418 students. Currently the university's population has increased to reach 40,000 students

studying in 17 colleges including: Allied Health Sciences, Architecture, Arts, Business Administration, Computing Science and Engineering, Dentistry, Education, Engineering and Petroleum, Law, Life Sciences, Medicine, Pharmacy, Public Health, Science, Sharia and Islamic Studies, Social Sciences, and the College of Graduate Studies (Al-Ruwaished & Suleiman, 2014-2015).

The College of Education is a higher education institution at the State University which is supported by the government, and it offers a four-year bachelor degree program that is mostly taught in Arabic. It is divided into four departments including the Departments of Curriculum and Instruction, Education, Educational Administration, and Educational Psychology respectively. The College prepares teachers in various areas of specialization including kindergarten and primary, intermediate and secondary school (international stream), and intermediate and secondary school (scientific stream). This study selected the College of Education at the State University as no other research investigating this area in the study country had investigated that university.

As inadequate utilization of ICT by in-service teachers in schools is often linked to inadequate preparation of pre-service teachers in university education departments (Goktas et al., 2009; Zhou et al., 2011), like many other teacher education programs the College of Education requires all pre-service teachers to take and pass three compulsory technology courses. In addition, students must take and pass the practicum teaching experience after achieving at least 120 out of a total 135 program credits. Course descriptions for the three technology courses are provided below.

A. *Computer Literacy in Education*: This three-credit course has been developed to provide pre-service teachers with the necessary computing skills and knowledge. The course includes computer hardware, software,

and troubleshooting skills respectively. The course has both a theoretical and practical aspect. The theoretical part includes an introduction to the history and development of computers, computer software and hardware, computer terminologies, areas of computer use in education, the history and development of the internet, and areas of internet use in education. The practical part includes mastering basic word processing skills, and proficiency in using computer peripherals (printer, mouse, scanners, microphones, and loudspeakers) (Al-Ruwaished & Suleiman, 2014-2015).

B. *E-learning*: This is a three-credit hour course developed to acquaint learners with the terminology and basic concepts of e-learning. It also enhances their skills in terms of the use of computers and concomitant technologies in a way that supports their learning process and helps them to acquire content, pedagogical and technical knowledge. The course's theoretical aspect aims to identify concepts of learning and e-learning (e-school, e-library, distance learning, virtual universities, e-commerce, and e-government), computer hardware and software familiarity, and recognition of technical obstacles that accompany the integration of technology in the learning process. The course's practical part aims to provide pre-service teachers with skills in the use of the internet, e-libraries, and simple web page design respectively (Al-Ruwaished & Suleiman, 2014-2015).

C. *Media and Educational Technology*: This is a three-credit hour-long introductory course focusing on the technology of education, which surveys the concept of educational technology and its diachronic development, while highlighting its role in teaching and learning alongside that of communication. This course tackles the basis of selecting,

designing, using and evaluating media and educational technology in formal education. It also introduces pre-service teachers to educational communication tools and their properties in accordance with the requirements of learners' development in both the middle and secondary stages. The course has both a theoretical and practical dimension as follows: The theoretical part introduces pre-service teachers to the concept of educational technology, its terminology, classification, role in solving educational problems as well as obstacles, in addition to methods concerning the use of educational devices. The practical aspect aims to provide pre-service teachers with the skills required to use slides, display data via presentations and video films, the selection of proper educational means, and the use of the above mentioned methods to design a lesson (Al-Ruwaished & Suleiman, 2014-2015).

D. *Field Experience Course (Practicum)*: The practicum is a nine-credit hour-long course which aims to provide pre-service teachers with the opportunity to observe and participate in diverse educational settings and to employ the educational methodologies (diverse teaching methods) learned over the course of the education program course work. The pre-service teachers' practicum structure is subdivided into four stages, namely an observation stage, and teaching practice 1, 2, and 3 respectively (see Table 2) (Al-Ruwaished & Suleiman, 2014-2015).

Pre-service teachers are divided into small groups of five students and assigned to the training schools according to the geographical distribution for the accommodation of pre-service teachers (Al-Ruwaished & Suleiman, 2014-2015).

Table 2. *Practicum Structure of College of Education*

Stages	Setting	Benchmark Description
Observation Stage	Spend a total of 20 hours over two weeks (ten hours per week) at school.	This is also called the pre-lesson stage, where the pre-service teachers observe different in-service teachers teaching in their classrooms (different subjects).
Teaching practice 1	Spend four weeks practising teaching in a particular school	In this stage, pre-service teachers participate in the activities and rituals of teachers in the field as they participate in the authentic activity of teaching. They become involved in the wider aspects of the teaching community as it is expected from them to manage the classroom, manage class time, preparing for the lesson (mentally and written preparation), and using appropriate resources for the lesson.
Teaching practice 2	Spend four weeks practising teaching methods and teaching skills.	At this stage, pre-service teachers are expected to use different methods of teaching that serve the lesson objectives and learners' differences.
Teaching practice 3	Spend four weeks practising teaching	This is the final stage, where pre-service teachers are assessed by their mentors.

3.4   Population and Sampling

According to Bartlett et al. (2001), appropriate sample size depends on the nature of the target population and the study objectives. However, some researchers have claimed that the larger the sample size, the more accurate the results and the more representative they are (Kaplan et al., 2014).

The population for this study is composed of senior year pre-service teachers enrolled in an undergraduate teacher education program at the College of Education for the

2014-2015 academic year. I chose to focus on senior year pre-service teachers because it was expected that they would have taken and passed at least two of the three compulsory ICT-related courses offered by the education program, that they would have a certain degree of pedagogical knowledge and could define what type of barriers they might encounter as they integrated ICT in their future teaching. It was also expected that they would have passed the practicum (experience of teaching practice related to pre-service teachers' own specialized major) as a graduation requirement.

The teacher education program has 5,135 students in all areas of specialization. Of the 5,135 students, 588 (11.5%) are seniors in their final year. Table 3 details the students in relation to their nationality from data provided by the College Administration.

Table 3. *Description of the population*

	Citizens	Non-Citizens	Total	Percent
	73	68	141	24
	322	125	447	76
	395	193	588	100
Percent	67	33	100	100

From Table 3 it is evident that 67% of the pre-service teachers are citizens. It is expected that the majority of the pre-service teachers who are citizens will teach in public schools based on their specialization. In recent years, many Gulf state have seen calls to replace non-nationals with nationals, thereby in the study country there is a national goal to appoint more citizens in schools' education departments. It is worth noting here that the State University's undergraduate program is intended to serve citizens only. Non-citizen students at the State University are admitted through their embassy, as each embassy has a

number of places for scholarship students. The majority of non-citizen graduates continue to teach in the state after graduation as their families reside there.

3.5   Study Instrument

As mentioned earlier in this chapter, the study used a questionnaire to collect data. Questionnaires are used widely in educational research (Strange et al., 2003) to measure attitudes, intentions, perceptions (Creswell, 2008), and to evaluate perceived abilities (Al-Sharija, 2012; Siniscalco & Auriat, 2005). In particular, the questionnaire was used to collect data from the whole senior year pre-service teacher population regarding their confidence, attitudes towards and intention to utilize ICT in their future instructional practice, alongside their perceptions of the teacher education program's role in preparing them to utilize ICT in their future instructional practice. Kumar (2005) has defined a questionnaire as a "written list of questions, the answers to which are recorded by the participants. The participants read the questions, interpret what is expected and then write down the answers" (p.33). A questionnaire can provide concrete data, allows simple distribution to larger populations, provides a wide overview of a given field of study, and can be anonymous as Onwuegbuzie and Johnson (2004) have observed. Another merit of questionnaires is that "participants can complete them at a time and place that suits them. In addition, as the inflow of data is quick and from many people, data analysis of closed questions is relatively simple, and questions can be coded quickly" (Gray, 2009, p.338). However, questionnaires are often not returned and, in some cases, not fully completed, while some questions might be misinterpreted by the participants (Kumar, 2005).

In the current study, to overcome some of the disadvantages, the questionnaires were hand-delivered to pre-service teachers in their subject matter lectures by a colleague of mine, who also gave out the instructions and directions to pre-service teachers regarding the

consent forms, withdrawal, and the questionnaire questions, as will be detailed later in this chapter. The colleague is a professor at another well-respected Middle Eastern university's college of education. This method of distribution attempted to enhance the pre-service teachers' response and return rate.

3.5.1   Questionnaire Design

In a well-designed questionnaire, the researchers must consider in detail the information they are attempting to derive from the data in conjunction with the research objectives and questions (Crawford, 1990). I reviewed the literature to identify whether there was any questionnaire survey that could be used to gather the required data about pre-service teachers' confidence, attitudes, and intentions toward ICT integration in their instructional practice. However, no existing survey questionnaire was tailored to cover all of the research questions and objectives due to the differences between the context, nature, and elements of the current study and those of previous research studies. Therefore, I developed an instrument to use in this study instead of deploying an existing instrument to obtain the necessary data.

The questionnaire for this study was designed and developed specifically by me for the purpose of this study and based mainly on the research questions, relevant studies, ongoing academic dialogue with supervisors and other colleagues, ideas derived from other questionnaires, expert input, and through consultations with relevant literature from which the theoretical research framework has evolved. I consulted questionnaires from studies that measured confidence, attitudes, intentions toward ICT integration in classrooms, as well as the TPACK questionnaire. The questionnaire items were developed using Johnson et al.'s (2011) guidelines, where each item focuses on one thought, each item is concrete, ambiguous or biased phrases are avoided, and items are relevant to the study's purpose. All

of the questionnaire items were either constructed by me or selected from existing questionnaires with changes in the wording of statements based on their relevance to the study's purpose. The questionnaire went through several versions before being applied.

The questionnaire was initially developed in English. However, given that Arabic is the mother tongue of all pre-service teachers involved in the current study, I had the questionnaire translated into Arabic by a bilingual educational expert who was aware of the concepts underlying the study of ICT. A comparison was made between the Arabic version and original versions of the questionnaire in English to ensure meanings and colloquial terms were equivalent, then corrections were made to the Arabic version. After translation, an Arabic language expert assessed the questionnaire in terms of expression, properties, coherence, and grammar. The questionnaire was then revised based on the expert feedback. The Arabic language version is included in Appendix J.

3.5.2   Questionnaire Components

The questionnaire was made up of three sections and included a total of 20 items (see Appendix I). The first section contains twelve statements pertaining to pre-service teachers' confidence in relation to integrating ICT, attitudes toward the same, and their perception of the teacher education program's role in preparing pre-service teachers to utilize ICT in their future instructional practice. The confidence item in this section is based on the TPACK confidence instrument (Jamieson-Proctor, Finger, & Albion, 2010); the attitudes items were derived from many research studies such as the instruments used by Chai et al. (2009), Bower and Wittmann (2009), Kaur (2011), and Teo (2008). Items 6 to 9 were based on ongoing academic dialogue with supervisors, colleagues, and practicum and course description manuals. Participants were asked to rate their response using a 5-point

Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, and 5 = Strongly Agree).

The second section includes one primary question pertaining to pre-service teachers' intentions to utilize ICT in their future instructional practice with '*Yes*' and '*No*' response choices. This question is followed up by a set of statements to help explain participants' responses to the primary question. For example, if a participant answers '*Yes*' to the primary question, then s/he is asked to tick all the choices that apply to them from the list of reasons as to why they chose '*Yes*' or '*No*'. The ideas for the questions were taken from the literature review. The '*Yes*' or '*No*' items in this section were based on literature such as Agyei and Voogt (2011), Bingimlas (2009), Keengwe and Onchwari (2008), Khan et al. (2012), and Lucas (2005).

The last section contains seven questions aimed at eliciting background information about pre-service teachers. This information enabled me, as a researcher, to construct the independent variables. I tried to obtain as much information as possible about the different variables that might affect the pre-service teachers' intentions, confidence, and attitude to utilizing ICT in their future instructional practice. The background information I sought was based on: experience with computer usage; daily access to the internet; ICT courses taken in the education program; the main focus of the ICT courses; ICT course settings; and whether or not participants have taken the practicum. This is an anonymous questionnaire developed to be administered in-person to the participants (not online). The questionnaire takes about 10-15 minutes to complete.

3.5.3   Questionnaire Validity

According to Miller (2004), a study instrument's validity and reliability is considered a critical factor in establishing that study's efficacy. Furthermore, the concept of

reliability is one of the most desirable technical merits in educational and social research, though it has a different meaning in qualitative and quantitative research. In qualitative research, the concept of reliability is viewed as synonymous with confirmability, credibility, consistency and trustworthiness (Golafshani, 2003). In quantitative research, the term reliability can be replaced by the instruments' reproducibility, replicability, and dependability (Oluwatayo, 2012). As this study used a quantitative method, reliability can best be described as the extent to which the developed questionnaire provides consistent and stable results (Miller, 2004), as well as "the degree to which the items that make up the scale are all measuring the same underlying attribute" (Pallant, 2001, p.6).

The concept of validity, as applied to survey research, is defined as "the extent to which the instrument measures what it purports to measure" (Kimberlin & Winterstein, 2008, p.2278). There are four types of validity, namely content, orientation-related, face, and constructed (Cronbach & Meehl, 1955). Of the four, I utilised content validity. Content validity assesses the extent to which the instrument comprehensively covers the domain items, and it is usually dependent on the judgment of experts in the field (Kimberlin & Winterstein, 2008).

In testing the validity of the questionnaire items, I planned to ascertain whether I could "draw meaningful and useful inferences from scores on the instrument" (Creswell, 2003b, p.157) to identify if the items were clear to the pre-service teachers when they were answering the questionnaire. Therefore, the latter was reviewed thoroughly by the primary and secondary supervisors to check its clarity, scalability, possible question redundancy, and to ensure that the contents were accurately interpreted. In the second step, the questionnaire items were evaluated by three experts from the Instructional Technology and Curriculum and Instruction sections at the State University's Faculty of Education. This helped to achieve comparability of meaning, since the three experts have good local knowledge and

cultural awareness (Kirkpatrick & Teijlingen, 2009). The experts provided feedback regarding clarity/focus, appropriateness, and the coverage of questionnaire items reflecting the concepts of interest, exhaustiveness of response choices, clarity of directions, and the questionnaire's overall structure/organization. The questionnaire was revised based on the feedback received.

3.5.4 Pilot Study

Running a pilot study is very useful before carrying out the main study. Van-Teijlingen and Hundley (2002) state that a pilot study has several merits such as reducing the number of treatment errors, providing knowledge not foreseen before the pilot study, and obtaining feedback. In terms of the questionnaire, it provides the researcher with the opportunity to revise item wording, design, layout, length, sequence, and timing (Artinoet al., 2014). Having translated the questionnaire into Arabic and assessed its content validity, I then pilot-tested the questionnaire with six pre-service teachers in their senior year in the College of Education. Pilot testing was performed in person by me. I explained the purpose of the questionnaire to the pilot-test subjects. The pilot-test subjects provided feedback regarding the clarity of the instructions, items and response choices, grammar, spelling, and the items' applicability/relevance. The questionnaire was further revised based on the feedback received from pilot-test subjects.

3.6 Ethical Considerations

In an attempt to collect participants' data, I have had to pay attention to the ethical considerations related to them. Therefore, ethical considerations were an integral part of developing the research process for this study, and these were guided by the University of Liverpool's Code of Ethical Conduct for Research. Hence it was approved by the University of Liverpool's Ethics Committee (Appendix D).

The ethical considerations of the study procedure and data collection included the following items:

3.6.1 Confidentiality and Anonymity

The pre-service teachers were assured about the voluntary nature of their participation as mentioned several times in this chapter. Pre-service teachers were also granted permission to withdraw from the study at any level and for any reason they considered significant for them.

The collected data were treated in a way that protected the confidentiality and the anonymity of the study's senior year pre-service teachers. The study did not collect any personally identifiable information from participants such as names, class, section etc. No data obtained during the study was discussed with people other than the supervisors. Data will be stored securely in a password-protected computer for five years. To further protect the participants, a colleague of the researcher collected the data required as mentioned in the following section, in case there was a chance that I might know any of the participants, as I had been teaching senior students at a school where most of the pre-service teachers had attended.

3.6.2 Minimization of Risk of Harm

Participants did not experience any risks or harm derived from their participation, because the topic is not sensitive.

3.7 Data Access

This study collected data from pre-service teachers attending the State University's College of Education in accordance with the following provisions:

3.7.1 Data Collection Procedure

Permission was sought from the University of Liverpool's Institutional Review Board to commence data collection. Then a letter was issued by the University of Liverpool confirming that the researcher was a registered student there and requesting the College of Education's Dean to grant permission to conduct the study and to facilitate the researcher with the necessary means in accordance with the University regulations (Appendix A). Copies of the student consent form (Appendix E), participant information sheet (Appendix G), questionnaire, and the study abstract were attached to the confirmation letter.

Upon receipt of permission from the State University's College of Education Dean, the confirmation letter and all the attached documents were translated into Arabic by an accredited translation office as the Dean requested (Appendices B, F, H, & J). Thereby, the College of Education administration provided the researcher with information concerning the number of pre-service teachers, their nationality, and the

number of students who took the practicum. Furthermore, they provided the researcher with a description of the College's ICT-related courses and the practicum-experience manual. In addition, the Dean granted me permission to conduct the study, and forwarded a letter to each faculty member by name to facilitate data collection during their lecture (See Appendix C). The Dean's action was taken to ensure that the faculty members would cooperate with the researcher.

In November 2014, consent forms and participant information sheets were distributed to all senior-year pre-service teachers who attended classes on that day. Pre-service teachers had the opportunity to read and ask for any clarification concerning the consent form. After collecting the signed consent forms, the questionnaire was distributed to senior-year pre-service teachers who attended classes. In each class, pre-service teachers were given instructions and directions on how to fill in the questionnaire, and it was made

clear again that participation in this study was optional, and they could withdraw at any time.

The University of Liverpool's Research Ethics Committee were concerned about the pre-service teachers' privacy and anonymity if I were to collect the data by myself. In addition, the committee queried how I would handle the presence of the lecturer as the process might appear to imply coercion. I was granted approval from the University of Liverpool after I clarified that a colleague would collect the data on my behalf and I would not interact with participants under any circumstances in order to protect their privacy and anonymity, thereby avoiding any implication of coercion. I felt confident that he could be trusted to explain to the pre-service teachers that participating in this study was voluntary and the questionnaires were anonymous.

What are the implications of the colleague distributing the questionnaires?

The lecturers welcomed this colleague's presence in their lectures as he identified himself and his position in this area as mentioned earlier. The lecturer then left the lecture room for the reasons mentioned below. The colleague further explained the purpose, aim, and significance of this study for pre-service teachers, and the implications of the study for the College of Education and MoE. In addition, he explained how the results of the study would assist the College of Education and MoE to address some issues related to the integration of ICT in schools while also preparing pre-service teachers for this mission as ICT had emerged as a significant focus of interest. From my point of view, the colleague was the appropriate person for this mission as he is an experienced specialist in this area as mentioned earlier.

The lecturer left the lecture room for two reasons as follows:

- The lecturer thought his presence in the room implied coercion to participate in the study. Leaving the lecture room would allow the students the opportunity to

make their own decision whether or not to participate in the study. It would also help clarify that participation was voluntary and that their course grade would not be affected if they declined.

- The identity of students who had participated or who had refused to participate would be unknown to the lecturer, therefore they would not be identifiable.

You may ask, as a reader, what were the implications of the above for data collection?

First of all, 74% of the questionnaires were returned (as will be discussed later in chapter 4): this implies that a portion of pre-service teachers took a decision not to participate in the study, which is very normal and was expected. However, does this portion influence the data analysis? Nulty (2008) has commented that 65% and up is an adequate response rate for a sample drawn from a population between 500 and 750.

Furthermore, and as mentioned earlier, this study's population was 588. Therefore, the lecturer leaving the classroom did not affect the data analysis as the researcher had an adequate cohort for analysis. Secondly, this is evidence that participation in this study was voluntary and that the approach also satisfied the ethical considerations.

The main obstacle to the data collection process that the researcher encountered was bureaucratic. Even after gaining institutional approval, some of the college instructors did not exhibit any cooperation. At the beginning they refused to allow data collection at their lectures, and started to question the study's purpose, asking why I could not conduct my study in a Liverpool context. Also, even though the pre-service teachers were told that the data collection process and the data itself would be anonymous, they refused to be interviewed due to the conservative local context as mentioned earlier. Therefore, the researcher turned to a colleague to help collect the data. Given this country's culture, it is perhaps unsurprising that instructors were willing to work with a high-status male colleague

when they had been unwilling to work with a researcher who was a comparatively low-status female.

3.7.2 Data Screening

The data were initially screened for errors to ensure accurate data entry and were also examined for missing values. I selected a sample of the original questionnaires randomly and crosschecked them item by item with the database information several times. Those entry errors found were rectified immediately.

3.8 Data Analysis

Data were analysed using SPSS software version 22. Demographic/background data from the questionnaire (such as experience with computer usage, access to the internet, ICT courses taken in the education program, main focus of the ICT course, course setting, and if they had taken the practicum) were analysed using descriptive statistics for direct and indirect factors involving attitudes, confidence, intention, and also in terms of the evaluation of the College of Education. The following statistical procedures were applied to answer the research questions:

1) Descriptive statistics, including frequency distribution, measures of central tendency, and standard deviation, in order to answer the first three research questions;

2) Multiple linear regression analysis to explore the relationship between confidence in integrating ICT and attitudes toward ICT integration;

3) Multiple linear regression analysis to explore the strongest predictor of intention in relation to computer experience, attitudes, confidence, computer literacy in education, e-learning, media and technology in education, and practicum;

4) Chi-square test to explore the relationship between confidence and ICT-related courses;

5)   Chi-square test to explore the relationship between attitudes and ICT-related courses;

6)   Point-biserial correlation to explore the relationship between confidence to integrate ICT and intention to integrate ICT;

7)   Pearson correlations to explore the relationship between confidence and assessment of the teacher education program, and the relationship between confidence and assessment of the teacher education practicum.

3.9   Chapter Summary

This chapter has described and justified the research conducted, thereby demonstrating why this design would answer the research question. A description of the study population was then outlined, and the sample divided according to gender and nationality. This was followed by a description of the research instrument, and justifications for using the questionnaire in terms of answering the study's research questions. The procedures for how, when, and where the data were gathered and how it would be analysed were explained. Finally, I detailed how the issues of reliability, validity and ethical considerations are addressed.

CHAPTER FOUR

4.0   Results

This chapter presents the study's findings. The results first discuss participants'

reports on their experiences of computer usage and access to the internet. Their reports on

the practicum (field experience), ICT-related course, and the focus of the ICT-related course

from their point of view are presented next. In turn, this leads to an investigation of the

participants' attitudes toward ICT integration in education, their confidence regarding

integrating ICT, their intention to utilize ICT in their future instructional practice, the

relationship between confidence and the teacher education program, and finally the

relationship between confidence and students' field experience.

4.1   Questionnaire Response Rate

The questionnaire and cover sheet were distributed to all pre-service teachers in their

senior year at the campus of the Education College at the State University in November

2014. In total 588 questionnaires were distributed, and 435 questionnaires were returned,

amounting to 74% of the total population. Overall, n=421 (71.6% of the total population) of

the returned questionnaires were found to be complete and usable for analysis. The majority

(n=325) of participants were female while less than one-fourth of them (n=96) were male.

4.2   Participants' Demographic and Background Characteristics

The third section of the questionnaire asked pre-service teachers to provide personal

information about themselves regarding a number of demographic characteristics: gender;

experience with computer usage; access to the internet; ICT courses taken in the education

program; main focus of the ICT courses; and whether or not they have taken the practicum.

I chose these characteristics following on from the literature review which indicated that this

demographic and background information influenced pre-service teachers' intentions, attitudes and confidence in terms of integrating ICT in their instructional practice.

4.2.1   Pre-Service Teachers' Experience in Using Computers.

Approximately half of the participants had little experience using computers (less than one year), while approximately 30% of them had extensive experience (more than ten years). This is shown more clearly in figure 7, thereby indicating that the general level of experience in using computers is low.
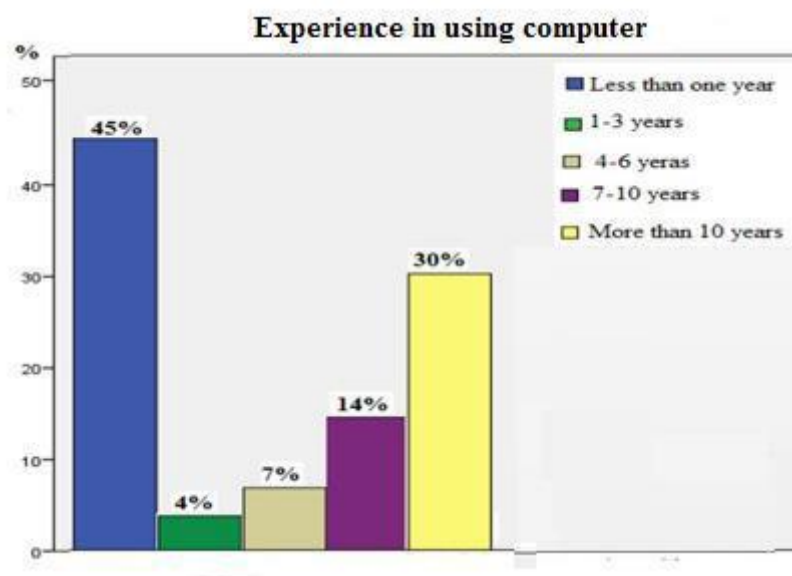
Figure 7. *Pre-service teachers' computer usage in years*

4.2.2 ICT Courses Taken at College.

With regard to the ICT courses taken during the teacher education program, it can be seen from Figure 8 that the majority of the participants had taken the Computer Literacy in Education course while only 9% of them had not completed all three courses.
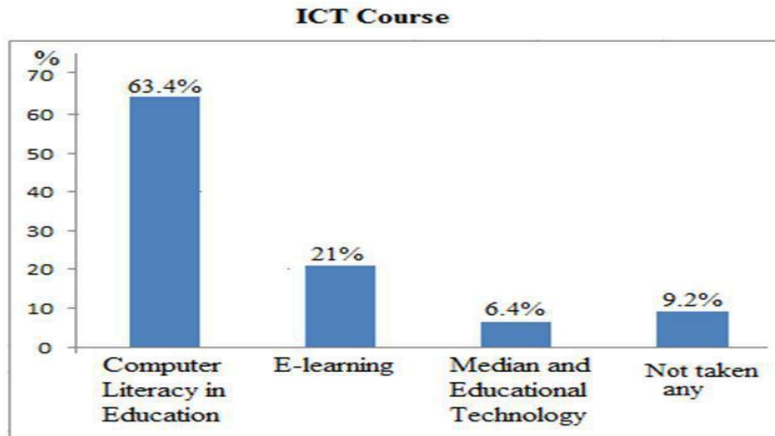
Figure 8. *Completion status of ICT courses*

The researcher asked where these courses had taken place. It can be seen that the majority of the pre-service teachers had taken the ICT-related courses in the computer lab.
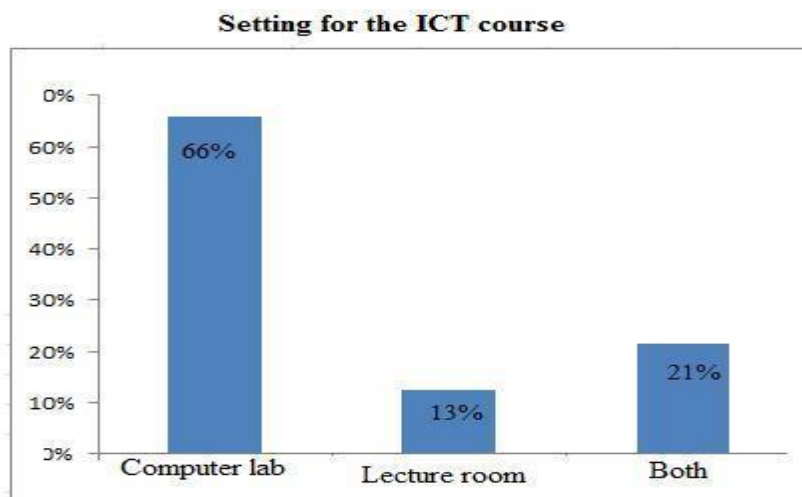
Figure 9. *ICT course settings*

4.2.3 Primary Focus of The ICT Courses.

Pre-service teachers were asked about the focus of the ICT-related courses they had undertaken at the Education Department. Over three-fifths of the participants reported that the primary focus of the ICT courses in the teacher education program was to provide pre-service teachers with general computer skills and knowledge, while one fourth of the participants believed the main focus was to learn how to use Word documents for lesson

preparation and EXCEL to record students' grades. Figure 10 illustrates pre-service teachers' responses to the ICT-related courses' main focus.
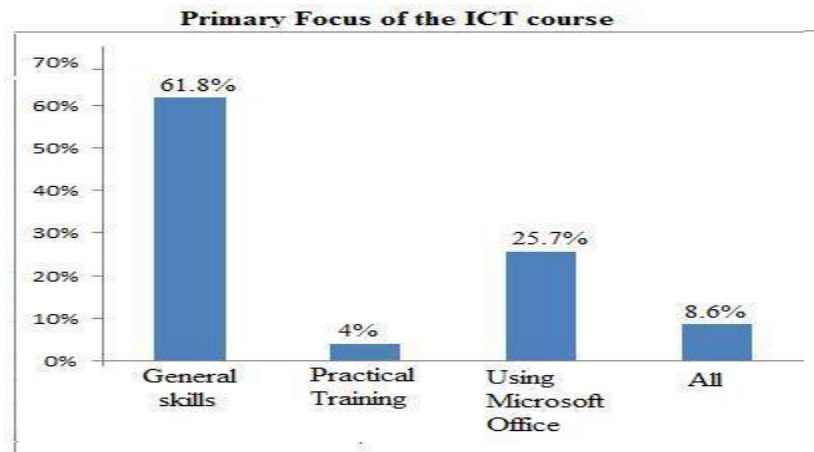
Figure 10. *Primary focus of the ICT courses*

4.2.4 Daily internet usage.

Pre-service teachers were asked how many hours per day they spent browsing the internet. The greatest number of participants, n=337 (80%), spent between one to five hours using the internet, while the lowest number of participants, n=42 (10%), spent between 15 to 24 hours using it. Thus, nearly eight out of ten pre-service teachers spend less than five hours a day using the internet.
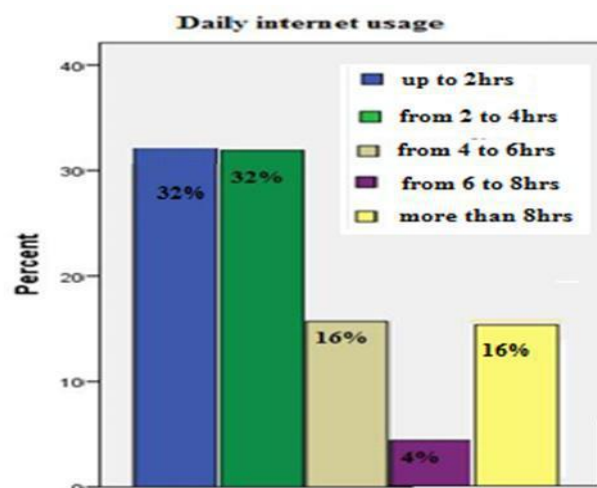
Figure 11. *Pre-service teachers' internet usage per day*

4.2.5   Practicum (Field Experience).

The final question of the third part focused on the number of pre-service teachers who had undertaken the practicum (field experience). Over two thirds of the pre-service teachers (n=297, 70.5%) had already undertaken the field experience, while n=124 (29.5%) participants had not yet done so. It is worth mentioning that participants who took the practicum were in their final semester at the College of Education, while participants who had not done so were in their first semester of the final year. In relation to the practicum and the ICT course taken, the results in Table 4 show that the majority of the participants who had undertaken the practicum had also completed the Computer Literacy in Education course.

Table 4. *Participants taking the practicum and the ICT course*

	ICT Courses at College of Education			
	Computer literacy in education (1)	E-learning (2)	Media and education technology (3)	Not taken any course
Practicum	66%	24%	8.6%	1.4%

4.3   Research Questions

4.3.1   Research Question 1: How confident are pre-service teachers regarding integrating ICT in their future instructional practice?

As mentioned in chapter two, the literature indicates that the pre-service teachers' confidence in their ICT competence could be a barrier to integrating ICT in their future instructional practice. Therefore, the questionnaire featured a question concerning the confidence of pre-service teachers in utilizing ICT in their future teaching.

In relation to this question, pre-service teachers were asked to rate how confident they feel about their ability to utilize ICT in their future instructional practice on a five-point Likert scale. Descriptive statistics (frequencies and measures of central tendency) were used to analyse the participants' responses. The results in Table 5 show that the mean for n=421 responses to this question was 3.204, slightly higher than the midpoint of a 5-point scale. However, the responses were relatively spread out (SD=1.39), and the most frequently chosen response was 'Disagree'. Frequency distributions (Table 6) further illustrate that approximately half of the respondents (50.2%) disagreed or strongly disagreed with the statement, while the other half (47.1%), agreed or strongly agreed, with about 3% remaining 'neutral'. In summary, participants are nearly equally divided with regard to confidence in their ability to utilize or integrate ICT in their future instructional practice.

Table 5: *The measure of central tendency attitudes, perceptions toward teacher education program, and practicum (n=421)*

Item		Mean	SD	Mode	Median
		**Measures of Central Tendency**			
Confidence	I feel confident in my ability to utilize ICT in my future instructional practice	3.204	1.3874	2	2
Attitude1	The use of ICT in teaching leads to better student learning outcomes	4.204	0.9289	5	4
Attittde2	Using ICT can improve my teaching practice	4.287	0.7932	5	4
Attitude3	Technology makes the subject more interesting	4.508	0.6783	5	5
Attittude4	Technology can help me to learn many new things related to teaching	4.297	0.8192	5	4
My Teacher Education program prepared me					
Education1	with the general knowledge of possible uses of ICT in my future instructional practice	2.848	1.1300	2	2
Education2	to be an effective teacher in the use of ICT in the classroom	2.836	1.2244	2	2
Education3	to operate ICT tools without technical support	2.981	1.0372	2	3
Education4	to upgrade my computer and technological skills through the ICT-related courses	3.062	1.1088	2	3
Education5	to integrate ICT in my future instructional practice through modelling of ICT by the Education faculty members	2.786	0.9719	2	3
In Practicum					
Practicum1	the teacher mentor modelled effective use of ICT in his/her teaching	3.12	1.131	2	3
Practicum2	I have been provided with a valuable experience to integrate ICT in my future teaching	3.26	1.196	2	3

Table 6. *Frequency of confidence, attitudes, perceptions toward teacher education, and practicum (n=421)*

Items			Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Confidence	I feel confident in my ability to utilize ICT in my future instructional practice	n	20	191	12	79	119
		%	4.8	45.4	2.9	18.8	28.3
		%	50.2		2.9	47.1	
Attitude1	the use of ICT in teaching leads to better student learning outcomes	n	1	38	27	164	192
		%	0.2	9	6.4	38.7	45.6
		%	9.2		6.4	84.3	
Attitude2	Using ICT can improve my teaching practice	n	2	11	44	171	193
		%	0.5	2.6	10.5	40.6	45.8
		%	3.1		10.5	86.4	
Attitude3	Technology makes the subject more interesting	n	0	9	17	146	249
		%	0	2.1	4	34.7	59.1
			2.1		4	93.8	
Attitude4	Technology can help me to learn many new things related to teaching	n	0	13	58	141	209
		%	0	3.1	13.8	33.5	49.6
		%	3.1		13.8	83.1	
My Teacher Education program prepared me							
Education1	with the general knowledge of possible uses of ICT in my future instructional practice	n	21	198	70	88	44
		%	5	47	16.6	20.9	10.5
		%	52		16.6	31.4	
Education2	to be an effective teacher in the use of ICT in the classroom	n	35	189	68	68	61
		%	8.3	44.9	16.2	16.2	14.5
		%	53.2		16.2	30.7	
Education3	to operate ICT tools without technical support	n	7	166	119	86	43
		%	1.7	39.4	28.3	20.4	10.2

		%	41.1		28.3	30.6	
Education4	to upgrade my computer and technological skills through the ICT related	n	4	47	99	95	57
	courses	%	1.9	39.2	23.3	22.1	13.5
		%	41.1		23.3	35.6	
Education5	to integrate ICT in my future instructional practice through modelling of	n	15	191	101	97	17
	ICT by the Education faculty members	%	3.6	45.4	24	23	4
		%	49		24	27	
In Practicum							
Practicum1	the teacher mentor modelled effective use of ICT in his/her teaching	n	3	119	58	72	45
		%	1	40.1	19.5	24.2	15.2
		%	41.1		19.5	39.4	
Practicum2	I have been provided with a valuable experience to integrate technology in	n	1	117	45	71	63
	my future instructional practice	%	0.3	39.4	15.2	23.9	21.2
		%	39.7		15.2	45.1	

Note: For prac1 and prac2, pre-service teachers who did not take the
practicum were excluded from the calculations.

The measurement of confidence in this study was derived from the statement "I feel confident in my ability to utilise ICT in my future instructional practice". Table 7 explores the influence of demographic variables (ICT course, practicum, and prior experience) on pre-service teachers' confidence, as measured by their self-rating (1 = Strongly Disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, and 5 = Strongly Agree).on this question, as follows.

Table 7. *Mean and standard deviation between confidence and demographic variables*

			Mean	Standard Deviation
	Practicum	Yes	3.559	1.3572
		No	2.355	1.0530
Confidence	Course taken	Computer Literacy in Education	3.908	0.7589
		E-learning	3.945	1.0711
		Media and Educational Technology	4.6965	0.48
		Not taken any	2.008	0.8708
		All courses	4.793	0.4123
	Computer Usage	Less than one year	2.222	1.0603
		1-3 years	2.328	0.9556
		4-6 years	3.063	1.2936
		7-10 years	3.911	1.1485
		More than 10 years	4.381	1.0108

A higher mean response value indicates a higher level of confidence. Therefore, the output for the means in Table 7 shows that participants who had taken the practicum appeared to have more confidence. The result for the courses taken demonstrates that, broadly speaking, students who had taken one or all of the three ICT compulsory courses were more confident than those who had not taken any.

To distinguish between the influences of the different ICT courses on confidence, I used a Chi-square test as shown in Table 8. where it is evident that the participants who had used computers for less than one year seem to be least confident about their instructional ICT skills. It is notable that as the participants' experience with computers increases, their confidence about their ICT skills also rises. The researcher used a Chi-square test to distinguish between the ICT courses and their influence on confidence as shown in Table 8.

Table 8. *Relationship between confidence and the demographic variables*

		Pearson Chi-Square	p	Strength of the relationship Cramer's value
	Computer Literacy in Education	14.711	.005	.189
	E-learning	53.999	.000	.337
Confidence	Media and Technology	43.906	.000	.307
	Not Taken any course	39.200	.000	.292
	All courses	286.509	.000	.829
	Practicum	71.768	.000	.382
	Prior comp exp.	133.655	.000	.563

This tells us that there is a statistically significant relationship between confidence and the combination of the three ICT-related courses at the College of Education, prior computer experience, and the practicum. The strength of the relationship between the variables goes for those who had taken the three ICT-related courses for those who had taken the three ICT courses is 829

4.3.2   Research Question 2: What is the pre-service teachers' attitude toward the integration of ICT in education?

The literature indicates that pre-service teachers' attitudes towards using ICT can be a barrier to ICT integration in their future instructional practice. Therefore, the questionnaire contained four items concerned with the attitudes of pre-service teachers in terms of utilizing ICT in their future classes. This study's findings lend support to the literature, in that the vast majority of pre-service teachers have positive attitudes toward the use of ICT in education. Specifically, 84.3% (n=356) of the participants agreed or strongly agreed with the statement that '*The use of ICT in teaching leads for better student learning outcomes*' (Att1); in total, 86.4% (n=364) agreed or strongly agreed with the statement that '*ICT can improve my teaching practice*' (Att2); overall, 93.8% (n=395) agreed or strongly agreed with the statement that '*ICT makes the subject more interesting*' (Att3); and 83.1% (n=350) agreed or strongly agreed with the statement that '*ICT can help me to learn many new things related to teaching*' (Att4). More detailed descriptive statistics are presented in Tables 5 and 6. Again, these results suggest that most pre-service teachers have positive attitudes toward the use of ICT in teaching and learning.

In this study 'attitude' was measured as the weighted sum of the four attitudes items (att1, att2, att3, and att4) from the questionnaire. This yielded a 5-point scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, and 5 = Strongly Agree),

indicating a more positive attitude. The relationship between attitude and the demographic variables is shown in Table 9.

Table 9. *Mean and standard deviation between attitudes and practicum and ICT course*

			Mean	Standard Deviation
	Practicum	Yes	4.4255	0.7453
		No	4.0847	0.8698
Attitudes		Computer Literacy in Education (CLE)	4.354	0.7961
		E-learning (E-L)	4.187	0.9743
		Media and Educational Technology (MET)	3.25	1.0601
	Course	Taken All 3	4.508	0.6590
		Not taken any	4.024	0.8861
		CLE+E-L	4.391	0.7105
		CLE+MET	4.333	0.5142

In this analysis, the mean score for 'attitude' showed no significant difference between those who had completed the ICT courses or the practicum, and those who had not. Therefore, the researcher used a Chi-square test to distinguish between the ICT courses and their influence on attitudes as shown in Table 10.

Table 10. *Relationship between attitudes and the ICT courses*

		Pearson Chi-Square	P	Value Strength of the relationship Cramer's value
Attitudes	Computer Literacy in Education	9.131	.003	.146
	E-learning	17.528	.000	.200
	Media and Technology	6.729	.009	.125
	Not taken any course	6.729	.000	.125
	Practicum	49.334	.000	.324
	Hrs/day net	56.444	.000	.337
	Prior experience in using computers	94.140	.000	.468

This tells us that there is a statistically significant relationship between attitudes and the three ICT-related courses at the College of Education, prior experience in using computers, daily hours spent on the internet, and the practicum. The strength of the relationship between the variables is moderate for the prior experience in using computers and weak for the courses. Overall, pre-service teachers have a positive attitude in terms of the use of ICT in education.

4.3.3 Research Question 3: Do pre-service teachers intend to integrate ICT in their future career as teachers?

To answer this, pre-service teachers were asked to answer the question, *Do you plan on integrating technology in your future instructional practice? If you answered YES to Question 2, please answer Question 3*, and *If you answered NO to Question 2, please go to Question 4 (in the questionnaire)*, using 'Yes' or 'No' response choices. This question was immediately followed by asking the reasons why they intend to integrate technology or not. The results showed that just over half of the participants (n=228, 54.2%) have no intention to utilize ICT in their future instructional practice. As shown in Table 11, of those who have no intention, almost all (99.5%) cited the reason that '*Schools are not equipped with the technological infrastructure to support effective use of technology in classrooms*' as a barrier, closely followed by *'the belief that ICT wastes time'*, that *'ICT is not a requirement for teaching'*, or that *'they are not prepared or confident to do so'*, while others cited that they '*do not enjoy working with technology*' as the reason why they will not use the latter.

Table 11. *Frequency of barriers that may impact pre-service teachers' intentions to integrate ICT in their future teaching*

Please tick all the reasons why you answered NO to the previous question	n	%
Schools are not equipped with technological infrastructure to support effective use of technology in classrooms.	227	99.5
Using technology in teaching and learning practices wastes time allotted for lessons.	220	96.5
I will not be required to integrate technology in my teaching practices.	214	93.8
I do not feel my teacher education program prepared me to utilize ICT in my teaching.	212	92.9
I am not confident in my ability to integrate technology in my teaching practice	211	92.5
I do not enjoy working with technology.	209	91.6

Note: n : frequency of participants who reacted positively to this statement. %: Percentage

In addition, n=47 of the participants added that "*ineffective teacher education programs do not prepare me for the use of ICT in my future instructional practice*" (written as free text in Arabic, translated by me). This supports participants' assessment of their educational experiences (to be presented later). On the other hand, nearly half of the

participants (n=193, 45.8%) plan to utilize ICT in their future instructional practices. Table 12 details the reasons cited by these participants.

Table 12. *Frequency of enablers that may impact on pre-service teachers' intention to integrate ICT in their future teaching*

Please tick all the reasons why you answered YES to the previous question	**n**	**%**
I am confident in my ability to integrate technology in my teaching practice.	193	100
I enjoy working with technology.	193	100
Technology will make my teaching interesting for my students.	191	99
I will be required to integrate technology in my teaching practices.	190	98.4
Technology will make my teaching more effective for my students.	189	98
I am an open-minded teacher for new methods of teaching based on ICT integration.	187	96.8

Note: n : frequency of participants who reacted positively to this statement. %: Percentage

The questionnaire included an option to list 'any other comments' as to why they plan to integrate technology. Participants added comments which are synthesized and listed below (comments written in Arabic were translated and synthesized by me):

1. *'To develop my ability to teach in my country by using' ICT* (n=12)

2. *'Using ICT in classroom attracts students' attention'* (n=15)

3. *'To follow technological developments in the education area'* (n=7)

4. *'Easier to demonstrate the lesson activities'* (n=6)

5. *'Helps me as a teacher to follow updates in education'* (n=3)

6. *'Saves time and effort'* (n=2)

7. *'Learning from other teachers' experiences'* (n=4)

Given that the literature suggests that attitudes are one of the strongest predictors of intentions, the researcher investigated the extent to which attitude and confidence as well as computer experience, ICT courses, and the practicum predict intentions using multiple regression tests as shown in Tables 13 and 14.

Table 13. *Regression Summary Table predicting the relationship between intentions and subset of independent variables*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	83.245	8	10.406	201.489	.000 [b]
	Residual	21.277	412	.052		
	Total	104.523	420			

a. Dependent Variable: Intention
b. Predictors: Computer Experience, Attitudes, Confidence, Computer Literacy in Education, E-learning, Media and Technology in Education, and Practicum.

Table 14. *Multiple R for the relationship between intentions and subset of independent variables*

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	F change	Sig F change
1	.892[a]	.796	.796	.2273	201.489	.000

Predictors: Computer Experience, Attitudes, Confidence, Computer Literacy in Education, E-learning, Media and Technology in Education, and Practicum.

The multiple regression results as shown in Table 14 are statistically significant (p=.000) with 79.6% variance explained (R=.892). These findings suggest that these variables do predict pre-service teachers' intention regarding ICT integration in their future instructional practice. While all predictor variables contribute statistically significant variance to the model, some contributed more and some less, as shown in Table 15. Specifically, confidence and attitudes were the strongest predictors of intentions, followed by computer experience and the practicum, while the three ICT courses are the weakest predictors. This suggests that pre-service teachers with more confidence in their ability and having positive attitudes toward ICT plan to teach using technology. Similarly, those with more experience using computers and have completed the practicum respectively also plan to teach using technology. However, completion of the ICT courses predicts their intention to a lesser extent.

Table 15. *Relationship between intention and subset of independent variables*

Predictors	Intention	Sig
Practicum	.427	.000
Computer Experience	.562	.000
E-learning course	.325	.000
Computer Literacy in education course	.247	.000
Media and educational technology course	.174	.000
Confidence	.862	.000
Attitudes	.659	.000

4.3.4   Research Question 4: What is the relationship between confidence in TPK and attitudes regarding the integration of ICT in education among pre-service teacher education students?

A multiple linear regression analysis was conducted to investigate the relationship between TPK confidence and attitude toward ICT integration in education among pre-service teacher education students. The criterion variable confidence was regressed on all four predictor variables (including att1-4) concerning pre-service teachers' attitudes toward ICT integration. The results are shown in Table 16.

Table 16. *Regression summary table predicting the relationship between confidence and attitudes*

Model	SS	df	MS	F	Sig	R^2	Adj. R^2
Regression	169.764	4	42.441	27.644	0.000^b	0.210	0.202
Residual	638.668	416	1.535				
Total	808.432	420					

b.   *Predictors: (Constant) att1, att2, att3, and att4*
c.   *SS: sum of squares, df: degrees of freedom, Adj R2: adjusted R square,*
      P: sig value, MS: Mean Square

The four attitudes items include: *The use of ICT in teaching leads to better student learning outcomes* (att1); *ICT can improve my teaching practice* (att2); *Technology makes the subject more interesting* (att3); and *Technology can help me to learn many new things related to teaching* (att4). Data for these four items were simultaneously entered into the model, and their individual contributions to the overall predictive model were examined.

The result was statistically significant, $F(4, 421) = 27.64$, $p < 0.001$, with an effect of $R^2 = 0.210$. There was a minimal shrinkage due to theoretical correction for sampling error (adjusted $R^2 = 0.202$). This means that 21% of the variation in confidence is accounted for by variation in attitude. This result suggests that the model is statistically and practically significant, and the contribution of each predictor variable to this observed effect merits further examination.

Regression coefficients (beta weights, p values, structure coefficients and squared structure coefficients) presented in Table 17 suggest that of the four predictor variables relating to attitude, the first two (att1 and att2) contributed the most variance to the observed effect, while the last two predictors (att3 and att4) did not contribute noteworthy variance to the observed effect. The positive beta weights indicate a positive correlation. These results suggest that those who feel that the use of ICT in teaching leads to better student learning outcomes and that ICT can improve their teaching practice tend to feel more confident about their ability to integrate ICT. Interestingly, participants' attitudes toward whether or not technology makes the subject more interesting (att3), and whether technology can help them to learn many new things related to teaching (att4) do not have much bearing on their confidence to integrate ICT.

Table 17. *Beta weights and structure coefficients for the regression model predicting the relationship between confidence and attitudes*

Variable	ß	Sig	r_s	r_s^2
Attitudes				
Att 1: *The use of ICT in teaching leads to better student learning outcomes*	0.351	0.000	0.435	0.189
Att 2: *Technology makes the subject more interesting*	0.144	0.006	0.325	0.105
Att 3: *Technology makes the subject more interesting*	0.015	0.765	0.233	0.054
Att 4: *Technology can help me to learn many new things related to teaching*	0.033	0.495	0.202	0.041

b. *ß: Beta, r_s: structure coefficient*
c. *Beta weights were statistically significant at p<.05 for items Att1, and Att2.*

4.3.5   Research Question 5: What is the relationship between confidence and intentions to integrate ICT among pre-service education students?

Point-biserial correlation analysis was used to explore the bivariate relationship between TPK confidence (5-point Likert scale) and intention to utilize ICT in their future instructional practice (dichotomous *Yes* and *No* scale). As shown in Table 18, there is a strong negative relationship (r_{pb}=-.84) between confidence and intention, and it is statistically significant at the .001 level (*p*=.000). The relationship is negative because *Yes* responses were coded as 1, and *No* responses were coded 2. The effect size of this relationship (r^2pb=.707) is 71%. In other words, there is a 71% shared variance between these two variables. These results suggest that those who feel more confident in their ability to use ICT also plan to integrate ICT in their future teaching practice.

Table 18. *Relationship between confidence and intention*

		Confidence	Intention	r^2p_b
Confidence	r$_{pb}$	1	-0.841	0.707
	Sig (2 tailed)		0.000	
	N	421	421	

Note: Correlations is significant at the 0.01 level (2-tailed)

4.3.6 Research Question 6: How do pre-service teachers assess their educational experience?

The literature indicates that the adequacy of pre-service teachers' experience in the College of Education program and practicum can be a barrier to the integration of ICT into their future instructional practice. Therefore, the questionnaire contained items on pre-service teachers' perspectives regarding the role of the teacher education program (5 items; edu1, edu2, edu3, edu4, and edu5), and the practicum (2 items, prac1 and prac2) in preparing them to teach in the digital era through integrating ICT in their future instructional practice. The descriptive statistics (frequencies and measures of central tendency) were used to analyze participants' responses and the results are presented in Table 5.

For Edu1, *My teacher education program provided me with the general knowledge of possible uses of ICT in my future instructional practice*, 52% disagreed, and 31.4% agreed, whilst 16.6 % (n=70) were neutral. This result indicates that only one third of the participants believe that their teacher education program provided them with general knowledge regarding possible uses of ICT in education, and over half believe the opposite, namely that their teacher education program did not provide them with general knowledge in terms of possible uses of ICT in education

Similarly, for Edu2, *my teacher education program prepared me to be an effective teacher in the use of ICT in the classroom*, just over half of the participants disagreed, 30.7%

agreed, and approximately 17% are uncertain. Results for *edu1* and *edu2* are very close, where over of the half of the respondents believe that their teacher education program did not prepare them to be an effective teacher using ICT in the classroom. However, only 30% of the participants believe that they are provided with the skills to be an effective teacher using ICT. In total, 30% agreement in the total sample is a small number, therefore, a question arises here; does this impact on pre-service teachers' intention to utilize ICT in their future instructional practice, as they feel unprepared to use ICT in their future instructional practice? I will explore this question in the following section.

For Edu3, *my teacher education program prepared me to operate ICT tools without technical support*, only 30.6% agreed with this statement, and approximately 28% were uncertain, while 41% of the participants disagreed or strongly disagreed that their educational experience has prepared them to work with classroom ICT tools without technical support. As Jones' (2004) study has indicated, lack of technical support in schools will discourage teachers from using ICT in their instructional practice. Furthermore, as 41% of the participants believed that they lacked the skills required to operate ICT without technical support, one may ask, does this impact on their intention to utilize ICT in their future instructional practice?

For Edu4, *The ICT-related courses at my college helped me to upgrade my computer and technological skills*, approximately one-fourth of the participants were uncertain if they helped them to do so. In terms of Edu4, approximately 35.6% believe that the ICT courses were helpful in upgrading their computer skills, whilst 41% believed that they were not helpful. Given such this result, one may ask, do ICT-related courses in teacher education programs assist pre-service teachers to upgrade their computer and technological skills in order to ease the use of ICT in their future instructional practice?

For Edu5, *Education faculty members on the teacher education program modelled effective use of ICT in their teaching*, one half of the participants disagreed, while only 27% agreed that the use of ICT was modelled well in classrooms. In total, 23% remained neutral.

Regarding Prac 1, *The teacher mentor on my practicum modelled effective use of ICT in his/her teaching*, 41% of those who had completed the practicum disagreed while a similar number of participants (39.4%) agreed that the teacher mentor on the practicum modelled effective use of ICT in his/her teaching. Overall, 20% were uncertain about the practicum mentor teacher's effective use of ICT in classrooms. Similarly, for Prac 2, *My practicum provided me with a valuable experience to integrate technology in my future teaching*, participants' responses were very close, with 45% agreeing and 40% disagreeing with the statement. In total, 15.2% of the participants remained neutral.

In summary, about half of the participants feel that their educational experience at the College of Education lacked effective preparation regarding teaching with technology, while 16%-28% remain uncertain. Similarly, for the practicum, about 40% of participants believe that their practicum experience lacked effective preparation in terms of teaching with technology, and 15%-20% remaining uncertain.

The large shared variance between confidence and intention (as shown earlier) begs the questions: What builds confidence and how do we increase students' confidence and what factors are related to education students' confidence to use technology for teaching and learning purposes?

The literature identified that the teacher education program and practicum can be a barrier or an enabler in relation to utilizing ICT in future classrooms, and a positive experience of either can be a strong predictor for pre-service teachers integrating ICT in their future teaching (Choy et al., 2009; Choy et al., 2011; Gill & Dalgarno, 2008; Serhan, 2009). Therefore, the researcher further investigated the following:

1. The relationship between students' evaluation of their educational/practicum experiences and confidence.

In other words, the researcher wanted to find out if those who feel more positive about their learning experiences are more confident in their ability to integrate technology. To this end, items edu1, edu2, edu3, edu4, and edu5, and prac1 and prac2 in the questionnaire were correlated using Spearman correlation analysis. Bivariate correlation coefficients are presented in Table 19. An explanation is provided either before or after all other tables.

Table 19. *Relationship between confidence and the edu and prac items (N-421)*

Confidence	r	Sig	r^2
Edu1: My Teacher Education program prepared me with the general knowledge of possible uses of ICT in my future instructional practice	0.657	0.000	0.431
Edu2: My Teacher Education program prepared me to be an effective teacher in the use of ICT in the classroom	0.627	0.000	0.393
Edu3: My Teacher Education program prepared me to operate ICT tools without technical support	0.555	0.000	0.308
Edu4: My Teacher Education program prepared me to upgrade my computer and technological skills through the ICT related courses	0.600	0.000	0.360
Edu5: My Teacher Education program prepared me to integrate ICT in my future instructional practice through modelling of ICT by the Education faculty members	0.427	0.000	0.182
Prac1: In practicum the teacher mentor modelled effective use of ICT in his/her teaching	0.584	0.000	0.341
Prac2: In practicum I have been provided with a valuable experience to integrate technology in my future instructional practice	0.667	0.000	0.444

Note: Correlation is significant at 0.01 level (2 tailed)

The results show that all the correlations are statistically significant ($p<.0001$) and range between $r=.43$ and $r=.68$, which suggests moderate and strong positive relationships between participants' confidence and their assessment of their education and practicum experiences. These results suggest those who feel that their educational and practicum experiences prepared them to teach with technology tend to be more confident in their ability to integrate ICT in their future teaching practices. Given the strong positive relationship between confidence and intention, this may suggest that the more the pre-service teachers feel that they have had effective and valuable educational and practicum ICT integration experiences, the more confident they feel, hence the more likely they are to utilize ICT in their future teaching.

4.4 Summary

The study population consisted of 588 pre-service teachers in their senior year in the 2014-2015 academic year at the country's State University. Surprisingly, more than one tenth of the participants had not yet taken any ICT-related courses despite being in the education program's senior year. On the other hand, over half of the participants had taken the Computer Literacy in Education course in the computer lab. The participants reported that the primary focus of the ICT-related courses in the Education Department concerns general skills computer skills.

Results also showed that approximately half of the participants feel confident in their ability to utilize or integrate ICT in their future instructional practice, but less than half of the participants plan to utilize ICT in the same vein, and it is those who feel more confident who are more likely to integrate ICT, while those feeling less confident do not plan to integrate it. Given the strong positive relationship between confidence and intention, I considered factors that may be related to pre-service teachers' confidence, such as participants' assessment of their educational and practicum experiences. More than 40% of the respondents believed that

their classroom and practicum experiences did not prepare them to use ICT effectively in teaching and learning.

Overall, the more the pre-service teachers felt prepared for ICT integration, the more confidence they have about their competence, and the greater their intention to utilize ICT in their teaching. Similarly, the more the pre-service teachers feel they had an effective and valuable practicum for ICT integration, the more confidence they have regarding their ability to integrate ICT.

Finally, participants generally have positive attitudes toward the use of ICT in teaching and learning, and the near strong positive relationship between confidence and attitudes suggest that those who have a positive attitude to the role of technology in education tend to have greater confidence in their ability to teach using technology. The following chapter begins the discussion of the integration of the literature chapter into this chapter's results.

CHAPTER FIVE

5.0   Discussion

Over the last decade, due to the development and utilization of ICT in the education sector in developed countries, the teachers in the current study's country have been encouraged to utilize ICT in their instructional practice. Interestingly, teachers and supervisors seem to encounter a variety of barriers that hinder their intention to manage and utilize ICT in their instructional practice. This study has investigated pre-service teachers' confidence about ICT, as well as attitudes toward and intentions to integrate ICT in their future instructional practice. In addition, this study explored other factors pertinent to their learning experiences (in the teacher education program as well as in the practicum settings) in relation to their confidence, attitude and intent. The theoretical framework, presented in Figure 6, was used to organize the discussion of the study's findings in this final chapter.

This thesis was guided by the following research questions:

1. How confident are pre-service teachers regarding their TPK?

2. What is the pre-service teachers' attitude toward the integration of ICT in education?

3. Do pre-service teachers' intend to integrate ICT in their future career as teachers? What are the reasons behind their decision whether or not to integrate ICT?

4. What is the relationship between TPK confidence and attitude toward ICT integration in education among pre-service teacher education students?

5. What is the relationship between TPK confidence and intent to integrate ICT in education among pre-service teacher education students?

6. How do pre-service teachers evaluate and assess their educational experience?

5.1   Pre-service Teachers' Intention to Integrate ICT in Teaching

This study supports the theoretical framework regarding the influence of first and second order barriers to intentions. Applied to this study, pre-service teachers' intention to

integrate ICT in their future instructional practice is influenced by both first order barriers, such as technological infrastructure and training effectiveness regarding ICT integration, and second order barriers, such as confidence and attitude toward ICT integration in education. Furthermore, it was theorized that the adequate provision of technological infrastructure and effective training in the use of ICT (first order barriers) affect pre-service teachers' confidence about their ability to integrate ICT and attitude toward the role of ICT in improving teaching and learning (second order barriers).

In a state that has a national strategy to reform the education sector, there may be a belief in the significance of integrating ICT in the education sector while the influence of first order and/or second order barriers might hinder pre-service or in-service teachers from using ICT in their teaching. Pre-service teachers' readiness to integrate ICT is a fundamental factor in the study country's MoE plan for ICT implementation in the state's public schools that could either hinder or support their intention to use ICT. When reviewing the broad aims of the National Strategy regarding ICT implementation in public schools, limited information is available concerning the progress of the strategy as mentioned earlier. However, recent studies in the country showed that neither schools, supervisors, nor teachers are ready for this step. Findings from this study reveal that each barrier is significant in its influence while the interaction between the barriers is equally important, as this forms the main components of pre-service teachers' intention to integrate ICT in the country's schools.

To answer the third research question, this study found that participants were almost equally divided about their intentions to integrate ICT into their teaching practice, whereas approximately half of them had no intention to do so. In this digital age, and with the current challenges posed by the ICT revolution, it seems that the College of Education has not met the education reform goals set out by the MoE. In terms of the successful integration of ICT into instructional practice, the study results highlighted factors that positively or negatively influenced pre-service teachers' intention, which will be discussed below. This result is

consistent with Bingimlas's (2009) meta-analysis of the literature on present hindrances regarding ICT integration in pre-service teachers' instructional practice. Bingimlas's findings indicate that pre-service teachers had good intentions to utilize ICT in their instructional practice, but that they encountered many barriers.

5.2   First-order Barriers/Enablers and Intent

In support of the theoretical framework and the literature on the use of technology in education, this study found that the following first order barriers have a bearing on pre-service teachers' intent to integrate ICT in their future teaching practice.

5.2.1   Technology Infrastructure in Schools:
Nearly all pre-service teachers who do not intend to utilize ICT cited the lack of ICT infrastructure in schools as one of the main reasons why they will not engage with ICT in their instructional practice. This may be due to the distribution of pre-service teachers in regard to the practicum in public schools in the districts where they reside. As some districts lack or have low levels of essential ICT infrastructure in comparison with other districts (Alajami, 2011; Alharbi, 2014, Alsharija, 2012), it would be expected that public school teachers in such areas remained heavily reliant on traditional methods of teaching in their practice. Thus, a good portion of the participants had not experienced ICT use in instructional practice during the practicum. Alajami (2011) has investigated the barriers influencing ICT implementation in public secondary schools in the country and found that inadequate provision of ICT in schools was one of the barriers to pre-service teachers' intentions to integrate ICT in their instructional practice. This result was also supported by AlMulhim (2014) and Bingimla's (2009) review of the literature on barriers to successful ICT integration in teaching and learning environments.

As mentioned earlier, equipping schools with ICT is part of the study country's national strategy as set out in 2008's plan to reform the education sector. In addition, Alharbi's (2014) research has concluded that the MoE has both failed to effectively

implement ICT in schools (p.213). In the current study, the availability of ICT in some public schools is presented in terms of the availability of computers for students' use in IT classes. Teachers of other subjects cannot utilize computers in the IT lab for instructional purposes because the lab is fully booked for IT classes only (Alajami, 2011; Alawidi & Aldhafeeri, 2017; Al-Harbi, 2014; Al-sharija, 2012). These findings do not match the MoE's 2008 announcement with regards to infrastructure availability in public schools and ICT implementation.

In addition, the MoE has announced that public schools will be connected both through a network with one another, and also with the MoE itself. However, this has not happened yet due to poor coordination between the MoE and the Ministry of Telecommunication (MoT) (Alshemmari, 2015; Alawidi & Aldhafeeri, 2017). At the time that the data was collected for this study (2013-2014), many classes in public schools still had no internet access and limited availability of ICT tools and infrastructure, as Alawadi and Aldhafeeri (2017) have reported. The readiness of public schools' ICT infrastructure is still below expectations, therefore, there is an urgent need for the MoE to evaluate the implementation of the strategy, i.e. the adequate provision of ICT in public schools, supervisors' readiness to guide teachers in the implementation process, and effective training programs for teachers.

5.2.2 **Timing of ICT Training**: Very few of the participants had taken the three compulsory courses before the practicum. As shown in Table 13, those who completed the ICT courses were more likely to integrate ICT. This result is consistent with the findings of Zhou et al.'s (2011a) study conducted in China. They indicate that pre-service teachers' intentions to integrate ICT increased significantly after the completion of an ICT course.

One might ask, why so few participants in their senior year had taken all three ICT-related courses, as the three courses are compulsory for graduation. Also, why had a number

of the participants not yet taken any ICT-related course despite being in their senior year in the education program? It could be that they were taking these courses during the semester they participated in this study, or that they would take them in the following semester, which would have been their program's final semester. Regardless, it may be more effective for pre-service teachers to complete these courses earlier in the program and apply their knowledge in the practicum setting. Therefore, students should be advised to complete the ICT integration courses either before or concurrently with their practicum.

5.2.3 Focus of the ICT-Related Courses: In contrast to the ICT-related courses' description by the College of Education (see Chapter 3), participants who had taken at least one of the courses indicated that they were focused primarily on general computer skills. This could be the case, since the majority of participants had taken only the general ICT course (*Computer Literacy in Education*), and few of them had taken courses that related to the integration of ICT in education. Participants expected to be provided with more advanced skills than basic computer abilities to upgrade their technological capacity as half of them had more than four years' experience in dealing with computers. From my point of view, pre-service teachers have less need to know about the history and the development of computers (offered in the *Computer Literacy in Education* course) – as evidenced by more than 60% of participants believing that this course is theoretical – and particularly as they are in more need to learn about computers from a practical perspective, so they may have the ability and the competence to support their teaching practice.

Much literature carried out in developed and developing countries has indicated that ICT-related courses influence pre-service teachers' intention to utilize ICT in their future instructional practice effectively: the findings in this study echo Banas and York's (2014) study based on the USA, Chai et al. (2010), Koh et al. (2013) and Choy et al. (2009) on Singapore, Fook et al. (2011) on Malaysia, Fokides (2016) on Greece, Kojima's (2014) study

in Japan, Kounenou et al. (2015) on Greece, Mumcu (2017) on Turkey, and Serhan (2009) on the UAE respectively.

5.2.4 Technical Support: This study's results showed that the College of Education training did not allow pre-service teachers to retain control while facilitating teaching with ICT tools, as nearly half of the participants disagreed that the College prepared them to operate ICT tools in their teaching without technical support. Therefore, results might suggest that College of Education graduates do not meet teacher international standards (ISTE; see Chapter 2) to integrate and deal with technology in their future instructional practice. This finding in this study aligns with Akbulut et al. (2011) and Baydas and Goktas's (2016) Turkish studies and Teo and Milutinovic (2015) on Serbia, namely that a lack of technical support was one of the main reasons cited by pre-service teachers for not having any intention to utilize ICT in their instructional practice.

With regard to my profession, it makes it easier for me to meet with and talk to teachers when there are some specific issues to discuss. When discussing some of the issues related to ICT utilization in teaching, they claimed that technical support is a significant issue when thinking about ICT utilization in teaching, so that when they encounter any ICT-related problem in the classroom, they find themselves helpless in front of their students, which is embarrassing to them. However, they commented that the *'MoE is currently hiring an ICT technician in each school to assist teachers with their integration'*. Therefore, in relation to ICT availability in classrooms and teachers' competence, ICT integration in public schools will be less of an issue in the future.

5.2.5 Evaluation of The Practicum Experience: The majority of the participants had completed the practicum, however over half of them felt that the practicum was ineffective in helping them to learn to integrate ICT. This may be due to two reasons:

First, it is possible that if the students had completed the ICT courses prior to taking the practicum, they might have been better prepared to apply their ICT knowledge and skills in practice, and would have found the practicum more beneficial.

Second, the distribution of pre-service teachers across different districts in regard to their accommodation results in different teaching experiences depending on the specific school, anticipated teaching context, technology affordance in classrooms, school policy, and teachers' usage of ICT respectively. College of Education supervisors should revise pre-service teachers' distribution in schools, so that pre-service teachers experience ICT integration and modelling at schools through their practicum. According to the ICT implementation strategy for the country's public schools, teachers are expected to integrate and use ICT in their teaching, therefore, all pre-service teachers should conduct their practicum at schools with better ICT infrastructure as half of the schools have implemented ICT.

The study's findings reflect prior studies regarding whether the practicum has a positive or negative influence on pre-service teachers' intentions to integrate ICT in their future instructional practice. These studies have included Admiraal et al. (2017) dealing with the Netherlands, Akbulut et al. (2011) on Turkey, Andrews, Crossland, and Lovelace (2010) and Wright and Wilson (2011) on the USA context, Choy, Wong and Tan (2011) on Singapore, Gill et al. (2015) on Australia, Henderson et al. (2013) on Australia, Jita (2016) on South Africa, and Merc (2015) on Turkey respectively.

5.2.6   Prior Computer Experience: Nearly half of the participants have less than one year's experience in using computers. Only three studies (as per the researcher's information) – Gill et al. (2008, 2015) on Australia and Aslan and Zhu (2015) on Turkey – found that previous computer experience has been viewed as helping to predict pre-service teachers' intentions to integrate ICT. The MoE needs to assess its ICT implementation plan in the curricula at all levels, while the College of Education could assess the *Computer Literacy in Education*

course's suitability based on the students' computer competence, so that pre-service teachers with poor skills can be given more comprehensive training in using a computer and its peripherals.

5.2.7   ICT Skills and Knowledge: Using the appropriate ICT tools in order to manage the learning environment requires a strong foundation in ICT skills and competencies. The results may suggest that participants are questioning their preparedness to integrate ICT in their future teaching. This may be due to their lack of experience of utilizing ICT in a meaningful way for the purpose of teaching. A similar insight is provided in Aslan and Zhu's (2015) questionnaire analysis of Turkish pre-service teachers; one of the main factors influencing their intention to integrate ICT in instructional practice as reported by pre-service teachers was a lack of ICT competence and knowledge. Aslan and Zhu also report that pre-service teachers are expected to have ICT-related knowledge, to be able to select appropriate ICT resources to reach specific learning objectives, and to know how to adopt new teaching methods in ICT settings. Therefore, ICT skills and knowledge are a key indicator of pre-service teachers' intention to integrate ICT in their teaching.

In line with this, the College of Education needs to offer and provide pre-service teachers with the ICT experience, opportunities to practice ICT integration within the program, observe ICT modelling in a real context setting, and ICT modelling at the College of Education by the faculty members.

Conversely, those who intend to integrate ICT noted that they will be required to integrate technology in schools that they enjoy working with technology, technology will make their teaching interesting and effective, and they are open to trying new methods using ICT. This result is consistent with Bower and Wittmann's (2009) study of the College of Education program offered by Macquarie University in Australia. They report that a proportion of pre-service teachers perceive that teaching is more effective and interesting when ICT is used, and that this perception is found to be a significant enabler for ICT

integration. In addition, Goktas and Yildirim (2009) researching on Turkey urge the need to integrate ICT in the classroom and curriculum. Pre-service teachers could play a significant role at the frontier of adopting ICT innovations in their instructional practice.

Similar in ranking to the aforementioned enablers, 97% of the participants who have an intention to integrate ICT agreed they are willing to learn new methods of using ICT in teaching to enable the effective use of technology in future teaching. The findings of Gill and Dalgarno (2015) writing on Australia also parallel this study's results.

5.3   Second-Order Barriers/Enablers Relating to Intent: Confidence

Before discussing the relationship between confidence and intent, I will address the first research question, namely how far pre-service teachers are confident about their TPK. The analysis outlined in the previous chapter suggests that only half of the participants have confidence in their TPK to utilize ICT in their instructional practice. I suggest that a further study is needed to investigate pre-service teachers' confidence in relation to their subject specialism as this issue could be one of the barriers or enablers of pre-service teachers' confidence to integrate ICT. This suggestion is supported by Zhou et al.'s (2011a) study based on China, and Lei's (2009) research on the USA. Regarding the current study's country, Alharbi (2014), Alshemmiri (2015), and Alawdi and Aldhafeeri (2017) have all argued that subject specialism has an influence on teachers' confidence to deploy ICT in their practice.

In addition, participants may be not as confident in their ability to integrate ICT due to the following reasons:

5.3.1   Little Previous Experience in Using Computers*:* It is interesting to note that nearly half of the participants had less than one year's experience in using computers, and it is these students who seem to be less confident in their ability to integrate ICT in their teaching practice (as shown in Table 7). This result is also reflected in Yeung et al.'s (2012) research on Singaporean pre-service teachers and Bozdoğan and Ozen's (2014) study of Turkish pre-

service teachers, such that pre-service teachers' confidence correlates to their years of experience in using computers and the amount of time they spend online.

5.3.2 Lack of Opportunities For Development in The Practicum: Even though approximately three quarters of the participants had taken the practicum, half of them had no TPK confidence to utilize ICT in their future instructional practice (see Table 7). This result is confirmed by Bozdoğan and Ozen's (2014) Turkish study, Ward and Overall (2013) on the USA, and Gill and Dalgarno's (2010) research in Australia, all of which reflect the influence of the practicum experience in increasing pre-service teachers' confidence to integrate ICT. Again, the College of Education needs to pay more attention to the effectiveness of the practicum experience so pre-service teachers are exposed to ICT integration in teaching.

5.3.3 Relative Ineffectiveness of ICT Courses in Developing Participants' Confidence: Participants who had taken the *Media and Technology* or the *E-learning* courses were more confident compared to the other groups (see Table 7). However, only approximately one-third of the participants had taken one of these courses. This finding echoes precisely earlier research such as Ward and Overall (2013) on the USA, Fook et al. (2011) on Malaysia, and Gill and Dalgarno (2010) on Australia in that e-teaching method courses emphasizing ICT integration increased pre-service teachers' confidence regarding the same. Teacher education programs must provide pre-service teachers with access to professional ICT courses that enable them to acquire multiple skills in accordance with ISTE standards of performance for technology integration in education.

5.3.4 Lack of ICT Competence and Skill: Approximately one-third of the participants agreed that they had gained the skill required for general use of ICT in their instructional practice. This finding reflects Bozdoğan and Ozen's (2014) research in Turkey, Jita (2016) on South Africa, and Jamieson-Proctor, Finger and Albion (2010) on Australia, whereby pre-

service teachers' lack of confidence is attributed to their lack of competence and skill to utilize ICT in their instructional practice.

5.3.5   Relationship Between Confidence and Intent: To answer research question five, namely to identify the relationship between confidence and intent, this study found that confidence is the strongest predictor of pre-service teachers intention to utilize ICT in their future instructional practice, with those who are more confident also more likely to utilize it in their practice. Similar findings were reported by Andrews et al. (2010) in their research on USA, and Gill and Dalgarno (2008) and Kaur (2011) on Australia, in that those who are more confident are more likely to integrate ICT in their teaching.

This suggests that participants with little prior experience in using computers and no opportunities for development in the practicum, together with the ineffectiveness of ICT courses in developing their confidence, are barriers to intentions to integrate ICT in future instructional practice. This finding is consistent with the research of Kessler and Plakans (2008) on the USA, Gill and Dalgarno (2008) on Australia, and Fook et al. (2011) on Malaysia.

In conclusion, from my point of view, pre-service teachers' lack of confidence triggers the fear of making mistakes during their instructional practice, especially in front of a 'digital generation' (students), with teachers consequently disgracing themselves in relation to their colleagues. Therefore, there is a need to re-visit ICT courses' effectiveness, the demonstration and modelling of ICT in the teacher-training program, and also in the practicum setting. In doing so, more hands-on computer technology opportunities should be available to students who have had limited experience using computers. In addition, the sequential order and the content of the ICT courses and practicum may need to be revised so as to improve student learning with regard to the application of ICT.

**5.4	Second-Order Barriers/Enablers Relating to Intent: Attitude**

To answer the second research question, in overall terms the pre-service teachers were positive regarding the use of ICT for teaching and learning purposes, corroborating Bower and Wittmann (2009) and Gill and Dalgarno's (2010) Australian studies. Pre-service teachers appeared to appreciate ICT's potential to enhance student learning, improve their teaching practice, help them to learn new things related to teaching, and make the subject more interesting, all of which resulted in most pre-service teachers developing a positive attitude toward ICT use in education. This finding is consonant with Bower and Wittmann's (2009) Australian research, Lei's (2009) work on the USA, and Aslan and Zhu's (2015) Turkish study.

In addition, pre-service teachers' positive attitudes toward ICT may be due to the following two reasons:

**5.4.1	Prior Experience of Computers:** The results displayed in Table 10 demonstrate a significant relationship between internet usage, prior experience in using computers, and attitudes to ICT. The majority of the participants use the internet between one to five hours daily and more than half of them have more than one year's experience in using a computer (see Table 4). Kaur's (2011) study on Australian pre-service teachers lends support to the possibility that pre-service teachers' positive attitude toward ICT integration is related to their daily use of the internet. In addition, Chai et al.'s (2009) study of Singaporean and Taiwanese pre-service teachers, Padmavathi's (2016) research on India, Shirvani (2014) on the USA, So et al. (2010) on Korean and Singaporean pre-service teachers, and Teo's (2008) Singaporean work show a significant difference in pre-service teachers' attitudes toward the use of ICT in education based on the length of their computer technology experience.

**5.4.2	ICT Course:** The majority of the participants had taken the *Computer Literacy in Education* course which seems to have been sufficiently robust in terms of influencing pre-

service teachers' attitudes toward ICT use in teaching. This echoes Fook et al.'s (2011) research in Malaysia, Gill and Dalgarno's (2008) study of Australian pre-service teachers, and Serhan's (2009) work in the UAE, in that pre-service teachers developed positive attitudes toward ICT use in their future instructional practice as their skills developed after taking an introductory ICT course. However, Sarıçoban's (2013) Turkish study showed no significant relationship between pre-service teachers' ICT-related course (taken/not taken) in terms of resultant attitudes.

5.4.3 Relationship Between Attitudes and Intention: While only half of the pre-service teachers have intentions to utilize ICT in their instructional practice, the majority of them have positive attitudes toward ICT use in education. There appears to be a difference between what they believed and what they were intending to practice. Pre-service teachers' intent to utilize ICT in their instructional practice was influenced by their attitudes. The results displayed in Table 13 show that attitude has a moderate effect on pre-service teachers' intentions to use ICT in their future instructional practice. This finding chimes with a number of studies in different contexts showing that attitudes were a predictor of future ICT use by pre-service teachers in their classroom practice. These studies include Sang et al. (2009) on Chinese pre-service teachers, Anderson and Groulx (2011) and Sadaf (2013) on the USA, So et al. (2010, 2012) on Korea and Singapore, Wong et al. (2013) on Malaysia, Sarıçoban (2013) and Baydas and Goktas (2016) on Turkey, Teo and Milutinovic (2015) on Serbia, Burden and Jopkins (2016) on the UK, Gymafi (2016) on Ghana, and Fokida (2017) on Greece respectively.

While the participants are positive regarding the use of ICT in education, some pre-service teachers may cite practical limitations such as lack of time (Andrews et al., 2010), inadequate ICT infrastructure (Akbulu et al., 2011), and their own abilities (Choy et al., 2008; Choy et al., 2011) when deciding whether or not they will use ICT in the classroom. It is also

interesting to note that the first order barriers – especially evaluation of training in ICT integration – have little bearing on their attitude. In other words, even students who were not happy with their preparedness in terms of the use of ICT in the classroom are positive in relation to its use in the classroom.

It can be argued that youth in Arab countries generally, and in the country under study here in particular, are digitally competent in terms of deploying their general ICT skills for digital games and are active social network users (e.g., Facebook, Twitter, WhatsApp, and Instagram) (Alharbi, 2014; Kononova & Alhabash, 2012). Therefore, their positive attitudes toward ICT integration in education could result from their experience in using the digital technology in general. Therefore, it is possible that the participants' use of the internet (for either social networking or games) promotes positive perceptions of the role of technology in education. However, personal utilization of technology does not always lead to its transfer to educational contexts as reflected in Lei's (2009) hypothesis that pre-service teachers lack experience in utilizing more advanced ICT for instructional purposes despite their basic use of it for social activities.

As the participants' attitudes do not seem to be an issue that hinders ICT classroom integration, College of Education faculty members and administrators could take advantage of their positive attitudes toward ICT by increasing the exposure of pre-service teachers to more practical experiences of integrating ICT in teaching and learning in the practicum and within the program. It is important that future research on the study country's pre-service teachers focuses on this topic.

5.5   Relationship Between Confidence and Attitude.

To answer the fourth research question, the literature showed a significant relationship between confidence in using ICT in future instructional practice and attitudes towards ICT in education among pre-service teachers, where those who are more confident are more positive

toward the use of ICT (Andrews, Crossland, & Lovelace, 2010; Kaur, 2011; Teo, 2008). However, in this study, attitudes and confidence as two second order barriers were not strongly correlated. Therefore, a more positive attitude does not necessarily lead to more confidence and vice versa. This finding may reflect pre-service teachers' recognition that the use of ICT in classrooms requires knowledge and skills beyond general technological capacity. This result therefore does not support the findings in the majority of the literature that positive attitudes necessarily lead to more confidence.

5.6 The Results and The Theoretical Model

As mentioned previously, the current study's theoretical framework consists of three constructs, first order barriers, second order barriers, and intentions. The results support the theoretical framework in the influence of first order barriers (ICT modelling at practicum, practicum, ICT competence and experience, ICT-related courses, technical support, and technology infrastructure in schools) on pre-service teachers' intentions to integrate ICT in their instructional practice. In addition, the results showed that second order barriers such as confidence and attitudes in this study have an influence on pre-service teachers' intentions to integrate ICT in their future instructional practice. The results also showed that confidence is the strongest predictor of pre-service teachers' intentions to utilise ICT in their future instructional practice.

However, the results of the current study contradicted some of the aforementioned literature in that attitude is not as strong a predictor of intentions as confidence. Attitude in this study appears to have little bearing on whether or not the pre-service teachers plan to use ICT. In a state that has a national strategy to reform the education sector, that state might have a belief in the significance of integrating ICT in the education sector, however, the influence of first order barriers or second order barriers on intentions might deter pre-service or in-service teachers from using ICT in their teaching.

Furthermore, it was theorised that adequate provision of technological infrastructure and effective training in the use of ICT (first order barriers) affect pre-service teachers' confidence concerning their ability to integrate ICT and attitude toward the role of ICT in improving teaching and learning (second order barriers). The results of this study show that confidence and attitudes are influenced most by ICT course, practicum, and prior experience.

5.7 Evaluation of The Teacher Education Program

The sixth research question asked pre-service teachers how they evaluate their educational experience. Nearly half of the participants believed that they were not prepared to use ICT in their future instructional practice. This is unsurprising considering that many of them had not completed the ICT courses, and those who had taken the first course did not feel that it was appropriately focused and effective. In general, a more comprehensive study is needed to assess the teacher education program's role in preparing pre-service teachers to integrate ICT in their instructional practice. Again, more attention should be paid to the sequential order of courses, so pre-service teachers take all compulsory ICT courses before they take the practicum.

This is consistent with Valtonen et al.'s (2015) quasi-experimental study results based on investigating how experience of an education program influenced Finnish pre-service teachers' intentions to utilize ICT in their instructional practice pre- and post-completion of an ICT course. In essence, Tondeur et al.'s (2012) study in six different countries, which focused on strategies to prepare pre-service teachers to utilize ICT effectively in their instructional practice, is consistent with this study's results.

In addition, participants view faculty modelling in the use of ICT integration as poor. This aligns with Gill et al. (2015) and Sweeney and Drummond's (2013) Australian studies. In addition, Admiraala et al.'s (2017) study conducted in the Netherlands identified the positive role of modelling the use of ICT by faculty members in terms of their teaching of pre-service teachers and their intention to utilize ICT in their future instructional practice.

5.8 Summary

Integrating ICT into instructional practice is an issue. This research has three outcomes. The first is that half of the participants did not show any intention or confidence to utilize ICT in their future instructional practice, while reporting some reasons that would prevent them from using ICT in this setting, despite the fact that they showed general positive attitudes toward such integration.

The second outcome is an understanding of those factors that might influence pre-service teachers' intentions to utilize ICT in their future instructional practice. The most commonly mentioned barriers were: ineffectiveness of the training in the use of ICT in teaching, no perception of future requirements for this, lack of enjoyment working with technology, lack of confidence, and fear of lack of technical support. The relationship between these barriers relates first order to second order barriers.

The final outcome is a series of recommendations which would help improve pre-service teachers' experience within the education program while providing them with the essential skills for ICT integration.

Keeping in view the above discourse, the pace of ICT implementation within educational institutes seems slow in the country investigated in the current study due to the aforementioned barriers. Therefore, one can safely assume that due to these barriers, in-service and pre-service teachers in the country encounter difficulties in managing and utilizing ICT in their instructional practice. This will require, on the one hand, both the MoE and the MoHE to review the ICT policy in schools and to adopt more professional training programs to train such teachers to adopt ICT in their instructional practice. On the other hand, school supervisors need to be trained in how to guide teachers effectively in integrating ICT in their instructional practice.

5.9   Implications

Based on the study's discussion and results, the research has some implications for the process of preparing pre-service teachers to teach using ICT in their future instructional practice, both nationally and internationally. Despite the availability of some ICT tools in half of the country's public schools, using these resources in teaching methods in classrooms is not always the teacher's priority, and this is also the case in some developing countries as mentioned earlier. Pre-service teachers need support and encouragement from a mentor and a supervisor who has a clear understanding of the potential value of ICT in teaching and learning. This requires outlining a collaborative plan between the practicum mentors in schools and the College of Education supervisors so as to optimize pre-service teachers' learning experiences in the use of ICT. In turn, ICT should be utilized in teaching practice as an essential part of the practicum requirements in order to test the pre-service teachers' skills and allow them to reflect on their practice accordingly.

From the evidence gathered by this study, most of the participants view ICT as a crucial tool in terms of learning and teaching. However, the study's findings indicate that over half of the participants believed that the teacher education program did not prepare them for ICT use in their instructional practice. The pre-service teachers' journey in the Teacher Education program has implications, as the literature suggests, that would make a difference in accomplishing the effective use of ICT in instructional practice in teacher education programs.

Encouraging pre-service teachers' integration of ICT in their future instructional practice requires a strategic plan. One of the reasons for developing this particular study is that the researcher is the mathematics and physics coordinator at an American academy in the study country where teachers use traditional methods of teaching, despite the Accreditation Agency recommendations to integrate ICT into teaching and the academy's wider context. Therefore, the Academy's graduates encounter some problems related to the use of ICT in

their learning. Thus, preparing pre-service teachers to teach is an urgent need in the 21st century. In terms of the College of Education's programs in particular (nationally) and for in-service teachers' development courses in general (internationally), a plan for preparing pre-service teachers to integrate ICT in their future instructional practice is recommended. This plan should consist of three components based on the literature and the current study's results.

As the first component, a considerable number of pre-service teachers on the College of Education programs are either ICT illiterate, or have limited technological knowledge or skills, whereas some have substantial experience in dealing with computers and the internet. Therefore, pre-service teachers should take the *Computer Literacy in Education* course during the first semester. Pre-service teachers should be distributed into groups in relation to their ICT level, where those with good ICT skills could take a course to upgrade these skills, while digitally illiterate pre-service students should be taught basic ICT knowledge and skills.

In the current digital age, the younger generation have substantial ICT skills and competence but are not necessarily transferring these skills to their instructional practice or to their college-based learning. Therefore, and as I mentioned earlier, the College of Education could assess the suitability of the *Computer Literacy in Education* course based on the students' computer level, so pre-service teachers with poor skills should be given a more comprehensive course in using the computer and its peripherals. Other courses must concentrate on how to integrate ICT in teaching and learning: these should be taken in the second year or prior to the practicum experience.

Secondly, and as the current study and the literature recommend, faculty members should model the use of ICT in teaching different subjects and specializations so that pre-service teachers are able to observe and understand the effective uses of ICT in teaching and learning. This modelling should be carried out in each College of Education course program.

Thirdly, the plan requires meaningful experience in real school contexts. Pre-service teachers should start observing teachers who integrate ICT in their instructional practice, beginning in their second year, then they would have to have the opportunity to experience teaching in technology-enriched environments within the practicum. Accordingly, pre-service teachers will develop their ICT pedagogical and technical skills in a meaningful environment. To accomplish this, it is recommended that a clear vision should be set out so that policy makers at the College of Education know exactly where they are heading. An on-going assessment must be undertaken to determine the barriers that may prevent pre-service teachers from integrating ICT in their instructional practice and to identify solutions.

The current study's international implications were based on the findings discussed. Three main themes emerged that can be woven together to enhance pre-service teacher preparation to utilize ICT in their instructional practice, internationally as well as nationally:

- Barriers influencing the integration of ICT such as pre-service TPK confidence: today the majority of pre-service teachers worldwide as well as the pre-service teachers in the current study are active users of digital tools; however, they need to have digital literacy about how to utilize these tools in their instructional practice effectively. Therefore, firstly ministries (or their equivalents) worldwide should assess teachers' skills and competence in accordance with the ISTE criteria before making their graduation official. Secondly, ministries of education worldwide should reflect on their current programs and their readiness to prepare pre-service teachers to respond to globalization's demands in terms of learning and teaching. Engaging pre-service teachers in real contexts is better than teaching through theories, as the majority of them are instructed to teach the content knowledge without any pedagogical and technological background;

- Classroom context: The availability of ICT tools in classrooms is one of the barriers that influence pre-service teachers' intent to utilize ICT creatively as opposed to

practicing a traditional pedagogy. In relatively wealthy developing countries where GDP is buoyant, ministries should consider more carefully the availability of ICT tools in classrooms to ensure that every student has access. This then differentiates countries that do have money to spend on education and those which are more cash-strapped;

- Attitude: as the findings show that attitude is one of the most important predictors of intent, the development of pre-service teachers has to come from the teachers themselves during their program journey. In essence, developing their beliefs and attitudes regarding ICT integration in their instructional practice is better than being instructed by others to utilize it, therefore college instructors modelling good practice and, even more importantly, enthusiastic teachers during the practicum will help to develop these positive beliefs and attitudes.

5.10 Limitations of The Study

In any educational research, there are several unavoidable limitations regarding the instrument, the nature of the research, and the features of the population, all of which determine the scope of the study.

One of the major limitations of this study as mentioned previously, the study investigated the research problem using a questionnaire. The fact that some lecturers did not cooperate initially was the main problem in this research. This made it impossible to apply an interview technique as part of the data collection. This method necessarily provided the participants with limited replies depending on the questionnaire options, thereby the method lacked the flexibility to add further questions based on pre-service teachers' replies that might have emerged using other methods such as interviews. This also prevented data validation through cross verification between the questionnaire and interviews.

Secondly, the research population was limited to pre-service teachers at the College of Education in the only state university in the country. The majority of students at the main

university are citizens, however, the majority of the country's public school science teachers are also non-citizens who have an overseas contract. Therefore, the results of this study cannot be generalised to science-stream public school teachers.

Thirdly, the study is limited to pre-service teachers' intentions to utilise ICT in their instructional practice, thus it did not include faculty members' opinions on barriers that impede pre-service teachers' intentions.

Fourthly, as the majority of the pre-service teachers in the sample had not taken the three ICT courses before the practicum, this made it hard to measure ICT courses' quality in terms of preparing pre-service teachers to integrate ICT effectively in their instructional practice. Thus, pre-service teachers who followed the sequence order of ICT-related courses before the practicum might have had a different story to tell regarding their intention and confidence to utilise ICT in their practice.

Fifthly, there is a lack of reliable literature in the same research area. There has been no research focusing on pre-service teachers at the College of Education in the main state university in the study country, except Alayyar (2011), who assesses pre-service science teachers' perceptions at the all-female Institute of Education toward ICT use, ICT training needs, and their perceptions of the current curriculum in relation to ICT. As a result, there is no method of making comparisons with the findings in the same context, since Alayyar's study focuses on one subject (science), one gender (female), and a different teaching context (an institute not a university context). Therefore, it would be difficult to identify and refer to the research results to enhance ICT-related courses, practicum experience, ICT modelling, and the general teacher education program in the other education institute in the study country.

5.11   Recommendations

5.11.1 Recommendations for Practice

- Faculty members at the College of Education need to take advantage of pre-service teacher proficiency in dealing with social networking and games technology while employing this potential to strengthen their skills in using and dealing with ICT for learning purposes and for future instructional practice. Increased levels of exposure to ICT for educational purposes may reduce their reluctance to use ICT and increase their confidence and willingness to experience new applications.

- Faculty members at the College of Education should model methods of using ICT to impact pre-service teachers' learning.

- Pre-service teachers' training in schools should be initiated in their second year to monitor teachers' teaching and use of ICT in real environments while practising teaching as well, as learning by doing will enrich the experience.

- The College of Education needs to link theoretical and practical teaching components with reference to the use of ICT to reduce the gap between what is taught in pre-service teacher training and how they are expected to integrate ICT in their instructional practice.

- The teacher education program may need to adopt ISTE standards for pre-service teachers. Graduate teachers should be assessed based on meeting the ISTE standards in relation to integrating ICT in their instructional practice.

- The sequential order of the courses should be reviewed, and pre-service teachers should take all ICT-related courses before they experience the practicum.

- The College of Education and schools need to cooperate to develop pre-service teachers' capabilities to practise ICT skills (both technical and pedagogical) in their instructional practice during the practicum.

- Policy makers in the country should develop a curriculum which indicates the ICT standard expected of teachers across the curriculum, taking into account worldwide developments in this area.

- The MoE and MoHE should evaluate and assess the progress of the national strategy after seven years and implement the national educational strategy in schools and higher education institutes.

5.11.2 Recommendations For Research

Educational research on ICT in education has a short history in the study country compared to developed states. Therefore, further research is required to:

- Assess pre-service teachers' preparedness to use ICT in their future instructional practice with regards to their specialization. Previous research has suggested that mathematics and science pre-service teachers have better opportunities to use ICT. In contrast, recent research by Alharbi (2014) on the study country's teachers showed that mathematics teachers are less confident than their counterparts in other subjects in terms of using ICT in their teaching;

- Assess whether pre-service teachers' language is a barrier in using ICT in their future instructional practice. The students' first language is Arabic, as is the study language used at the College of Education, however, most of the educational resources and manuals on the internet are in English;

- Assess pre-service teachers after one year or more on the job to discover whether they actually use ICT and why they do/do not do so;

- Assess how the ICT-related course *Computer Literacy in Education* can be improved to contribute to developing pre-service teachers' technical ICT skills;

- Evaluate the role of the practicum experience in terms of improving pre-service teachers' use of ICT in their future instructional practice;

- Explore pre-service teachers' reflections on observing mentor teachers and their use of ICT in the practicum;

- Investigate pre-service teachers' beliefs regarding the impact of ICT on education and factors that influence these beliefs.

5.12   Contribution to Knowledge

By providing MoE and MoHE with a copy of the study results, the current study could made a significant contribution to research on the current status of ICT integration in the study country's public schools, the role of the College of Education to prepare teachers for effective teaching through using ICT in their instructional practice, and the barriers/enablers attributed to pre-service teachers' intentions to utilize ICT in their future instructional practice. Therefore, the study's findings provide a framework and guide for the MoE to effectively implement ICT in public schools by investigating the level of ICT policy implementation in those schools alongside the readiness of schools, teachers, and supervisors. The research study also contributes to policy developments in other developing countries in the Arab world.

The findings of the current study are that HE lecturers need to enhance pre-service teachers' learning during the teacher education program and the role of instructional technology in utilizing, integrating, and evaluating their instructional practice. This study provides evidence of the barriers that pre-service teachers encounter when attempting to integrate ICT in their instructional practice, which can be addressed if pre-service teachers experience improved educational programs at the College of Education. The study offers HE educators suggestions to, respectively, enhance learning during the practicum, review ICT course content and sequencing, demonstrate ICT modelling, and so on. In addition, they should consider pre-service attitudes and skills when engaging in TPK to transform content knowledge.

MoE and MoHE educators should consider extending the duration of the practicum, at least to one year, as per my information and experience in the developed country that I was raised in where pre-service teachers were sent to schools to practice teaching and observe teacher modelling lessons from the second year of the education program under a mentor's supervision. Therefore, pre-service teachers observing in-service teachers modelling good practice might develop their insights regarding others' instructional practices, which would assist them to start planning to deploy ICT in their instructional practice. The extended practicum would provide pre-service teachers with an opportunity to learn how to enhance and develop their TPK. Furthermore, it is an opportunity to understand how students learn with ICT, which will boost teachers' confidence about ICT integration.

In addition, this research developed a theoretical framework that could help predict pre-service teachers' intention to use ICT in their future instructional practice. As mentioned in Chapter 2, the framework was derived from the literature, and identified first order and second order barriers that hinder pre-service teachers from utilizing ICT in their instructional practice, while presenting the relationship between the variables that have not been researched previously in the current context of the research study. Also, the research contributed to research in the Arab world, as the questionnaire has been translated into Arabic, so it could be used by other research studies in different Arab countries.

Finally, the findings and recommendations of this study are expected to be of benefit to policy-makers, the MoE, the MoHE, in-service teachers, and educators in terms of the barriers that require significant attention to effectively and successfully utilize ICT in classrooms.

5.13 Reflection

Studying pre-service teachers' intent, attitude, and confidence to integrate ICT in their instructional practice helped in closing the research-practice gap in the country researched

here. This acknowledges a considerable overlap in my role as a researcher as I am also a teacher, coordinator, supervisor, and syllabus developer. Meanwhile, this has been important in the context in which the current study has been carried out. By acting through different roles, I gained an understanding of the context of the current study, research problem, and their respective significance. This deepened my understanding of the participants' problems in being interviewed, and the lecturers' reluctance to cooperate, preventing the data collection from being a seamless process.

Reflections on The Study Outcomes:

(1)   Assessing The Context

As mentioned earlier, from my experience of many of the study country's teachers and my role as coordinator and head of department, ICT integration in the classroom was not adopted by many teachers in public schools for the reasons mentioned earlier. The current study illuminated the pre-service teachers' preparation in the country's State University (which has a prestigious status in the Middle East). In essence, to accomplish the research aims and objectives, it was important to investigate pre-service teachers' evaluation of their teacher education program, ICT courses, and the practicum in relation to their intent, attitude and confidence in integrating ICT in their instructional practice.

The findings showed that the teacher education program has many deficiencies in terms of preparing pre-service teachers to integrate ICT in their instructional practice and these were found to relate to the practicum, the lecturers' modelling of ICT, and the ICT courses. Although the findings of this study are context specific for pre-service teachers at the State University in the study country, they also contribute to the international understanding of barriers to ICT integration in education.

(2)   Colleague Assistance in Collecting Data

In the current study, a colleague helped me in collecting the data from pre-service teachers for reasons mentioned in Chapter 3. Reflecting on this, it was a successful phase, and the advantages were that it both saved time and protected the participants' anonymity. In relation to saving the study time and effort, I visited the university several times to collect documents or for appointments with educators, and each time ended up standing by doors for hours to receive nothing at the end. From my perspective, firstly, this was a conservative context, and the course instructor did not feel comfortable working with a female. Secondly, there was no mutual interest as I studied at an overseas university. Thirdly, as I am not a faculty member at the State University, therefore I would feel free to write about any deficiencies in the program from pre-service teachers' points of view.

(3)   Assessing The Questionnaire Development

I developed a questionnaire specifically for the current study as no other questionnaire was appropriate. For example, some ideas were derived from the TPACK questionnaire but not the individual items, as the questionnaire has seven domains that were difficult to separate from each other, and my study did not measure all of these. Therefore, to overcome this challenge, various data sources were used to develop a questionnaire appropriate for this study. The questionnaire measured unobservable variables such as intent, confidence, and attitudes, therefore it assessed what pre-service teachers thought they could do and what they believed, but not the actual practice. In relation to the current study's results, the findings could be generalized in other settings that have similar contexts and where the same barriers are evident.

5.14   Closing Statement

This research describes pre-service teachers' experience and preparedness to integrate ICT in their future instructional practice at a college of education in a specific country. Far

from ICT development and the need for moving away from traditional paradigms to a student-centred one, "schools in the country remain at the level where they are simply not employing enough ICT to make a difference" (Alharbi, 2014, p.213).

The research does suggest there is capacity in terms of the skills of pre-service teachers and faculty members to employ ICT, at least on a basic level. There remains a significant gap between possessing general skills and employing them in instructional practice and classroom settings. Alongside this, pre-service teachers who recognise the importance of ICT in learning and teaching have positive attitudes toward integrating ICT in classrooms. Therefore, improving pre-service teachers' pedagogical technological and technical skills in the classroom alongside improving teacher-education program planning will close the gap and increase pre-service teachers' intention to pursue ICT classroom integration.

The 2008 MoE and MoHE strategy sought to reduce the gap between daily use of technology and its application in education. On this point, this research shows little indication that the teacher education program has been sufficiently successful thus far, and has underlined the need for reforms to prepare pre-service teachers for future classrooms.

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APPENDICES

Appendix A: Request to participate in a study (English Version)

Appendix B: Request to participate in a study (Arabic Version)

Appendix C: College of Education Letter for the faculty member researcher

Appendix D: Ethical Approval Letter

Appendix E: Consent Form (English Version)

Appendix F: Consent Form (Arabic Version)

Appendix G: Participants Information Sheet (English Version)

Appendix H: Participants Information sheet (ArabicVersion)

Appendix I: Questionnaire (English Version)

Appendix J: Questionnaire (Arabic Version)

Appendix K: Definition of Terms

Appendix L: Codes

Appendix M: Participants' background characteristics

APPENDIX A

<div align="right">Monday, 31st March 2014</div>

To: The Education Department of the State University

Student ID:

This is to confirm that Tojan Al-Sharef is currently studying with the University of Liverpool on Doctor of Education (Higher Education) program. Tojan has started the program in April 2011 and has already completed all obligatory modules in the program.

In December 2013, Tojan has started the Thesis stage of the program in which she will conduct and report research during a period for a minimum of one, and a maximum of two years. Upon successful completion of this stage, she will be awarded Doctor of Education (Higher Education) degree by the University of Liverpool.

Tojan has requested me to issue this letter, to confirm her intention to conduct the research in the State University education department. Please facilitate Tojan's research with the necessary means and in accordance with the local regulations. Your assistance during Tojan's Thesis project will be greatly appreciated by herself and the

University of Liverpool.

Please do not hesitate to contact me for any further questions. Yours sincerely,

Robert Gigengack

Student Support Manager

APPENDIX B

جامعة ليفربول

الإثنين مارس2014

إلى :كلية التربية

نحيطك علما بأن الطالبة تدرس حاليا بجامعة ليفربول للحصول على درجة الدكتوراه في التربية(التعليم العالي) . بدأت الطالبه مرحلة اْلطروحة من البرنامج والتي ستقوم من خلالها بإجراء أبحاث و إرسالها خلال فترة عام كحد أدنى وعامين كحد أقصى .وبعد اجتياز هذه المرحلة بنجاح، تمنح الطالبه بعد ذلك درجة الدكتوراه في االتربيه (التعليم العالي) من جامعة ليفربول.

وبناء على طلب الطالبه، قمنا بإرسال هذا الخطاب وذلك للتعبير عن رغبيتها في إجراء البحث في كلية التربية ، لذا يرجى مساعدةالطالبه في بحثها بجميع الوسائل الممكنة، ووفقا للوائح الداخلية، كما نقدر لكم مساعدة الطالبه في مشروح أطرحتها وتقدر لكم جامعة ليفربول ذلك.

مع خالص الشكر والتقدير

روبرت جيجينجاك

مدير دعم الطالب

APPENDIX C

Associate Dean for Students Affairs   College of Education

Date: Nov.16th. 2014

Ref 26

  From: Associate dean for student affairs

To: Dr. _____ faculty member in curriculum and

instruction department

Subject: Facilitate Tojan's research with the necessary means and in accordance with the local

regulations within the lecture time through distributing the questionnaire to students. Yours

sincerely,

التاريخ: 16 نوفمبر 2014
المرجع:26
من الدكتوره:_____ العميد المساعد للشئون الطلابيه كلية التربيه
ألى: الدكنور:_____ عضو هيئة التدريس بقسم المناهج وطرق التدريس
الموضوع: نسهيل مهمة
يرجى التكرم بعمل اللازم نحو توفير كافة التسهيلاتلتطبيق الاستبانه المرفقه طي كتابنا على طلبة
مشروع التخرج في_____ ورقم المقرر والذي تقومون بتدريسه على جدول الفصل الأول للعام
الجامعي 2014\ 2015 وذلك من متطلبات اطروحة الدكتوراه للطالبة والتي تدرس حاليا بجامعة ليفربول للحصول على
الدكتوراه في التربيه والتعليم العالي.

وتفضلوا بقبول فائق االحترام والتقدير

APPENDIX D

Dear Tojan Al-Sharef

I am pleased to inform you that the EdD Virtual Program Research Ethics Committee (VPREC) has approved your application for ethical approval for your study. Details and conditions of the approval can be found below.

Sub-Committee:	EdD. Virtual Program Research Ethics Committee (VPREC)
Review type:	Expedited
PI:	
School:	Lifelong Learning
Title:	
First Reviewer:	Prof. Morag A. Gray
Second Reviewer:	Dr. Lucilla Crosta
Other members of the Committee	Dr. Baaska Anderson [observation status only]; Dr. Ewan Dow; Dr. Peter Kahn
Date of Approval:	14th May 2014

The application was APPROVED subject to the following conditions:

Conditions

M: All serious adverse events must be reported to the VPREC within 24 hours of their occurrence, via the EdD1 Mandatory Thesis Primary Supervisor.
This approval applies for the duration of the research. If it is proposed to extend the duration of the study as specified in the application form, the Sub-Committee should be notified. If it is proposed to make an amendment to the research, you should notify the Sub-Committee by following the Notice of Amendment procedure outlined at http://www.liv.ac.uk/media/livacuk/researchethics/notice%20of%20amendment.doc.

Where your research includes elements that are not conducted in the UK, approval to proceed is further conditional upon a thorough risk assessment of the site and local permission to carry out the research, including, where such a body exists, local research ethics committee approval. No documentation of local permission is required

(a) if the researcher will simply be asking organizations to distribute research invitations on the researcher's behalf, or (b) if the researcher is using only public means to identify/contact participants. When medical, educational, or business records are analyzed or used to identify potential research participants, the site needs to explicitly approve access to data for research purposes (even if the researcher normally has access to that data to perform his or her job).

Kind regards,
Morag Gray

APPENDIX E

Committee on Research Ethics

PARTICIPANT CONSENT FORM

Title of Research: PRE-SERVICE TEACHERS' PERCEPTIONS OF THE BARRIERS TO ICT INTEGRATION IN THEIR FUTURE INSTRUCTIONAL PRACTICE IN A GULF STATE
.

Researcher(s): Tojan Al- Sharef

Please initial box

1. I confirm that I have read and have understood the information sheet dated [DATE] for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my rights being affected. In addition, should I not wish to answer any particular question or questions, I am free to decline.

3. I understand that, under the Data Protection Act, I can at any time ask for access to the information I provide and I can also request the destruction of that information if I wish.

4. I agree to take part in the above study.

Participant Name   Date   Signature

Name of Person taking consent   Date   Signature

APPENDIX F

استمارة موافقه على مشاركه في مشروع بحث للحصول على درجة الدكتوراه

عنوان الدراسة

PRE-SERVICE TEACHERS' PERCEPTIONS OF THE BARRIERS TO ICT INTEGRATION
IN THEIR FUTURE INSTRUCTIONAL PRACTICE IN A GULF STATE

الترجمه: تأثير المعيقات من الدرجه الأولى والثانيه على نوايا طلبة كلية التربية نحو استخدامهم تكنولوجيا المعلومات والااتصالات بتدريسهم المستقبلي.

		الطالب: أوافق انا الموقع ادناه بأنني على دراية كاملة بأن موافقتي على المشاركه في هذا البحث تعني :
		أقر بأني قد قرات واستوعبت المعلومات التي تم ذكرها في اللأستبيان للدراسه المشار إليها أعلاه
		وأنه قد اتيحت الفرصه لاخذ في عين الاعتبار هذه المعلومات والاستفسار عن اية تساؤلات تتعلق بالدراسه.
		إنني أفهم بان مشاركتي تطوعيه وبإمكاني إلإنسحاب بدون أي التزامات تترتب على ذ لك
		إنني أفهم أنه بموجب قانون حماية البيانات، أنه يمكنني في أي وقت طلب الحصول على المعلومات

اسم الطالب
المشترك
التاريخ
التوقيع
الباحثه
التاريخ
التوقيع
المشرف على الدراسه:
باسكا اندرسون
التاريخ
التوقيع

APPENDIX G

Participant information sheet

Title of Study: PRE-SERVICE TEACHERS' PERCEPTIONS OF THE BARRIERS TO ICT INTEGRATION IN THEIR FUTURE INSTRUCTIONAL PRACTICE IN A GULF STATE
1.

2. **Version Number and Date: (V 3.4)** *(May 16-2012*)

3. **Invitation Paragraph**

You are being invited to participate in a research study. Before you decide whether to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and feel free to ask us if you would like more information or if there is anything that you do not understand. Please also feel free to discuss this with your friends, relatives and GP if you wish. We would like to stress that you do not have to accept this invitation and should only agree to take part if you want to.

Thank you for reading this.

4. **What is the purpose of the study?**

The purpose of this study is to assess pre-service teachers perceived TPK, their attitude toward ICT integration, and intents to integrate ICT in their future career, and to explore the relationship among perceived TPK and attitude toward and intent to integrate ICT.

5. **Why have I been chosen to take part?**

You have been chosen to take part in some aspect of the study because of your involvement in the teacher education program at senior year. You are a pre-service teacher who is expected to utilize technology in their future instructional practice in regards to their perceived technological pedagogical knowledge and its relationship to your attitudes and intents to integrate the technology in future. It is expected that you took the three compulsory courses on technology: Computer Literacy in Education, E-learning, and Media and Educational Technology. Therefore, owning the skill and the knowledge to integrate ICT in your future practice.

6. **Do I have to take part?**

NO. Your participation is voluntary, and even if you begin participation, you are free to withdraw anytime without explanation or penalty. If you choose not to participate, no data related to you or your work will be used or reported in the research study.

7. **What will happen if I take part?**

The current study will assess pre-service teachers' attitudes toward information and communication technology (ICT) integration in education, perceived Technological Pedagogical Knowledge (TPK), and intents to integrate ICT in their future professional practice and will explore the relationship between perceived (TPK) and attitudes toward the ICT integration as well as the relation relationship between perceived

(TPK) and intent to integrate ICT in future professional practices among pre-service teachers in one of the gulf states countries.

If you choose to take part, some of the data you generate through participation in the TPACK framework questionnaire that will be used to compile an anonymous report/analysis and shared with research supervisors at the University of Liverpool.

All data will be gathered by the researcher prior to October 01, 2014, after which time participation in the study will end and no further data will be gathered, and then you have no commitment to the study. Participants will be given direction on how to fill the questionnaire, and the time needed to fill it is between 20 to 30 min. After two days data will be collected by the researcher colleague in your lectures.

8.   **Expenses and / or payments**

You need to be aware that there will be no expenses or personal payments for the participants in this research now or later.

9.   **Are there any risks in taking part?**

It is not anticipated that you will experience any risks, harm or expenses from participation in this study. Should you experience any discomfort as a result of your participation, please inform the primary researcher immediately.

Tojan Al-sharef (e-mail: tojan.al-sharef@my.ohecampus.com)

10.   **Are there any benefits in taking part?**

There will be no benefits to the participant from their participation in this research

11.   **What if I am unhappy or if there is a problem?**

"If you are unhappy, or if there is a problem, please feel free to let us know by contacting [Baaska Anderson, 001 (940) 580-2295] and we will try to help. If you remain unhappy or have a complaint which you feel you cannot come to us with then you should contact the Research Governance Officer at ethics@liv.ac.uk. When contacting the Research Governance Officer, please provide details of the name or description of the study (so that it can be identified), the researcher(s) involved, and the details of the complaint you wish to make."

12.   **Will my participation be kept confidential?**

The research team will not disclose to any third party that you participated in this study. Any data you generate will be kept anonymous; you will be identified by an ID number, and any information about you will have your name and address removed so that you cannot be recognized from it.

PS: You don't need to provide your name in the questionnaire, but if the happened, the researcher guarantee you that your name will be erased and an ID number will be used instead.

13.   **What will happen to the results of the study?**

Anonymous results will be compiled and reported within the University of Liverpool to fulfil course requirements and might be shared with the college of education at State University in order to improve practice (if needed). Participant data will be made unidentifiable, which means that not only are names removed, but potentially identifying characteristics and demographic information will also be stripped from any shared data.

without explanation. Results up to the period of withdrawal may be used, if you are happy for this to be done. Otherwise you may request that they are destroyed and no further use is made of them.

4.   **What will happen if I want to stop taking part?**

You may withdraw anytime

5.   **Who can I contact if I have further questions?**

Baaska Anderson

APPENDIX H

نموذج معلومات تخص مشروع بحث

1. عنوان الدراسة:

PRE-SERVICE TEACHERS' PERCEPTIONS OF THE BARRIERS TO ICT INTEGRATION
IN THEIR FUTURE INSTRUCTIONAL PRACTICE IN A GULF STATE

.

2. دعوه للمشاركة:

لقد تمت دعوتك للمشاركة في هذه الدراسة البحثية .قبل أن تقرر ما اذا كانت ستشارك، فمن المهم بالنسبة لك أن

تفهم لماذا هذا البحث وماذا سيشمل.
3 لذا يرجى أخذ الوقت الكافي لقراءة المعلومات التالية بعناية، و لا تتردد في طلب المزيد من المعلومات أو شرح أية معلومات لا تفهمها .ونود أن
نؤكد لك انك تستطيع الاعتذار عن قبول هذه الدعوه وعدم المشاركه بالدراسة

4. الهدف من هذه الدراسة:

هو التعرف على اتجاهات ونوايا طلاب التربية بجامعة الكويت نحو دمج تكنولوجيا الاتصاالت والمعلومات بالتدريس .و تقييم ثقة طالب التربية جامعة
الكويت بمعرفته التكنولوجية التربويه .
5. كيف تم إختياري للمشاركه في هذه الدراسة؟
لقد تم اختيارك لهذه الدراسة بسبب كونك طالب سنه رايعه في كلية التربية .ويتوقع انك قد درست المساقات التالية:
أ. الحاسوب في التربية

ب. التعليم الالكتروني   (E-learning)

ت. الوسائط وتكنولوجيا المعلومات   (Media and Educational Technology

6. هل يجب أن أشارك؟

لا مشاركتكم تطوعية، وتستطيع الانسحاب في أي وقت دون أي تفسير .

7. مذا يحدث لو شاركت؟

المعلومات التي سيتم جمعها سيتم عرضها وتحليلها مع المشرفين القائمين على البحث في جامعة ليفربول .وكما سيتم جمع جميع المعلومات قبل شهر
يناير /2015.وبعد ذلك لن تقوم الباحثة بجمع أية معلومات .سيتم جمع المعلومات من قِبل زميل من خلال المحاضرات.
8. المصروفات و /أو المدفوعات:

عليك أن تكون على علم بأنه لن يكون هناك مصاريف أو مدفوعات شخصية للمشاركين في هذا البحث الان أو في وقت لاحق.

9. هناك أي مخاطر في المشاركة؟

وفي حالة وجود أي إزعاج نتيجة مشاركتكم، يرجى إبالغ .ليس من المتوقع أن تواجه أي مخاطر، ضرر أو نفقات من المشاركة في هذه الدراسة
:الباحث الرئيسي

10. هناك أي فوائد في المشاركة؟

لن يكون هناك منافع للمشارك من مشاركتهم في هذا البحث

11. ماذا لو أنا غير سعيد أو إذا كان هناك مشكلة؟

إذا كنت غير سعيد، أو إذا كان هناك مشكلة، لا تتردد في إعالمنا عن طريق الاتصال باسكا اندرسون

12 هل ستحفظ خصوصيتي؟

.قضايا الخصوصية الشخصية ستؤخذ بعين الاعتبار .ولن تذكر أسماء المشاركين في الاستيبان أو مشروع البحث ذاته وانما ستستبدل بحروف
وهمية لا تدل على صاحبها

13 ماذا سيحدث لنتائج الدراسة؟

سيتم تجميع المعلومات في جامعة ليفربول لاستكمال متطلبات الحصول على درجة الدكتوراه. وبالطبع نستطيع مشاكرة النتائج مع كلية التربية في حالة رغبوا في ذلك.

ماذا يحدث لو أردت النسحاب في أي وقت؟

تستطيع الانسحاب في أي وقت أردت من دون ذكر أي تفسير، ويتم سحب المعلومات المتعلقة بك اذا أردت ذلك

15.بمن يمكنني التصال إذا كان لدي المزيد من الاسئلة؟Baaska Anderson

APPENDIX I

Dear Students

I would like to invite you to be part of this important study. Through the questionnaire, I aim to explore your attitudes, confidence, and intents toward the integration of Information and Communication Technology (ICT) in your future instructional practice. The survey consists of three sections. Each section begins with some directions pertaining to that part only. As you begin each section, please answer each question to the best of your knowledge. Your thoughtfulness and candid responses will be greatly appreciated.

Note: The terms technology and ICT are used interchangeable within the current study. Therefore, ICT in this study is referred to the computer related technology software, facilities and features as video cameras, digital still, internet, and communications features

1. *For each statement below, place a cross [X] in the box which represents your own opinion*	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
a) I feel confident in my ability to utilize ICT in my future instructional practice					
b) The use of ICT in teaching leads to better student learning outcomes					
c) ICT can improve my teaching practice					
d) Technology makes the subject more interesting					
e) Technology can help me to learn many new things related to teaching.					
f) My teacher education program provided me with the general knowledge of possible uses of ICT in my future instructional practice					
g) My Teacher education program prepared me to be an effective teacher in the use of ICT in the classroom					
h) The ICT related courses at my college helped me to upgrade my computer and technological skills					

i) My teacher education program prepared me to operate ICT tools without technical support					
j) Education faculty members on the teacher education program modelled effective use of ICT in their teaching.					
k) The teacher mentor on my practicum modelled effective use of ICT in his/her teaching.					
l) My practicum provided me with a valuable experienceto integrate technology in my future instructional practice.					

	YES	NO
2. Do you plan on integrating technology in your future instructional practice? *(Please circle your answer)*		

If you answered YES to Question 2, please answer Question 3.

If you answered NO to Question 2, please go to Question 4.

3. Please tick all the reasons why you answered YES to Question	
I will be required to integrate technology in my teaching practices.	
I enjoy working with technology.	
I am confident in my ability to integrate technology in my teaching practices.	
Technology will make my teaching interesting for my students.	
Technology will make my teaching more effective for my students.	
I am an open-minded teacher for new methods of teaching based on ICT integration.	

If you have any other reason, please add: _____

4.Please tick all the reasons why you answered YES to Question	
I will be not required to integrate technology in my teaching practices.	
I do not enjoy working with technology.	
I am not confident in my ability to integrate technology in my teaching practices.	
Schools are not equipped with technological infrastructure to support effective use of technology in classrooms.	
I do not feel my teacher education program prepared me to utilize ICT in my teaching.	
Using technology in teaching and learning practices wastes time allotted for lessons.	

If you have any other reason, please add: _____

5. What is your gender?   Male   Female

6. How long have you been using computer?
   a. Less than 1 year
   b. 1-3 years
   c. 4-6 years
   d. 7-10 years
   e. Over 10 years

7. How many hours per day d How many hours per day do you spend in roaming the internet? What ICT course you took at the education program

   a. Computer Literacy in Education
   b. E-learning
   c. Media and Educational Technology
   d. Other (Please list here) ……………………………
   e. I have not taken any ICT courses as part of my teacher education program.

8. If you have taken one or more of the ICT courses listed above, where did these courses take place?

   a. Lecture room
   b. Computer Lab
   c. Both

9. What was the main focus of the ICT related course you have undertaken at the education department?

   a. General skills in using computer
   b. Practical training on utilizing ICT in my future instructional practice
   a. Using Microsoft Office (word and spreadsheet) to record students grades and preparing lessons. d. All of the above.

10.   Did you take the practicum?   Yes   No

If yes, then
   a) I used traditional teaching methods in the practicum
   b. I utilized technology in my instructional practice during the practicum period

APPENDIX J

الطالبة ؛؛؛/ الطالب

يسرني دعوتك للمشاركة في هذه الدراسة من خلال الاجابة على أسئلة الاستبيان الخاص بالبحث. كما اود ان أوضح لك أن جميع المعلومات المستخلصة من الاستبيان أغراض البحث العلمي فقط، ولن يطلع عليها سوى الباحثة والمشرفين، وسوف يتم تخزينها لمدة لا تقل عن خمس سنوات حسب قوانين جامعة ليفربول، فبرجاء الإجابة على جميع الاسئلة وذلك باتباع التعليمات التي تخص كل جزء.

تشكر الباحثة حسن تعاونكم ؛؛

اسئلة الاستبيان

الجزء الأول:
أجب عن جميع الأسئلة وذلك بوضع علامة (√) في المربع المناسب والذي يمثل أفضل تعبير عن اجابتك.
تنبيه: مصطلح (**التكنولوجيا**) يقصد به في الاستبيان: تكنولوجيا الاتصالات والمعلومات والتعامل مع الحاسب الآلي والبرمجيات والانترنت والوسائل التعليمية التكنولوجية، وكاميرا الفيديو والصور الفوتوغرافية.

لا اوافق بشده	لا اوافق	محايد	اوافق	اوافق بشده	التساؤلات	
					أثق من استخدامي للتكنولوجيا بمهنتي كمعلم في المستقبل	1.
					إن استخدام التكنولوجيا في التدريس يؤدي إلى رفع مستوى التحصيل لدى الدارسين	2.
					استخدامي التكنولوجيا سوف يحسن من أدائي كمعلم في المستقبل	3.
					من خلال استخدام التكنولوجيا بالتدريس، تصبح المادة التعليمية أكثر تشويقاً	4.
					تساعدني التكنولوجيا على تعلم كل ما هو جديد بمجال تخصصي .	5.
					تسهم مقررات برامج كلية التربية في تزويدي بالمعلومات العامة التي تساعدني على استخدام التكنولوجيا في ممارساتي	6.
					يعمل برنامج كلية التربية بالجامعة على إعدادي لاستخدام التكنولوجيا في التدريس بالمستقبل بفاعلية	7.
					تعمل مقررات تكنولوجيا الحاسوب في الكلية على تحسين مهارات الطلبة الحاسوبية والتكنولوجية	8.
					تعمل برامج كلية التربية بالجامعة على تجهيز الطلبة على التعامل مع التكنولوجيا دون الحاجة لمساعدة فني متخصص	9.
					أعضاء هيئة التدريس الحاليون ببرنامج كلية التربية يستخدمون التكنولوجيا في تدريسهم و بفاعلية	10.
					بالتدريب الميداني في مرحلة إعدادي كمعلم، شاهدت حصصا تعتمد دمج التكنولوجيا بالتدريس	11.
					التدريب الميداني بفترة إعداد المعلم يزود الطالب بتجربة قيمة لدمج التكنولوجيا بالتدريس عمليا	12.

الجزء الثاني:
أجب عن السؤال التالي

	لا	نعم	هل تنوى استخدام التكنولوجيا في التدريس من خلال مهنتك كمعلم مستقبلا

اذا كان جوابك (نعم) للسؤال السابق ، فبرجاء الاجابة على أسئلة المجموعة (أ) اذا كان جوابك لا) للسؤال السابق ، فبرجاء الاجابة على أسئلة المجموعة (ب)وذلك بوضع عالمة(√) في المربع المناسب والذي يمثل سبب إجابتك

أسئلة المجموعة (أ)

لا	نعم	التساؤلات	
		تتطلب مهنة التعليم مستقبلا دمج التكنولوجيا بالتدريس	**1.**
		استمتع حين استخدم التكنولوجيا بالتدريس	**2.**
		اثق بقدرتي على دمج التكنولوجيا بالتدريس مستقبلا	**3.**
		استخدامي للتكنولوجيا بمهنتي كمعلم مستقبلا يجعل التعليم أكثر تشويقاً للطلبة	**4.**
		استخدامي للتكنولوجيا بالتدريس يجعل التعليم أكثر فاعلية للطلبة	**5.**
		تطلع لمعرفة طرق تدريس جديده تعتمد دمج التكنولوجيا في التعليم	**6.**

اذا كان لديك أي سبب اخر يجعلك تحبذ استخدام ودمج التكنولوجيا بالتدريس مستقبلا ولم يذكر ، الرجاء ذكره هنا
....
....

أسئلة المجموعة (ب)

لا	نعم	التساؤلات	
		لا تتطلب مهنة التعليم مستقبلا دمج التكنولوجيا بالتدريس	**1.**
		لا استمتع حين استخدم التكنولوجيا بالتدريس	**2.**
		لا اثق بقدرتي على دمج التكنولوجيا بالتدريس مستقبلا	**3.**
		التكنولوجيا لدعم المدارس غير مجهزه ببنية تكنولوجيه استخدام تكنولوجيا بالتدريس	**4.**
		لم استفيد من مقررات برنامج كلية التربية في الجامعة لكيفية استخدام تكنولوجيا في التدريس	**5.**
		إن استخدام التكنولوجيا بالتدريس يضيع الوقت المخصص للدرس	**6.**

اذا كان لديك أي سبب اخر يجعلك لا تحبذ استخدام ودمج التكنولوجيا بالتدريس مستقبلا ولم يذكر ، الرجاء ذكره هنا
....
....

الجزء الثالث

أجب عن الأسئلة التالية :
1- ما هو جنسك؟
ذكر أنثى
2- منذ متى وانت تستخدم الحاسوب؟

أقل من سنة 1 – 3سنوات 4 – 6سنوات 7 – 10سنوات أكثر من عشر سنوات

3- كم من الوقت بالساعة تقضي يوميا تستخدم النت؟ ....

4- ما المقررات التكنولوجية التي درستها في برنامج التربية بفترة إعدادك كمعلم؟
أ. الحاسوب في التربية
ب. التعليم الإلكتروني (E-learning).
ت. الوسائط وتكنولوجيا المعلومات Media and Educational Technology
ث. مقررات أخرى (الرجاء اضافتها هنا) ....
ج. لم أدرس أي مقرر يتعلق بالتكنولوجيا في التدريس من خلال برنامج التربية حتى ا لان

5- في اي مكان كانت تعقد محاضرات هذة المقررات ؟
أ. في مدرجات غير مجهزة تكنولوجياً . ب. في مختبر الحاسوب .
ت. جميع ما سبق .

6- بيما اهتمت هذه المقررات ؟
أ. معلومات عامه عن الحاسوب .
ب. تدريب عملي على استخدام التكنولوجيا بالتدريس مستقبلا .

ت. تدريب على برنامج الكتابة (Word)لستخدامه عند التحضير الدفتري

ث. جميع ما سبق .

7- هل قمت بالتدريب الميداني (التربية العملية)؟

نعم لا

اذا كان

التساؤلات	نعم	لا	جوابك نعم :
لقد قمت بالتدريس بالطريقة التقليدية بدون الاستعانة بوسائط تكنولوجية			
لقد استخدمت التكنولوجيا في التدريس بالتدريب الميداني في حدود معرفتي			

APPENDIX K

Definition of Terms

Pre-service teacher: This terminology refers to a student in an education department at tertiary institution who seeks to complete his/her teaching qualifications (knowledge and training) under the supervision of qualified mentor (Australian Capital Territory, 2009).

*Attitudes***:** Attitudes structure in general is composed of three components are: behavior, feelings and cognition (Hogg & Vaughan, 2005).

- Cognitive component is the thinking component; pre-service teachers beliefs that the technology integration in their future instructional practice is beneficial.

- Affective is the feeling component; pre-service teachers emotional feelings that stimulated from their experience with the technology.

- Behavior is an intent component; pre-service teachers are ready to take an action as utilizing the technology in their future instructional practice (Fazio & Roskos- Ewoldsen, 2005), it is hard to measure but tied to behavior.

*Information and communication technology***:** The terms technology and ICT are used interchangeable within the current study. Therefore, ICT in this study is referred to the computer related technology software, facilities and features as video cameras, digital still, internet, and communications features (Ministry of Education, 1998; Kalanda, 2005).

Intentions: Intentions are determined by attitudes, subjective norm, and perceived behavioral control; the more preferred "the attitudes and the subjective norm with respect to behavior, the more perceived behavioral control, then the stronger

should be a person intentions to perform the behavior" (Pierce & Ball, 2009, p.300).

- Attitudes toward behavior refers to the degree to which an individual prefer or not the behavior.

- "Subjective norm refers to the perceived social pressure to perform or not to the behavior" (Pierce and Ball, 2009, 300).

- "Perceived behavioral control refers to the perceived ease or difficulty of performing the behavior" (Pierce and Ball, 2009, p.300).

Technological Pedagogical Knowledge (TPK): This terminology refers to understanding how learning and teaching can vary when specific technologies are used in specific methods. And this can be built by setting all the efforts to understand the technology affordance, constraints, disciplinary context from teachers behalf (Koehler, & Mishra, 2009). Or it is referred to the "technological pedagogical knowledge (TPK) is knowledge of the existence, components, and capabilities of various technologies as they are used in teaching and learning settings, and conversely, knowing how teaching might change as the result of using particular technologies" (Mishra & Koehler, 2006, p. 1028).

APPENDIX L

Participants' confidence, attitudes, and assessment of teacher education program and practicum

Conf	I feel confident in my ability to utilize ICT in my future instructional practice
Att1	The use of ICT in teaching leads to better student learning outcomes
Att2	ICT can improve my teaching practice
Att3	Technology makes the subject more interesting
Att4	Technology can help me to learn many new things related to teaching
My Teacher Education program prepared me	
Edu1	with the general knowledge of possible uses of ICT in my future instructional practice
Edu2	to be an effective teacher in the use of ICT in the classroom
Edu3	to operate ICT tools without technical support
Edu4	to upgrade my computer and technological skills through the ICT related courses
Edu5	to integrate ICT in my future instructional practice through modelling of ICT by the Education faculty members.
In practicum,	
Prac1	the teacher mentor modelled effective use of ICT in his/her teaching
Prac 2	I have been provided with a valuable experience to integrate technology in my future instructional practice

Note. Measured on a 5-point scale (1=*Strongly disagree, 2= Disagree, 3=Neutral, 4=Agree, 5= Strongly agree).

Con= Confidence. Att=Attitudes.
Edu= Teacher education program.
Prac= Practicum

APPENDIX M

Participants' background characteristics

Participants' background characteristics (N=421) Group	n	%
Gender		
Female	325	77.2
Male	96	22.8
Practicum		
Yes	297	70.5
No	24	29.5
Computer Usage		
Less than one year	189	44.9
1-3 years	18	4.3
4-6 years	32	7.6
7-10 years	56	13.3
More than 10years	126	29.9
ICT courses taken		
Computer Literacy in Education (1)	267	63.4
E-Learning (2)	88	21
Media and Educational Technology (3)	27	6.4
Not taken any	39	9.2
Focus of ICT Courses		
General skills in using computer	260	61.8
Practical training to integrate ICT into teaching	17	4
Using Microsoft Office to prepare lessons All	108	25.7
All	36	8.6
Course Setting		
Lecture room	53	12.6

	Computer lab	277	68.8
	Both	91	21.6
Intentions			
	Yes	193	45.8
	No	228	54.2
Using net per day	1h	30	7.1
	2h	103	24.5
	3h	71	16.9
	4h	65	15.4
	5h	27	6.4
	6h	41	9.7
	7h	6	1.4
	8h	13	3.1
	10h	14	3.3
	12h	8	1.9
	13h	1	0.2
	15h	8	1.9
	17h	1	0.2
	18h	3	0.7
	20h	11	2.6
	21h	2	0.5
	22h	1	0.2
	24h	16	3.8