Investigating Perceptions of Pre-Service Teachers and Instructors About TPACK Capabilities of Pre-Service Teachers: An Explanatory Study Among Selected UAE Universities

آراء مدرسي ما قبل الخدمة وأساتذتهم حول قدرات نموذج المعرفة التكنولوجية (تباك) لمدرسي ما قبل الخدمة: دراسة توضيحية لعينة منتقاه في جامعات الإمارات العربية المتحدة

by

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A thesis submitted in fulfilment

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Investigating Perceptions of Pre-Service Teachers and Instructors in UAE Universities About TPACK Capabilities of Pre-Service Teachers: An Explanatory Study

التحقيق في وجهات نظر المعلمين قبل الخدمة و اساتذتهم عن قدرات نموذج المعرفة التكنولوجية " التباك " للمعلمين ما قبل الخدمة : دراسه توضيحية من عينة منتقاة من الجامعات الموجودة في دولة الامارات العربية المتحدة

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ABSTRACT IN ENGLISH

This explanatory mixed-method study aimed at understanding UAE pre-service teachers' perspectives on their preparedness to use technology for future classroom practices, as well as their instructors' perspectives on pre-service teachers' preparedness to use technology for future classroom practices. This study also looks into the pre-service teachers and instructors' suggestions for future action plan to maximize the preparedness and the factors that they believed influenced the acquisition of knowledge and skills regarding technology integration in the classroom. In addition, the study explores research questions that will both address technology readiness and its affecting factors, for which the Technological Pedagogical and Content Knowledge (TPACK) model was used as a framework to reflect on the technology integration skills of pre-service teacher.

The study was conducted in three selective universities in the UAE, where the quantitative data was obtained from a modified survey that was based on Schmidt et al.'s (2009) TPACK survey. A total of 500 surveys were distributed in the three participating universities. Out of these, 359 surveys returned which results in a response rate of 72%. The qualitative data was obtained from interviews with 12 pre-service teachers and 6 instructors.

This study used descriptive analysis for the survey and thematic analysis for the interviews to understand the pre-service teachers' and their instructors' perspectives of TPACK. In addition, thematic analysis was used for suggestions and recommendations. Furthermore, to know the factors that influenced the acquisition of knowledge and skills regarding ICT integration in the classroom, independent samples t-test and One-way between groups ANOVA analysis were conducted.

The analysis showed that in general, pre-service teachers are confident when it comes to their TPACK capabilities. With the highest mean score of M = 4.12 for Content Knowledge and the lowest mean score of M = 3.68 for Models of TPACK. Moreover, results indicated that the most significant factor that influenced the acquisition of knowledge and skills regarding ICT integration in the classroom was practical experiences in schools.

However, the analyses of the interviews of both pre-service teachers and instructors showed that there were some challenges and points for improvement to be considered.

ABSTRACT IN ARABIC

التحقيق في وجهات نظر المعلمين قبل الخدمة و اساتذتهم عن قدرات " التباك "
للمعلمين ما قبل الخدمة : دراسه توضيحية من عينة منتقاة من الجامعات الموجودة في دولة الامارات
العربية المتحدة

الملخص

تهدف هذه الدراسة التوضيحية ذات النمط المختلط إلى فهم اراء و وجهات نظر معلمي ما قبل الخدمة في دولة الامارات العربية المتحدة حول استخدام التكنولوجيا لممارسات الفصول الدراسية ، فضلا عن وجهات نظر اساتذة الجامعة عن معلمين ما قبل الخدمة حول استعدادهم لاستخدام تكنولوجيا المستقبل و الممارسات الصفية، إلى جانب ذلك تبحث الدراسة عن مقترحات المعلمين وأساتذة الجامعة لخطة عمل مستقبلية لتحقيق أكبر قدر من التأهب والاستعداد للعوامل التي تأثرت بها في اكتساب المعرفة المهارات المتعلقة في تكامل التكنولوجيا في الفصل الدراسي.، بالإضافة إلى ذلك فإن الدراسة ستعالج كلا من الاستعداد التكنولوجي والعوامل المؤثرة . و قد تم استخدام نموذج المعرفة التكنولوجية " تباك " كإطار للتأمل في مهارات التكامل التكنولوجي لمعلمي ما قبل الخدمة .

اجريت هذه الدراسة على ثلاث جامعات اماراتية منتقاة حيث تم الحصول على كمية البيانات من مسح معدّل "مسح تباك" المطور من قبل شميدت وآخرون في عام 2009.

تم توزيع عدد 500 استبانه بين الجامعات الثلاثة المشاركة ، عادت 359 استبانه تقريبا ما يعادل 72% تجاوبهم مع الدراسة إلى جانب مقابلة 12 معلما ما قبل الخدمة و6 من اساتذة الجامعة .

استخدمت هذه الدراسة التحليل الوصفي للدراسة الاستقصائية ، والتحليل الموضعي للمقابلات لفهم وجهات نظر معلمي ما قبل الخدمة و أساتذة الجامعة في " تباك " ، بالإضافة إلى ذلك تم استخدام التحليل الموضعي للإقتراحات و التوصيات. علاوة على ذلك لمعرفة العوامل التي أدت إلى اكتساب المعرفة والمهارات فيما يتعلق بتكنولوجيا المستقبلية والاتصالات في الفصل الدراسي فقد تم استخدام إختبار "تي -تيست " المستقل و طريقة واحدة بين المجموعات اجري تحليل " انوفا " .

أظهر التحليل أن معلمي ما قبل الخدمة واثقين بشكل عام عندما يتعلق الأمر بقدرات " تباك " الخاصة بهم . أعلى متوسط نقاط M= 4.12 و أدنى متوسط نقاط M= 3.68 وذلك لنماذج " تباك ".

وعلاوة على ذلك ، أشارت النتائج أن العامل الأكثر أهمية والذي أثر على اكتساب المعرفة والمهارات فيما يتعلق بتكامل تكنولوجيا المعلومات والاتصالات في الفصول الدراسية كان من خلال الخبرات العملية في المدراس . وقد أظهرت تحليلات المقابلات بين معلمي و معلمي ما قبل الخدمة إلى بعض التحديات و نقاط التحسين.

DEDICATION

I dedicate this work to my husband Ismail Murad and my four children Faisal, Adil, Mohammed and Alia for their continuous support, encouragement and love. Without them this thesis would have not happened. Also, my deepest gratitude and appreciation goes to my teachers, family and colleagues for their time and effort to assist me with my responsibilities.

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To acknowledge everyone who supported me in this journey will consume pages given the complexity, time consuming and multi-faceted of writing a doctoral thesis. However, I hope I give my appreciation to everyone involved and hope that the ones I forget will forgive.

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Table of Contents

List of Figures

List of Tables

List of Acronyms

Acronym	Definition
CK	Content Knowledge
EVAM	Value Theory of Achievement Motivation
ICT	Information and communication technology
ITU	International Telecommunication Union
NRI	Network Readiness Index
PK	Pedagogical Knowledge
PCK	Pedagogical Content Knowledge
SAMR	Substitution Augmentation Modification Redefinition
TAM	Technology Acceptance Model
TK	Technology Knowledge
TCK	Technological Content Knowledge
TPACK	Technological Pedagogical and Content Knowledge
TTAP	The Teacher Thoughts and Action Process Model
TPB	The Theory of Planned Behaviour
UTAUT	The Unified Theory of Acceptance and Use of Technology
UAE	United Arab Emirates

CHAPTER ONE: INTRODUCTION

1.1 Overview of the Chapter

Chapter one provides an introduction to this thesis, discussing the background and the motivation to the study. The statement of the problem is presented with the support of relevant literature. Then, the aim and objectives of this study are discussed and the related research questions. The relevance and the importance of the study are highlighted in the rationale of the study, followed by the structure of the dissertation at the end of this chapter.

1.2 Background and motivation to the study

The world has faced many changes in the past years due to the increased influence of highly paced advancements in technology (Weiser 2015). It is essential for a society to understand the importance of the advancement in technology and also to recognize the impact that these advancements can have over people's lives (Dalloway et al., 2014). In this regard, one of the most commonly observed and most widely spread impact of the technological advancement on the lives of the people in the world is the globalization and the conversion of the world into a global village, where every other person is connected to each other in different ways while having different communication means (Weiser 2015). Technology is an indispensable part of the contemporary world; in fact, culture and society have to be adjusted to meet the challenges of the knowledge age. The pervasiveness of technology has brought about rapid social, political, and economic transformation (Yusuf 2005). It comes without saying that information and communication technology (ICT) has massively changed our lives to another form of life in itself. It has swept all aspects of human's existence, where the different concepts of technology, its purposes and practices, are all mixed up. International Telecommunication Union (ITU) (2017) reports that 70% of world's youth are online, and that mobile-broadband subscriptions have grown more than 20% annually in the last five years and reached 4.3 billion globally by end 2017. In addition, International Internet bandwidth grew worldwide by 32% between 2015 and 2016.

Like many other countries, the Arab countries rank ICTs as a high priority within their development's objectives. They are an essential element in education, communication, and technology transfer (Hallouda & Ghonaimy 1998). With a major focus on the development of the required infrastructure, the Arab region is catching up on the spread of ICT. Understanding the importance of ICT and the major investments in its development has lead the United Arab Emirates (UAE) into delivering impressive results in the Network Readiness Index (NRI) of the Global Information Technology Report 2010-2011 (Dutta & Mia 2011). The UAE ranked at the top of the list, with a worldwide ranking of 24th. Likewise, the UAE is one of the most technologically sophisticated countries in the Middle East. At the heart of the growing information technology market, the UAE IT sector grew from USD 6.9 billion in 2003, USD 9.5 billion in 2005, to more than USD 11.4 billion in 2008 (ESCWA 2011).

To understand the high impact of this worldwide shift towards technology use in all aspects of daily life, it is worth noting what some international agencies say about it. For instance, ITU - the United Nations specialized agency for information and communication technologies - reasons that ICT not only has the ability to advance various government services but also to reinforce democracy. Numerous countries establish their national e-strategies to make ICT an enabler for democracy. Online participation is one way to use ICT to allow participation in democratic processes. Countries that have gone through such a process are Malta, Lithuania, Finland, Iceland and Estonia. However, the report argues that the processes of policy formulation, implementation and adjustment are often long and time-consuming. This disparity makes it difficult for technologies, which can drive economic and social development, to be implemented legally. Moreover, World Bank (2008) believes that computer technology is becoming central to human progress and development. It is responsible for much of the economic and social progress of the past few centuries, as it is very well known that a Knowledge-based Economy is linked to ICT (Bereiter 2002). Karsenti (2016) states that at the 2003 World Summit on the Information Society, Kofi Anan declared that technology advancement can push us to improve the life of millions of people through economic, societal and educational progress.

Likewise, education has evolved by the fast progresses in the use of ICT over the years which impacts different areas of education. It is moving towards meeting the bigger diversity of student needs, increasing flexibility of deliverables, consolidating the capacity for

integrating study with work and leisure through work-based and home-based learning, and developing approaches to individualized support for planning and recording accomplishments.

A new generation of learners is growing up with technology and is skilful in a technological world. As their education needs are different from older generations, old concepts of teaching and learning are not relevant any more. The traditional ‘chalk and talk’ approach of teaching and learning will leave the hi-tech learners bored and unsatisfied with their educational involvement. Consequently, two emergent themes serve as the driving force for integrating technology into K-12 environments: preparing students for the workforce and increasing student knowledge and skills (Lowther, Inan, Strahl & Ross 2008).

Countries around the globe have embarked on investing in educational technologies. For instance, all European countries have invested in technology integration in schools, such as Denmark, which invested 43 million euros over a period of four years in their national ICT project. The UK has spent an amount of 34 million pounds over a four-year period involving 28 schools for the so-called ICT test bed project, whereby high levels of investment were made in 30 schools and colleges in areas of socio-economic deprivation (Balanskat, Blamire & Kefala 2006).

Despite these clear gestures of willingness to invest in the educational technology development of the countries, the fact is that teachers carry the highest responsibilities when it comes to integrating technology in the classroom. Fullan, a renowned expert in change theory, stated that “educational change depends on what teachers do and think—it’s as simple and complex as that” (Fullan 1982, p. 107). Therefore, essential skills and the level of future teachers’ proficiency are main aspects in adopting up-to-date pedagogies that involve ICT in classrooms. As Hu and his colleagues stated: "Teachers have lasting impact on students' intellectual developments, value systems, and attitudinal beliefs, including those concerning technology" (Hu, Clark & Ma 2003, p. 228).

Yet, it seems, teachers are often overlooked when technology is discussed. Before technology can effect changes in the classroom, those who are ultimately responsible for the classroom must be considered. Teachers must learn to use technology and must allow it to change their present teaching paradigm in order to promote lifelong learners for the 21st

century (Bitner & Bitner 2002). Developing new skills and competencies will ensure continuous development and advancement in pedagogy and its effective implementation. Hence, an important aspect of teachers' professional knowledge regarding technology use is to know whether and how the technology applications they select are essential, or at least supportive, for realizing the goals in a particular learning activity. This deeper knowledge and insight is demonstrated in the (technology-rich) learning activities that teachers develop. Based on their professional knowledge, teachers develop learning activities that are oriented more toward either transfer or construction of knowledge (Ertmer & Ottenbreit-Leftwich 2010; Tondeur, Hermans, Van Braak, & Valcke 2008; Niederhauser & Stoddart 2001). Research shows that it is not the isolated learning activity that affects learning, but the way the teacher structures learning activities in a learning environment (Lai 2008; Voogt 2008). Learning environments that incorporate technology can be characterized by: the role of technology, curriculum characteristics, class organization, teacher and student roles, control of the learning activity, and organization of assessment and feedback (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur 2012; Kozma 2003; Lai 2008; Voogt 2008).

When shaping teachers into agents that are able to constructively use technology in the classrooms, the accountability starts at the base of a teachers' career: the universities that offer teacher education. University programs that offer teacher education should facilitate learning events, design and develop learning experiences and assessments fit for the digital age, model 21st century learning, promote digital citizenship, and engage in ongoing professional development and leadership of technology use (ISTE 2015; Kennisnet 2012; Tondeur et al., 2012; UNESCO 2006). Finger, Jamieson-Proctor and Albion (2010, p. 114) argue that: "Since the emergence of computers in schools during the 1980's, there have been considerable developments by education systems and schools to develop policies and expectations for the use of information and communication technologies (ICT) to enhance learning and teaching. These have not always translated into practice, which has resulted in a focus on the need for improvements in pre-service teacher education programs and professional development of practicing teachers". Also, Teo (2008, p. 2) states that: "In achieving excellence in schools, it is important to ensure that teachers are able to integrate technology into the curriculum. As such, the groundwork must be laid at the trainee or pre-service teacher's level. To do otherwise is to produce future teachers with underdeveloped skills in the use of technology". In view of that, universities that offer teacher education play

an important role in preparing future teachers to become capable in the integration of ICT into teaching and learning (Goktas, Yildirim & Yildirim 2009).

Research shows that a key factor affecting new teachers' adoption of technology is the quantity and quality of pre-service technology experiences included in their teacher education programs (Agyei & Voogt 2011; Drent & Meelissen 2008). Pre-service teachers should be provided with the tools and experiences that will be useful for the regular activities in their prospective profession: classroom instruction, research, and problem-solving. Using technology enables pre-service teachers to arrange their environment and adjust their instructional strategies (Zhang & Espinosa 1997). They are compelled to respond to a society driven by technology and to seize the opportunities it creates for education (Chien et al., 2012; Kaufman 2015). It is very well accepted that teachers need to be empowered and prepared to take up new roles and teach effectively to meet the new expectations of the 'digital natives'. Educational reform in ICT is a fundamental interest to policy makers, teacher educators, and professional development providers.

Previous research has demonstrated the numerous benefits of integrating ICT in teaching methodologies. For instance, students' motivation increased, their curiosity was found to be satisfied, they learn better and accomplishing numerous improved learning outcomes when technology is integrated into the curriculum (Hinson 2005; ChanLin et al. 2006). These outcomes are aligned with the findings of Schofield & Davidson (2003) whose study showed that students became more self-directed learners and gained more control over content when technology was used. Additionally, using technological tools in the classrooms offers great opportunities to join students' passion for technology with exciting and innovative teaching and learning methods (Tinio 2003).

Zheng, et al., 2015 described how the use of web-based collaboration tools such as wikis can help students develop skills in research, problem-solving, critical thinking, and knowledge management. Moreover, integrating technological tools in the classroom has been recognized to better prepare the current generation of students for a workplace where variety of technologies are becoming more ubiquitous. Skills and abilities that 21st century learners are expected to acquire in order to compete in an increasingly globalizing job market are called '21st Century Skills'. These skills include digital age literacy (consisting of functional

literacy, visual literacy, scientific literacy, technological literacy, information literacy, cultural literacy, and global awareness), inventive thinking, higher-order thinking and sound reasoning, effective communication, and high productivity (Lemke 2002). The potential of ICTs to promote the acquisition of these skills is tied to its use as a tool for raising educational quality, including promoting the shift to a learner-centred environment.

Not only for students, but also for teachers, technology integration creates various opportunities and benefits. For instance, it helps teachers perform their tasks better and makes it easier to transfer the lesson materials and knowledge to students. Sicilia (2006) explored the effects of technology on teachers' experiences, and defined various benefits, such as sharing of information, facilitating the communication between teachers and students, teachers and parents, and between teachers themselves, monitoring students' academic performance and editing documentations. Moreover, activating prior knowledge, as well as acquiring, using and understanding new knowledge was mentioned as an advantage for the teachers. Teachers see how their materials are clearer and more interesting visually for students because of editing features. They can access creative programs on the web on various subjects which they can incorporate in their lesson plan (Sicilia 2006).

As described above, the world is changing whereby technology is playing a bigger role and will continue to grow its significance in daily life. Students' education will be shaped by the use of educational tools, designed to support the learning progress to its best potential. Schools are increasingly provided with technology tools, and therefore teachers need to be equipped with the right skills and knowledge to effectively integrate the technology in their teaching (Al-Weher & Abu-Jaber, 2007). However, several studies have shown that pre-service teachers are not ready to use ICT in education and to effectively integrate ICT into classroom activities (Tondeur, et al., 2012). To make an improvement in this field possible, it is important to first create more understanding of the perspectives of the pre-service teachers themselves on their abilities to integrate technology in the classroom, and what changes are needed to improve the quality of education they receive. Therefore, the researcher of this study has chosen to explore this topic, hoping this to be a first step towards more research in the UAE with the aim to create a high-quality education system, preparing its students to be the best possible teachers of the future.

1.3 Statement of the Problem

Even though the importance of technology integration in the classroom has become common knowledge in the last years, research shows that in-service teachers have been using ICT infrequently and when used, it is for information transmission rather than the facilitation of students' knowledge construction (Gao, Choy, Wong, & Wu 2009; Harris, Mishra, & Koehler 2009; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer 2010; Sang et al. 2010). Additionally, several studies suggest that only a small number of pre-service and beginning teachers are able to use technology in diverse and flexible ways (Tondeur et al., 2012; Bate 2010; Gao, Wong, Choy & Wu 2011). A gap seems to exist between what pre-service teachers are taught in their courses and how teachers use technology in a real classroom (Ottenbreit-Leftwich, Glazewski, Newby & Ertmer 2010; Hare, Howard & Pope 2002). Research continues to reveal that beginning teachers feel they are not well-prepared to effectively use technology in their classrooms (e.g., Sang et al., 2010; Tearle & Golder 2008). From these studies, a conclusion could be drawn that teacher training programs should emphasize on making the connection between theory and practice. Zhang & Espinoza (1998) and Lam (2000) discussed how a teachers' higher degree of technology self-efficacy could lead to integrating more technology in their classrooms. A similar finding was reported by a study conducted by ChanLin et al. (2006), stated that the participating teachers who used ICT on a frequent base, showed knowledge and competency in using computer for instructional purposes.

Besides the quality of the pre-service teacher training programs, another factor that influences the pre-service teachers' technology use is the attitude towards ICT and its implementation in the classroom. Zhao, Tan and Mishra (2001) and Khine (2001) found that the attitudes of teachers are directly related to computer use in the classroom. As Teo (2008, p. 413) states: "The success of student learning with computer technology will depend largely on the attitudes of teachers, and their willingness to embrace the technology".

In their study Yang & Huang (2008) argued that although teachers had a positive attitude towards the utilization of technology in instruction, they faced several barriers that made integration quite challenging to implement. In several studies barriers were highlighted, such as lack of appropriate training workshops, lack of personal guidance and consultancy, lack

of suitable instructional software, and hardware and time constraints (Beckwith 2001; Guha 2001; Smith 2001; Butler & Sellbom 2002; Yang & Huang 2008; Al-Senaidi, Lin & Poirot 2009). The most frequently and important barrier acknowledged by teachers was 'lack of time needed for preparation and implementation of technology'. ChanLin et al. (2006) stated that teachers indicated that the integration of technology in their classes was consuming much more time and effort than doing regular teaching without technology. Many teachers indicated that they can utilize technology more efficiently if time is taken into account when scheduling their teaching loads (Ismail, Almekhlafi & Al-Mekhlafy 2010). In their study, Ismail, Almekhlafi and Al-Mekhlafy (2010) described how the participating teachers considered having an incentive such as free or discounted computers, positive evaluations, release time, or salary increment as very critical for successful technology integration in teaching.

Recently there have been numerous calls that have stated that in order to help pre-service teachers prepare themselves for effective technology integration, teacher education programs need to help them to build knowledge of good pedagogical practices, technological skills, and content knowledge, as well as how these concepts relate and interact with one another (Koehler & Mishra 2009). Therefore, Koehler and Mishra (2009) argued that these programs should not only focus on how to use technology but also how technology intersects with pedagogical and content knowledge, as directed by the concept of Technological Pedagogical Content Knowledge (TPACK).

A number of the studies stated the need for developing TPACK of teachers, for instance, Kirikçilar and Yildiz's (2018) study about middle school mathematics teachers' utilizations of the TPACK when designing classroom activities, which they prepared by using the GeoGebra software, were investigated indicated that teachers had difficulty integrating their pedagogical knowledge into the technology throughout the activity design processes and had deficiencies in terms of the TPACK. In addition, Patahuddin, et al. (2016) asserts in his study the need for thoughtful planning prior to using web-based resources and the importance to utilise critical events in developing and assessing teachers' TPACK. Also, Debbagh and Jones (2018) examined the instructional strategies of four English as a second language (ESL) teachers and their rationales for incorporating technology. Their findings suggested that teachers' pedagogical approaches determined the extent to which technology was used

in class. Furthermore, Kontkanen, et al. (2017) study that focused on Finnish students' experiences of using personal iPads in their studies through 3 years of upper secondary schooling, showed that teachers' TPACK is generally resistant to change and students' proto-TPACK is insufficiently developed to initiate change. Finally, Tondeur, et al. (2017) study aimed to identify profiles of pre-service teachers in order to explore their readiness to integrate technology in education. His analysis suggested that TPACK and other individual ICT-related characteristics are positively correlated, and pre-service teachers in a profile with strong TPACK, attitudes, and self-efficacy scores report high scores on the support they perceive at their teacher training institution. The study discussed implications for the role of teacher training institutions with a specific focus on how to close the gap between the two identified profiles.

In line with the underlying ideas of TPACK, pre-service teachers need to be educated on how to 'fit' pedagogy, content and technology. Britten and Cassady (2005) argued that a significant feature of this fit also relates to the necessity of understanding how specific technologies can be used to realize specific learning goals. Additionally, for an effective teacher training program that shapes teachers who are successful in technology integration, technology should be infused into the entire curriculum (Tondeur et al. 2014). Without such integrated methodologies, the capabilities that pre-services teachers will acquire during the teacher training program are likely to remain isolated and unexploited according to Polly et al. (2010).

The potentially positive outcomes of integrating technology into education have convinced a number of countries (including the UAE) to embark on the use of the internet and information technology in their educational systems in order to produce workforces that are educated, skilled in new technologies and able to face global challenges (Miner 2004; Almekhlafi 2006; Levin & Wadmany 2006). In the beginning of the 21st century, the UAE took several initiatives to reform its curriculum in schools as a response to the UAE 2021 vision and mission. The main purpose of the UAE 2021 plan for education is to be competing with the best countries in the world with a first-rate education system and progressive national curriculum (MOE 2017). With an eye on the UAE 2021 vision and mission, gaining more insight into the current status of the pre-service teachers' TPACK capabilities could be

of great importance for defining optimized strategies to further increase the technology integration in UAE classrooms.

Despite the rapid growth of technology integration into the classrooms, the studies in the UAE related to technology integration in teacher education programs are minimal. The ones that were reviewed indicated that there has been an increasing awareness among UAE researchers to understand different topics associated with the use of technology in UAE schools and higher education institutes in general (Serhan 2007; Al-Awidi & Alghazo 2012; Almekhlafi & Almeqdadi 2010; Tubaishat & Bhatti 2006; Ismail, Al-Awidi & Almekhlafi 2012, Al-Mekhlafi 2010; Sallam & Alzouebi 2014; Tamim 2013; Parahoo & Tamim 2012). However, studies related to pre-service education teachers' capabilities and preparedness to integrate ICT in education in particular were not identified. One of the few studies found that narrowly addressed this issue was the study from Almekhlafi and Almeqdadi (2010) who aimed to create understanding of teachers' perceptions of ICT integration in the UAE school classrooms. Their results showed that teachers integrate technology in their classes with different extents and values. To gain more knowledge and insight, this study will be investigating the UAE pre-service teachers' perspective on their preparedness and capabilities to integrate ICT into classroom practices after graduating. The strive is to provide practical and theoretical implications for researchers, teacher educators, policy makers, and administrators.

1.4 Aim and Objectives

The aim of the current study is to understand the perspective of the pre-service teachers' TPACK capabilities within the context of the United Arab Emirates (UAE) educational system and their willingness to integrate ICT in classroom practice. The following objectives were formulated to assist in achieving this aim:

1) *To acquire an understanding of the perspectives of both pre-service teachers and their instructors on the TPACK capabilities of pre-service teachers and their views on the action needed to enhance these capabilities.*
2) *To identify factors that impact the development of knowledge and skills related to the TPACK framework.*

This thesis is intended to be a further contribution to the knowledge of the UAE pre-service teachers' TPACK capabilities and the study will be aligned with the UAE Vision 2021, whereby the National Agenda emphasizes the development of a first-rate education system, a complete transformation of the current education system and teaching methods is required. Based on the outcomes of the quantitative and qualitative results, a plan for this future development and implementation will be made towards the creation of this first-rate education system, whereby the use of innovative technology might be an essential key to reach the national educational objectives.

1.5 Research Questions

Within the educational technology field there are several prominent theoretical frameworks and models that would serve the current study and focused on ICT integration in education and teacher education. However, the Technological Pedagogical and Content Knowledge (TPACK) model was found to be a framework which has received a lot of attention and was argued by practitioners and academics to be a useful framework to reflect on the ICT integration skills of pre-service teacher (Jamieson-Proctor, Finger & Albion 2010; Graham, Borup & Smith 2012; Smith 2013; Pamuk 2012; Koh, Woo & Lim 2013). Therefore, the TPACK model is used as a guiding framework for this mixed methods study. This thesis will try to capture the perceptions of pre-service teachers and their instructors on their TPACK capabilities to understand the current status and create recommendations for the way forward. Accordingly, the study explores research questions that both address technology readiness and its affecting factors on the acquisition of TPACK knowledge and skills.

The specific research questions addressed in this study are as follows:

1) *What are the pre-service teachers' perspectives on their preparedness to use ICT for future classroom practices?*
2) *What are the instructors' perspectives on pre-service teachers' preparedness to use ICT for future classroom practices?*
3) *What factors influence the acquisition of knowledge and skills regarding ICT integration in the classroom?*

The first and second research questionare is answered through both the quantitative and the qualitative paradigm as they require both the measurement of variables and the information from interviews. The third research question is answered with the use of quantitative analyses.

1.6 Rationale for the Study

As described above, the aim of this study is to understand insight in the pre-service teachers' TPACK capabilities within the context of the United Arab Emirates (UAE) educational system and their willingness to integrate ICT in classroom practices. Many researchers in this field have emphasized the importance of preparing the future teachers to work with these approaches (Drent & Meelissen 2008; Kay 2006; Tondeur et al. 2011). After all, they are the ones who must make the shift towards integrating technology into reality. Therefore, it is important for this study to not only gain the knowledge regarding the training and education these students enjoyed so far, but also transfer the outcomes of the data into practical implications for future teacher training programs. The effectiveness of technology integration and the way it is taught in pre-service teacher education will only be able to improve if the quality of the educational context is assessed regularly (Davies 2011).

By conducting this doctoral research, the researcher aspires to contribute to the understanding of ICT integration in education and how to shape pre-service teachers' preparation efforts. The drive of the UAE government towards educational reform and more of ICT integration in government and private services would require a new generation of citizens who can adopt and adapt to the rising challenges (Almekhlafi & Almeqdadi 2010). Teachers play the major role in preparing the future teachers to work with technology and implement it in the classrooms and making one of UAE's government agenda items successful. Investing in the development of the youth by adjusting the teaching methodologies to their needs is useless if the results and outcomes of this investment are not measured (Tearle & Golder 2008; Tondeur et al. 2011).

1.7 Structure of the Dissertation

This dissertation is divided into five main chapters: introduction, literature review, research methodology, results and conclusion. Chapter One presents a general background about the study: the statement of the problem, purpose and objectives, research questions, the relevance and importance of the study and the structure of the dissertation. Chapter Two presents a critical review of pertinent literature on TPACK capabilities and ICT integration into the classrooms – a conceptual analysis, in-depth description of the theoretical framework and a review of the related literature. Chapter Three provides the research methodology of the study. Chapter Four contains an analysis of the quantitative and qualitative data and presentation of the findings. Chapter Five presents the conclusion of the findings and implications and recommendations for practice. Also, it discusses the limitations and the scope for further study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Overview of the Chapter

This chapter provides a review of relevant literature so far on the topics related to this thesis and is divided into eight sections. To start with, the section titled conceptual analysis unpacks, defines, maps out the key concepts in this study. The models section will discuss various models and theories related to technology integration in education. The following models are discussed: The Teacher Thoughts and Action Process Model (TTAP), The Theory of Planned Behaviour (TPB), Value Theory of Achievement Motivation (EVAM), Substitution Augmentation Modification Redefinition (SAMR), Technology Acceptance Model (TAM), and The Unified Theory of Acceptance and Use of Technology (UTAUT). Thereafter, the theoretical framework that is used for the current study, the Technological Pedagogical Content Knowledge (TPACK) framework is enlightened. Given its importance to the current paper, this section elaborates with different examples of studies that used it and detailed account of its elements. The following section is dedicated to the types of ICT that are used in the educational context where after the sixth section reviews what is known about the impact of technology in the classroom. The seventh section evaluates studies regarding the role of teachers in technology integration and thereafter, the Perception Theory is reviewed, due to its significance to this study. The perception theory is used to build on and analyse the pre-service teachers' and their instructors' views and opinions. The chapter ends with presenting the higher education landscape in the UAE and technology integration initiatives that have been done so far.

2.2 Conceptual Analysis

It is important to create an understanding for the reader about the different terminology used in the dissertation. Definitions of key terminology used in this study are given below:

2.2.1 ICT and / or Technology

In this study, the terms ICT and Technology will be used intermittently and interchangeably. The term technology differs in various contexts and is used in different ways by different scholars. For instance, Jillellamudi and Biju (2011) believe that ICT is any combination of

hardware, software, media and delivery systems such as LAN, internet, digital cameras, camcorders, videos, CD-ROMs, DVDs, digital libraries, scanners, transparencies / power point presentations, overhead projectors, email, video and audio conferencing, virtual reality, simulation software, and assignments designed by the use of tools like Hyper-studio, Microsoft office, etc. While Klopfer, et al. (2009) define genres of technologies to be Social Networking, Digital Gaming, and Simulations. Nordin (2014, p. 10) uses the definition from Blurton (1999) report to define ICT: "the diverse set of technological tools (hardware) and resources (applications, software) used to communicate, to create, disseminate, store, and manage information. The new digital ICTs are not single technologies but combinations of hardware, software, media, and delivery systems, such as desktop, notebook, and handheld computers; digital cameras; local area networking; the Internet and the World Wide Web; CD-ROMs and DVDs; and applications such as word processors, spreadsheets, tutorials, simulations, electronic mail (email), digital libraries, computer-mediated conferencing, videoconferencing, and virtual reality".

Simard and Karsenti (2016) claim that the term "information" can be interpreted in many ways due to its abstract nature, therefore they adopted a post-positivists paradigm dating back to 1970s that states ICT includes all the content of new media and storage format. Hence, their definition of ICT "cover(s) all digital content and digital objects that can be transmitted (accessed and distributed), organized (stored and archived), retrieved (from the Internet, libraries, and archives), evaluated (for relevance and reliability), and processed (by computers and individuals). Thus, access, organization, location, evaluation, processing, and transmission are the common and essential attributes for recognizing multiple potential forms of information" (Simard & Karsenti 2016, p. 4). In the book "Handbook of Technological Pedagogical Content Knowledge (TPCK) for Educators" by Oliver (2011) a two-folded definition is given to technology. He believes that technologies can encompass an individual tool and technique or collective tools and techniques. The first one includes technologies to specific tools such as word-processing technology, computer technology or microscope technology. The latter includes the sum of tools and techniques used in education such as analog technologies (e.g., chalk, board, pencils, papers, etc.) and digital technologies (e.g., computers, blogging, internet, etc.). It is worth mentioning that Mishra and Koehler don't distinguish between older technologies and new technologies (Mishra & Koehler 2006).

Since the TPACK framework will be used in this study, the researcher will adopt Koehler and Mishra's (2005) definition, they state that the technology in TPACK framework includes all modern emerging technologies such as computers, the internet, digital video, and more commonplace technologies including overhead projectors, blackboards, and books. It is worth mentioning that this paper will use the terms ICT and/or technology in all the sections to give a broader and wider implication.

2.2.2 ICT and / or Technology Integration

This paper focuses on how pre-service teachers and their instructors perceive their abilities to integrate technology into the process of teaching and learning. Hence, within this study integration refers to the implementation of technology in teaching and learning activities according to the type of technology used, the reason behind the usage, and how it is used.

2.2.3 Pre-Service Teachers

In the current context of study, pre-service teachers are students who are studying in the university to become school teachers. They are awarded bachelor of education in a certain discipline. Usually, the degree is attained after competing 4 to 5 years studying in an undergraduate program.

2.2.4 Instructor

The word "Instructor" used in this study indicates the teachers who teach in a university level institute regardless their academic rank. The instructors could be lecturers, assistant professors, associate professors and / or professors.

2.3 Models

Technology has become an inseparable part of our daily lives, this warrants its usage in training teachers, to build requisite teaching capabilities which enhances learning and teaching in 21st century (Finger, Proctor & Albion 2010). Before the introduction of technology, students were forced to use old books for learning as the cost of updating the books was quite expensive. Today, updating software and educational materials have been made easier through the use of technology (Slykhuis, and Lee 2016). Students and teachers can be connected worldwide through devices installed with the internet. Learners can, therefore, communicate across the globe and share vital information and experience of learning.

Despite several studies have provided evidence that technology is essential in modern learning environments and technology being readily available in many countries, its application in education is still very low. Studies show that use of technology by teachers and students has not been significantly achieved (Sang et al., 2010). To support the challenging integration of technology in education, different theories and models have been developed to assist teaching and learning using different forms of technology. In their analysis of eLearning theories and models, Sang et al. (2010) suggest that in order to successfully integrate technology, it is important to understand how to facilitate technology integration in education and the importance of this. They further define theories as "an empirically-based explanation of factors that affects learning and model as principles used in integrating technology with education" (Sang et al., 2010, p.).

In the last few decades, various models and theories have been used to study technology integration in classrooms and teachers' roles, preparedness and capabilities. Ideally, theories and models are sources that support educators in the integration process. Studies show that there are many learning theories, but the dominant categories are cognitivism, behaviourism, and constructivism (Mahini, Forushan & Haghani 2012). This section will briefly examine the most relevant models and theories used for integration of technology in classrooms, its impact on students' learning, and how it equips teachers with the required skills to apply technology and education.

2.3.1 Teacher Thoughts and Action Process Model

The Teacher Thoughts and Action Process Model (TTAP) is perhaps the most significant and ground-breaking work in the educational field. The TTAP model explains the common relationship between teacher thought processes and related teacher behaviour (Sang 2010). The model is developed by Christopher Clark and Penelope Peterson in 1984. They presented and advocated the teaching profession and the role of teachers as important and as specialized as that of a doctor, lawyer or any other professional. Their study emphasizes that in order to understand the overall dynamics of a classroom and the quality of education imparted, it is imperative to understand the thinking and the mindset of a teacher which is at the base of planning, decision-making and the demonstration of certain interactive behaviours within a class and with the students (Clark & Peterson 1984). Jackson (1986) defines the complexity of the teacher's task and the distinctive segregation of the teacher's cognitive thought process in a pre-active, interactive and post-active phase. The overall objective of TTAP is to dig deeper into understanding the fundamentals and underlying intricacies of the overall teaching process and how it is closely associated with the thought process of the teachers and observable actions that take place as a result of that. In general, the model exists of two sections:

- Teacher's thought process – the thought process of an individual is a phenomenon which takes place inside the brain and cannot be measured directly. It can only be measured based on the actions taken as a consequence and their overall impact. The thought process includes the engaging thoughts and decision-making, the belief system and the associated theories built around it, and finally the overall planning part which can include the three stages of pre-, post- and interactive thoughts. It can also be used to categorize teachers according to these three stages as the teachers distinguish themselves in their thought processes;
- Teacher's actions and their effects – the actions are observable and can be easily demonstrated, measured and assessed while the teacher is engaged in a classroom activity. The parameters which can determine the teacher's measurable actions would include the engagement and the overall behaviour of the teacher as well as the students and the students' overall achievements.

The model suggests that interactions between the underlying factors in both the streams - the thought process and the observable actions - are cyclic and not linear. Where the thought process of the teacher cannot be directly measured, it can however be influenced by a number of factors which limit or inhibit the teacher's thought process. For instance, the overall autonomy given to the teacher in designing a curriculum as well as the involvement and participation in overall decision-making process would determine the flexibility and level of effort put in place by the teacher in its thought process. Similarly, the student-teacher and teacher-student interaction is reciprocal and closely associated to the overall achievement of the students.

2.3.2 Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) by Azjen (1991) is an extended work towards the earlier known model which was Theory of Reasoned Action (Ajzen and Fishbein 1980). Ajzen states that "Human behaviour is guided by three kinds of considerations: beliefs about the likely consequences of the behaviour (behavioural beliefs), beliefs about the normative expectations of others (normative beliefs), and beliefs about the presence of factors that may facilitate or impede performance of the behaviour (control beliefs)." (Ajzen 1991, p. 2)

This model argues that a particular action by person is driven by the attitude towards that particular behaviour. In general, the TPB advocates that there are certain parameters and factors which all come contribute to a person's intent towards a particular behaviour. The overall intent of a person is believed to be driven by following three factors:

- Attitude to Use (ATU) - The attitude towards a certain behaviour;
- Subjective Norm (SN) - The suitability and importance of exhibiting a certain behaviour as perceived on behalf of the people significant in a certain scenario;
- The perceived behavioural control (PBC) - the overall controlling factor and the pre-conceived level of difficulty or ease in exhibiting a certain behaviour. PCB is said to have a major impact in making strong correlations with one's intent to use technology (Compeau & Higgins 1995).

Once an insight is created in a person's positive or negative intent towards a certain behaviour, the behaviour of a person can easily be understood and speculated. In this case the TBP has been effectively used to evaluate the intention for adoption of technology in pre-service teachers.

To better understand TPB let's assume we have two female employees talking about the maternity leave and benefits package offered by the company they work for, and why they have differing attitudes toward it. The first lady is newlywed and wants to start a family, while the second lady is a career woman with no plans to start a family. As per TPB, the second lady might opt for the package because we are allowed to have an unfavorable or favorable attitude about something. However, these attitudes are not fixed. They, too, can change, thanks to the integration of new information with already existing information. In fact, this integration can completely erase the old attitude and give rise to a new and totally different one (Cleverism, 20180.

2.3.3 Expectancy - Value Theory of Achievement Motivation

The Expectancy - Value Theory of Achievement Motivation (EVAM) is a model developed by Allan Wigfield and Jackquelynne Eccles (2000). This model was originally proposed to measure the children's keenness in performing, achieving and carrying on with a certain task. This helps one understand the true intrinsic nature of individuals in executing a certain task. Expectancy value is perhaps one of the few such models which provide a very detailed and key overview about achievement and motivation. The roots of this model can be dated back to the work from Atkinson's (1957) and was further developed into the expectancy-value theory by Wigfield and Eccles (2000). In general, the model argues that for a person to perform a certain task, key detriments for an individual's eagerness to perform this task would be driven by that his expectation about the end result and the value proposition that he or she would tag in succeeding that task along with the overall achievement beliefs. "The EVAM is primarily used to explain how expectancies and values directly and indirectly influence achievement choices, performance, effort, and persistence across a wide range of academic and physical domains and age groups" (Hood, Creed & Neumann 2012, p. 73).

The factors of the expectancy-value theory framework are:

- Expectation of Success - the expectations of an individual about the completion of a task or the adoption of a technology both in the present as well as in future scenarios;
- Achievement Related Choices - the overall goals and objectives of an individual in achieving and completing a certain task;
- Associated Task Value – the value proposition from an individual committing to the task. This includes the importance of the task, its overall usefulness, the value to oneself and the cost at which the task would be completed.

In real-life scenario, every individual has a different belief system, exhibits a different set of attributes and acts differently to changes or new requirements. Some individuals would be quick learners and would adopt very easily to the change in their environment, whereas others would not. Overall performance of an individual is a direct derivative of the overall belief system, expectations and the value associated to that task. This, on one hand, allows a very useful insight in analysing the overall behavioural patterns amongst individuals. Additionally, it allows researchers and policy makers to work effectively on the areas which directly impact the overall performance. The application of this model in a classroom environment provides very useful insight in the way teacher-student interactions should be designed for enhanced performance and end results. To make it clearer, any combination of beliefs and evaluations developed about a certain classroom management technique could be either positive or negative. If positive, it is likely that the teacher would continue to use it; if negative, then one would avoid it (Twente, 2017).

2.3.4 Substitution Augmentation Modification Redefinition model

The Substitution Augmentation Modification Redefinition (SAMR) model developed by Ruben Puentedura is an important guideline and a fundamental framework in integration of technology in today's classrooms. It enhances the overall performance of the teachers from lower levels to higher levels by induction of the right technology into the classrooms. In today's fast pacing and technologically evolving world every student is a carrier of a technological intervention which is a substitute and an augmented aid to conventional means

of teaching. SAMR discusses the use and integration of these technological interventions such as smartphones, iPads, Kindle, smart tabs, etc. to be incorporated and embedded into the conventional means of teaching so that both these streams clubbed together can enhance the effectiveness of the teaching methods. As per Chou, Block and Jesness (2012), SAMR is the means to facilitate the acquisition of proficiency in modern consumer technologies and software for both staff and students with the hope of promoting 21st century skills. SAMR aims at inducting each technological intervention as a new task in itself and offers a structural model which defines the stages of this transitions. Broadly segregated into 'Enhancing' and 'Transforming' SAMR within these two broad categories have the following four stages:

- Substitution – specifies the incorporation of technology into the conventional classroom system whereby the technology (digital) acts as a better substitute for the already existing teaching methods (analog) and practices. This is the realization part of the framework. For example, students can use voice thread application to create a presentation that allows viewers to comment and annotate.
- Augmentation – discusses about the modalities of the technology which is to be used as a direct or indirect tool for assisting and aiding the entire education process. It is seen as functional improvement. For example, students can use comment feature on Google Doc to collaborate with others, or use Google Earth to "visualize" geography and tag specific locations.
- Modification – requires the modification in the existing processes and practices to make room for the technology to play its role. Tasks are redesigned according to the technology used. For example, students can use eAudiobooks to add audio to stories.
- Re-definition – allows the teachers to create new avenues, new streams and new tasks keeping in view of the offerings that the technology has to make which could not have been imagined as before. For example, use a word processing program instead of paper and pencil (SFUSD, 2016).

At the first two levels, technology is used for enhancement of the learning experience, while in the highest two levels, the technology is used to transform learning tasks and experiences through modification and redefinition (Chou, Block & Jesness 2012).

SAMR (Puentedura, 2006) asserts that use of technology could predict student outcomes. A study conducted by Angelo (2017) explored six teachers' and three administrators' perception

of the SAMR model in integrating technology into the classroom environment. The study found that educators using the SAMR model were and had a common level used for technology integration as well as a favorite level. It also claimed that SAMR model changed teacher practices by encouraging them to integrate technology at a higher level.

2.3.5 Technology Acceptance Model

The Technology Acceptance Model (TAM) is a working model developed by Davis (1986) and is an extension of the originally known Theory of reasoned action (TRA) (Ajzen & Fishbein 1980). TAM is a well-known model which discusses the behavioural assessment of the entities which are the end user or adopters of the use and adaptation of a technology. In case of education, teachers are an integral part of the equation which would pave way for the technology adoption. The original TAM is influenced primarily by two basic factors from user point of view. The enhanced Technology Acceptance Model (TAM) proposes that perceived ease of use and perceived usefulness are direct channels of technology acceptance behaviours. As Gong, Xu and Yu (2004, p. 366) define: "Perceived usefulness is defined as the prospective user's subjective probability that using a specific application system would increase his or her job performance within an organizational context" (p.366). Perceived ease of use, on the other hand, "refers to the degree to which the prospective user expects the target system to be free of effort".

- Individual's Perceived Usefulness - the mindset and the benefit that one thinks would get from adopting and using a certain technology;
- Individual's Perceived Ease of Use - is the overall keenness of an individual driven by the motivation that the work would be facilitated and simplified by adopting a certain technology.

There are, however, many intrinsic and extrinsic factors that might influence the individual in exhibiting these elements. These factors can be the cultural barriers, linguistics, social factors and the political framework of a country or an organization. There have been many changes to the original TAM and researchers have added a number of other interrelated factors to this model. TAM2 is an extended mode of the original work which also takes into account perimeters like voluntariness of a user, social image, social influence and perceived

importance and relevance of the technology to one's job, output quality and end results (Sullivan 2000). Where TAM is estimated to account for around 40% for the user acceptance, TAM2 gets around 60% of user adoption (Venkatesh & Davis 2000). Numerous studies have used the Enhanced Technology Acceptance Model as their theoretical background for explaining technology use and adoption (Cheung & Vogel 2013; Gong, Xu & Yu 2004; Teo 2009). These studies have found confirmation that perceived usefulness effects attitudes and approval toward technology practice.

2.3.6 Unified Theory of Acceptance and Use of Technology

The Unified Theory of Acceptance and Use of Technology (UTAUT) was created by Venkatesh et al. (2003) to present a completer picture and create a deeper understanding of the acceptance process than the developed models so far had done. They merged eight models that were previously used in the research field of technology acceptance into a unified model based on the conceptual and empirical similarities across these eight models. All of these theories had their origins in psychology, sociology and communications (AlAwadhi & Morris 2008). These eight models are the Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), the Theory of Planned Behaviour (TPB), the Motivational Model (MM), the combined TAM and TPB (C-TAM-TPB), the Model of PC Utilization (MPCU), the Diffusions of Innovations Theory (DOI) and the Social Cognitive Theory (SCT) (AlAwadhi & Morris 2008; Venkatesh et al., 2003). The UTAUT model contains five direct dimensions of behavioural intention and use behaviour:

- performance expectancy - "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al. 2003, p.447);
- effort expectancy - "the degree of ease associated with the use of the system" (Venkatesh et al. 2003, p.450);
- social influence - "the degree to which an individual perceives that important others believe he or she should use the new system" (Venkatesh et al. 2003, p.451);
- facilitating conditions - "the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of the system" (Venkatesh et al. 2003, p.453);

- behavioural intention - the person's behavioural intention to use a certain technology system.

The UTAUT model also explains how moderators can influence the five dimensions and cause individual differences in technology use. The four moderators are gender, age, experience and voluntariness of use (AlAwadhi & Morris 2008; Marchewka & Kostiwa 2007). By combining and improving upon existing ICT acceptance models, it is argued that "the UTAUT model should now serve as a benchmark for the acceptance literature" (AlAwadhi & Morris 2008, p. 3,4). The UTAUT's suitability, validity and reliability in technology acceptance studies in different contexts has been confirmed (Anderson & Schwager 2004; Lin, Chan & Jin 2004; Rosen 2005; Venkatesh, Morris, David & Davis 2003).

The theories and models described above are the main frameworks that have been used by scholars to study teachers' technology integration in classroom practices. The frameworks complement each other and can be used to investigate different elements of technology integration into the educational context. For instance, to examine influencing factors of ICT integration in China, Sang (2010) used The Teacher Thoughts and Action Process model (TTAP), The Theory of Planned Behaviour (TPB), and The Expectancy-Value theory of Achievement Motivation (EVAM).

The current study will further use TPACK as the main framework due to its comprehensiveness and focus on the technological, pedagogical, and content knowledge (and the intersection of these elements) which is highlighted by various research studies to be the most important aspect in successful technology integration (Archambault & Crippen 2009; Mishra & Koehler 2005; Lux, Bangert & Whittier 2011; Schmidt et. al. 2009). The below section will highlight the TPACK model, the studies that used it and its relevance to this study.

2.4 TPACK

The TPACK framework builds on the work of Lee Shulman (1986), who was the first to shed light on the pedagogical content knowledge (PCK) concept. He emphasized on the problem regarding the requirement of a more cohesive theoretical framework with respect

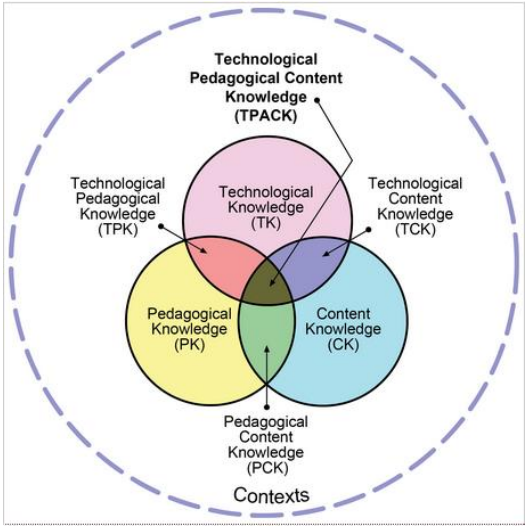
to the knowledge of the teachers, as well as what they are able to undertake. To provide a comprehensive explanation of the relationship present between content knowledge (or the quantity and the structuring of the knowledge pertaining to a certain subject) and pedagogical knowledge (knowledge pertaining on how to teach content of varying nature), Shulman came up with the concept of PCK. He elucidated PCK as crossing the boundaries of the ordinary knowledge on subject content to inculcate ideas on how to approach and deal with special subject matter. Teachers needed to go beyond just mere possession of content or subject knowledge, it was equally essential that teachers had the requisite skills to teach that particular knowledge in a manner which was easily comprehensible for the students (Archambault & Crippen 2009). Hence, it is the expression of the subject in such a manner to facilitate its understanding to other individuals.

Lee Shulman (1986) first presented the concept of pedagogical content knowledge (PCK) in his book "Those Who Understand: Knowledge Growth in Teaching". Through this concept he emphasized the importance of finding the method of demonstrating and conveying the subject that make it comprehensible to others (content). He also stressed the need to equip teachers with knowledge delivery strategies (pedagogy). Shulman described how teachers' understanding of educational technologies interact with pedagogical content knowledge to produce effective teaching with technology (Koehler & Mishra 2009). In addition, Shulman presented that the understanding of what causes a particular subject to be either simple or complex to learn is in fact a part of PCK. In the pursuit of effective teaching of a subject, the teacher should be thoroughly aware of the difficult areas where students often struggle with. These areas can vary depending upon the notions which the students possess along with their respective ages and backgrounds. If there is no comprehensive base of content knowledge, students can receive incorrect information and subsequently develop misconceptions about the content area (National Research Counsil 2000; Pfundt & Duit 2000). Shulman (1986) stated that if the students' conceptions are based on false information, teachers should possess the knowledge of varying strategies which could potentially be successful in the identification of the wrong learning patterns of students, as those students will most probably be having numerous predetermined ideas and notions (Archambault & Crippen 2009).

As a progression of the pedagogical content knowledge (PCK) framework initiated by Lee Shulman in 1986, Mishra and Koehler (2006) conceptualized the TPACK framework.

Shulman defined PCK as a teacher's ability to transform subject-matter knowledge into accessible forms that all learners could master (Young, Young & Hamilton 2013). However, Mishra and Koehler added that it also means that having knowledge of how "ICT can be used to access and process subject matter (TCK) and understanding how ICT can support and enhance learning (TPK) in combination with PCK" (Teaching Teachers for the Future 2014). TPACK can be said to be a natural progression from PCK as it incorporates the technological aspect into the PCK concept of teaching. TPACK not only ensures use of technology in education but also provides understanding to the teachers about the integration and interaction of technology with pedagogy and content knowledge (Tondeur et al. 2016). Phillips (2013) describes how the TPACK framework can be visualized by three overlapping circles, with each circle representing an element of teachers' professional knowledge. This framework resulted in seven aspects of teachers' professional knowledge with TPACK positioned at the linking core of these circles. These different forms of knowledge are the context in which teachers obtain and show their knowledge (Figure 1).

Figure 1: The TPACK framework



http://tpack.org/

The below table created by Koh and Chai (2016) defines the TPACK constructs and provides examples of its dimensions:

Table 1: Overview of the TPACK elements

TPACK constructs	Definition	Example
TK	All knowledge associated with the use of ICT related tools	Technical know-how about the use of Google Doc
PK	General knowledge about learning, instruction, assessment and students	Knowledge about how to use inquiry-based learning
CK	Knowledge pertaining to the subject matter	Content representations of specific science topics, e.g. law of relativity
PCK	Knowledge about content representations and associated teaching and learning activities that helps learners to learn	Knowledge of topic-specific illustrations, models and analogies
TPK	Knowledge of pedagogically sound ways to use specific ICT tools	Using WIKI to support collaborative inquiry
TCK	Knowledge about how ICT tools can be used to represent/research and create subject matter knowledge (excluding all forms of pedagogical considerations)	Knowledge of global positioning system and range finder used by geographers
TPACK	Synthesized knowledge that reflects elements of technological, pedagogical and content knowledge	Knowledge about using discussion forum to extend students' understanding about social issues

- *Content Knowledge*

The content knowledge is the teacher's knowledge about the actual subject matter that is to be learned or taught. For every subject taught in school, such as science or history, other content knowledge is critical for teachers. Teachers should therefore understand the deeper knowledge fundamentals of the disciplines in which they teach (Koehler & Mishra 2009). Shulman (1986) stated that the content knowledge includes knowledge of concepts, theories, ideas, organizational frameworks, knowledge of evidence and proof, as well as established practices and approaches towards developing such knowledge.

- *Pedagogical Knowledge*

Pedagogical knowledge is described as the deep knowledge about the processes and methods of teaching and learning. In their work, Koehler and Mishra (2009) argue that this form of knowledge applies to understanding how students learn, general classroom management skills, lesson planning, student assessment, techniques or methods used in the classroom, the nature of the target audience and strategies for evaluating student understanding. Understanding of cognitive, social and developmental theories can support the teacher when designing and shaping teaching in the classroom. The teacher with deep pedagogical knowledge knows how to stimulate student learning in the form construct knowledge and acquiring skills (Koehler & Mishra 2009).

- *Pedagogical Content Knowledge*

Shulman (1986) described pedagogical content knowledge as the knowledge of pedagogy that is applicable to the teaching of specific content. A teacher with deep pedagogical content knowledge is able to select the appropriate teaching methods and instructional materials that fit the content.

- *Technology Knowledge*

Koehler & Mishra (2009) describe how technology knowledge is always a difficult domain because with the fast pace of technological developments, any definition of technology knowledge is in danger of becoming outdated. They use the definition of 'Fluency of Information Technology (FITness)' as described by the National Research Council (NRC 1999). FITness requires a deeper understanding and mastery of information technology for information processing, communication and problem solving than the traditional definition of computer literacy. The teacher who has a deep knowledge of technology is able to accomplish a variety of different tasks using information technology and to develop different ways of accomplishing a given task (Koehler & Mishra 2009).

- *Technological Content Knowledge*

Technological Content Knowledge is the knowledge about how technology and content are related and influence each other. Teachers not only need to have a deep knowledge about a subject matter, but also have the insight in how the subject matter can be changed when

certain technologies are applied. Also, they need to know which particular type of technology is best suited for addressing subject-matter learning (Koehler & Mishra 2009).

- *Technological Pedagogical Knowledge*

Technological pedagogical knowledge is defined as the knowledge about the existence, components and capabilities of various technologies in teaching and learning settings (Mishra & Koeler 2006). If a teacher is familiar with up-to-date technologies, he/she can make an informed choice about which particular technology fits best with the purpose of a learning activity, thereby creating and maintaining an effective, high-quality learning environment.

- *Technological Pedagogical Content Knowledge*

Mishra & Koehler (2006) describe Technological Pedagogical Content Knowledge as "an emergent form of knowledge that goes beyond all three components (content, pedagogy, and technology)" (p. 1028). "TPACK is the basis of effective teaching with technology, requiring an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students' prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge to develop new epistemologies or strengthen old ones" (Koehler & Mishra 2009, p. 66). It represents a class of knowledge that is central to teachers' work with technology. Quality teaching requires a deep understanding of the relationship between these three concepts and how to make the best use of these three concepts. Insight and deep knowledge is needed to create the best possible learning environment in each unique situation as there is no technological solution that applies for every teacher, course or method.

Mishra and Koehler's (2006) framework for technological pedagogical content knowledge (TPACK) is widely recognized and has been thoroughly researched as a theoretical framework for the implementation of technological resources into a classroom environment and the associated skills that teachers have to master to make this implementation successful (Chai et al. 2013). Newer reviews discovered over 70 articles that have been published in relation to TPACK from 2003 to 2011 within the Scopus database. A specialized website

which has been established for TPACK research (http://tpack.org/) has collected over 450 articles. The SSCI-listed journals have contained approximately 134 articles regarding TPACK as of May 2015. TPACK research as an analytical as well as a creative framework that has the capability to produce a more deep and extensive knowledge based on the integration of ICT to researcher and educators. It could be fine-tuned, broadened and developed upon to consider numerous variables which impact - either positively or negatively – the quality and frequency of technology use in the field of education (Koh et al. 2015).

Literature indicates the wide use of TPACK in studies across the world and in different educational settings. For instance, Jamieson-Proctor, Finger, and Albion (2010) used the framework to audit the capabilities of final-year teacher education students in Australia and to review teacher education programs in regard to their student preparation in TPACK capabilities. Similarly, Kim and Lee (2014) used TPACK to implement an instructional design model in a technology integration course. They developed and used the model that showed the participants' lack of pedagogical knowledge in a technological content. Khan (2014) presented a model for integrating ICT in the professional development of teachers in Bangladesh based on the TPACK framework, in order to increase the effective usage of ICT in teaching. His model was created to assist teachers, trainers, policymakers and other educators who are directly or indirectly accountable for teachers' professional development.

Tondeur et al. (2012) conducted a study to explore the ways in which teacher education institutions (TEI) prepare pre-service teachers for integrating information and communication technology (ICT) in their classroom practice. Their results illustrated that the participating institutes were moving from ICT as a 'stand-alone' course towards embedding ICT across the curriculum. In addition, the institutes supported approaches for developing pre-service teachers' TPACK. They assert that developing teachers' TPACK skills should be seen as part of the development of the entire teacher education institutes' policy, where focus should be made on revamping curriculum, vision building, ICT-planning, leadership, co-operation within and between institutions and training staff.

Harris and Hofer (2014) argue that regardless of the different understandings of TPACK's seven areas among college educators, professional development individuals need to

understand how to operationalize the model in teacher training efforts on district level in North America. The researchers held a symposium where educators participated and narrated their experience in using TPACK in professional development workshops. Their findings indicated that universities operationalizing of TPACK was different from the in-service educators who lacked efficiency in doing so.

The study of Hao and Lee (2016) aimed at understanding pre-service teachers concerns related to flipped classrooms' technology integration. The results indicated that the pre-service teachers' main concerns were related to technology knowledge. Based on these results, they recommended updating curriculums and instructions in higher education institutes in a manner where pre-service teacher get equipped with fundamental knowledge and skills to teach in 21st century classrooms. Similar concerns from pre-service teachers were discussed in the study from Alayyar, Fisser & Voogt (2011). They investigated pre-service teachers' TPACK capabilities from a science teacher preparation program in Kuwait. These students reported higher gains in different TPACK domains when working in design teams and being coached by technology, pedagogy and content experts. However, the pre-service teachers indicated that they need more flexibility in relation to time and accessibility of support and an environment available in the Arabic language.

TPACK is widely proposed as the body of knowledge that teachers should acquire for them to have proper capabilities of constructively integrate technology in their teaching. Teachers with TPACK capabilities can use instructions that assists their students to understand and use technology in their learning quickly. A study by Harris and Hofer (2014) on different views regarding the use of TPACK, participants reported that the model helped them to learn from their past experiences. Teachers with TPACK capabilities can use the different experience to assist student learning. Sang et al. (2010) argue that teachers who are TPACK competent are aware that technology cannot replace content or pedagogical knowledge but they see technology as an added dimension.

Another study that used TPACK as its theoretical framework investigated how an online learning environment might affect the participants TPACK and technology integration capabilities in a certain course (Ellis, Dare & Roehrig 2016). The participants who were pre-service teachers created lessons to be used in an online learning environment and the results

showed that the online learning environment had supported the development of abilities to link content with technology and choosing the technology that could contribute constructively in the learning process.

A study that complements Ellis, Dare and Roehrig's (2016) efforts was conducted by Yeh, et al. (2017). The study asserts that teachers can choose the appropriate technology and implement it in the classroom based on their TPACK, particularly when it comes to in-service teachers whose TPACK is built and consolidated by trial-and-error throughout the years of teaching. Through their study that used video and discipline-focused questionnaires to measure TPACK, they assert that "In-service teachers' TPACK can be very different from that which pre-service teachers develop, because teaching experiences and beliefs can personally vary and situatively interact. Teachers' knowledge should first be developed for practice and then in practice, and ultimately become of the teachers" (Yeh, et al. 2017, p. 61). Baran et al. (2014) examined a course that that was designed using the TPACK model in a public university in Turkey. The authors used case study approach to study how TPACK was used to integrate technology into educational sciences courses, and computer education courses. Through qualitative analysis of the interviews, the authors pointed out that the participants indicated that TPACK can be used to enhance creativity in designing instruction, and that the adoption of TPACK framework was good for use by both future pre-service and in-service teachers.

To conclude this section, it is worth mentioning that literature indicates that TPACK model has been used extensively in research and teacher training, however it doesn't indicate how teachers can acquire a deeper understanding of the relationship between content, pedagogy and technology. Most researchers see that teachers can unlock this understanding by acquiring basic competency in hardware and software programs. This argument cannot be established without proper teacher training that requires TPACK, therefore, more studies are needed.

2.5 Types of ICT in education

In general terms, ICT refers to technologies that give access to information through telecommunications. ICT stands for information and communication technologies and can be defined as a diverse set of technological tools and resources used to communicate, disseminate, create, store and manage information. It can be compared to Information Technology, but ICT focuses mainly on communication technologies. Some of the components of ICT include: wireless networks, internet, cell phones, and other communication mediums. As of today, many countries are re-evaluating their education system in order to incorporate ICT to bring the upcoming generation to international standards. According to Kozma (2011), the application of ICT is making dramatic changes in economic and social developments around the world. Technologies have significantly improved teaching and learning and are expected to continue to impact education in many ways. Learners of today grow up with numerous technology tools and therefore the way of teaching should be adjusted to the possibilities of the new modern technologies. In order to cater to the needs of digital natives, there is need to pay attention to the medium used. Technology integration has reinforced the learning surroundings and classroom guidelines by allowing learners to complete their assignment using the internet (Almekhlafi et al. 2016). The school curriculum integration of technology entails the infusion of technology to heighten the learning in multi-disciplinary settings. This equips the learners a sense of power and allows for more improved learning in broad topics.

As Chandler and Munday (2012) state, ICT is the study, design, development, application, implementation and management of computer-based information systems. It covers all forms of computer and communications equipment and software to create, design, store, transmit, interpret and manipulate information in various formats (Chandler & Munday 2012). In the field of education, personal computers, laptops, tablets and mobile phones are commonly used tools. Clark further argues that regardless of the media used, it would be effective if the desired information reaches the audience (Clark 1983). Clark's definition of instructional method is one that is result-oriented in that he sees instruction as 'any manipulation of content that is meant to streamline its acquisition' (Clark 1994).

Several types of technologies have been identified to facilitate learning. These technologies include: use of computers in the classroom; creating class websites and blogs; use of digital microphones in class; use of mobile devices; use of smart interactive whiteboards; and the use of online media. This section and the next discusses two tools: use of computers in classroom and creating class websites and blogs. In the modern society of the 21st century, it is not strange to see at least one computer in every classroom. A classroom computer can be defined as any electronic device that allows the students to access the internet to research, create, and complete school work. As such, a laptop or tablet can also be considered a computer. These computers can be used by teachers to assign classwork to students and create study groups in a classroom. They can also use computers to illustrate visual related subjects which helps students learn easily and gain more insight. Applications can be installed on modern computers which helps students learn well. For instance, the students are in a position to use windows explorer to learn complicated concepts. The Encarta was one of the earliest application used by students as a learning aid.

Using computers in class comes with a number of benefits. For instance, computers provide engaging activities which make learning more interesting and deep, and enables the creation of a wider variety of individualized and differentiated lesson plans (Starčič, et al., 2016). Before the emergence of computers, due to time restrictions it was difficult to provide students who were struggling with all the help they needed for a particular subject because the class had to move forward. The use of computers has enabled the division of work and attention amongst students (Stockwell & Liu, 2015). On the other side, the computers have their own disadvantages. Firstly, the students have to be taught how to use computers before they can start learning on them. This can take time away from the traditional subjects to ensure the students are competent with the use of these gadgets (Wu, et al., 2018). Also, these gadgets come with a significant amount of distraction to the students (Eamon 2004). For instance, student can log into social media sites like Facebook and YouTube without the knowledge of the teacher.

The second tool is the use of websites and blog posts. Today, it is very easy to create a website or blog platforms. It is on these platforms that teachers can posts assignments or even start discussions. The ability to create these websites gave birth to the concept of E-learning. E-learning is utilizing electronic technologies to access educational curriculum

outside of the traditional classroom. Today, most of the colleges in the United States and Europe have their e-learning portal where students can learn from their comfort of their homes or workplaces. Although many people still adhere to traditional universities, online learning using these websites proves to be the best alternative. This can be attributed to the fact that students have the opportunity to study in their own time and with reduced or no costs. It is presented as a great way to study many fields and is pivotal in boosting the level of self-motivation (Arkorful & Abaidoo 2014). Secondly, it is also effective because students can finish homework quickly and a lot of time is spared which can be used to work or play. Finally, the use of e-learning websites enables students with an internet connection to learn at any place and a wide variety of topics or subjects. However, the use of this system is accompanied by a few disadvantages. Firstly, online learning does not offer human interaction, this means that some participants of online education may not learn other life skills such as patience, getting rid of disappointments, and how to compete. Also, in some cases online learning cannot fully cope with the large number of students who are looking to join the discussion in the websites. Finally, the use of websites or blog platforms can also be difficult for disciplines that involve hands-on practice, such as engineering.

2.6 Impact of technology in the classroom

Clark (1983) examined the influence of digital media on learning. He argued that media does not affect learning under any circumstances. For 30 years he claimed that media is the vehicle to deliver instruction and is never the message itself. He also believed that any benefit from media comes from the instructional method itself. He suggested that scholars should stop exploring the relationship between media and learning. The response to this argument came in 1991, when the “classic debate” started by Richard Kozma, who met Clark’s challenge and suggested a new theory outlining the synergy between media, content, and the interaction of the learner with that environment. Kozma claimed that digital media have different features that would produce a unique experience for learners (Kozma 1994). He states: “I believe that if we move from "Do media influence learning?" to "In what ways can we use the capabilities of media to influence learning for particular students, tasks, and situations?" we will both advance the development of our field and contribute to the restructuring of schools and the improvement of education and training” (Kozma 1994, p.23).

Another scholar who holds strong opinions regarding technology in classrooms is Cuban (2001), who argued that technologies are incompatible with the requirements of teaching. For 15 years he claimed that it is difficult for teachers to incorporate computers into regular classroom instructional practices. Therefore, teachers are not expected to make the effort (Cuban 2001).

In the last few years, the positive impact of integrating technology in the educational context became undeniable. Different studies have proved the importance of technology in the learning environment. For instance, the Ministry of Education in Ghana (2008) confirms that ICT can serve different purposes if used effectively. For instance, it can provide a platform for professional development of both pre-service and in-service teachers. It also can aid in teaching and learning processes, and increase teacher knowledge and skills. Similarly, it can improve educational management system, and improve the steadiness and quality of instruction both for formal and non-formal education, as well as increase prospects for more student-centred pedagogical methods. Likewise, they state that ICT can overcome gender disparity, language, disability, and broaden sources of information and knowledge, as well as nurture collaboration, creativity, higher order thinking skills. Finally, it can provide flexibility of delivery and reach learners outside traditional education systems. Moreover, education suffers from the economic growth, and technology-based changes, therefore ICT is considered as a way to support educational change, improve skills of students and prepare for global economy and knowledge based society (Kozma 2005). Moreover, it is well known that the way that technology is used in education improves the quality of teaching and learning more than the technology itself. ICT can play an effective role in studying, communication and flexibility. Modern technology requires work force to become life-long learners, and that can be maintained by efficient usage of ICT (Ministry of Economic Affairs and Communications 2006).

2.6.1 Student Achievement

The use of technology in teaching can have a profound effect on students' learning. Brown (2017) highlights this positive impact of technology. He states that with access to technology, students allowed the task to be transformed and were able to engage in tasks which demanded

higher cognitive inputs than was required in original versions of the task. This implies the development of higher cognitive capabilities among students when they use technology. According to Paratore et al. (2016), studies have found higher levels of reasoning and vocabulary in students who used educational media both with and without teacher mediation.

Numerous research papers and systematic reviews demonstrate that the use of ICT increases students' achievement and supports their learning and attainment. For instance, in a recent study by Tamim et al. (2011), a second-order meta-analysis was used to synthesize research findings from 25 meta-analyses addressing technology integration and its impact on students' achievement. The review synthesized data from 1,055 primary studies and summarized 40 years of research into the effect of computer technology on students' achievements. The findings showed that students in technology integration classrooms would perform 12% higher than students in the traditional settings.

Balanskat, Blamire and Kefala (2006) reviewed evidence from 17 impact studies and surveys carried out at national and international level and concluded that technologies used in the classroom positively impact students' learning. In their report, they suggested that ICT improves students' attainment and increases their performance in mathematics (Balanskat, Blamire & Kefala 2006). Additionally, studies have shown that technology can impact language acquisition, enhance literacy development, support learning, enhance self-esteem and motivate students. Indeed, studies showed that technology provides many opportunities for students to improve their literacy. Several studies indicated that learning in a multimedia environment helps student to gain better language skills than students using a traditional environment. Driscoll and Carliner (2005) suggest that technology can be used to improve language development by enhancing efficiency of access, authenticity, and comprehensibility. Research evidence indicates that technology can be used to improve quantitative assessment performance in several subjects. Also, different from traditional methods of learning, technology supports qualitative improvements, hence improves student's achievement. A study by Gulek (2005) found that a student who is introduced to computers at early stages of learning are not only motivated to learn but also have better learning outcomes than those who are not introduced to computers.

Besides supporting language development, technology also increases students' achievement in some core subjects such as mathematics and other science subjects. In a study that involved secondary school students, Saha, Ayub and Tarmizi (2010) investigated the impact of the software called GeoGebra in learning mathematics. They found that students' performance significantly improved. Boster et al. (2002) conducted a study that involved 6th and 8th graders to investigate the impact of technology on students' performance in mathematics. The findings indicated that students who were provided with video clip instruction improved their math achievement in comparison to students who received traditional classroom instructions without technologies. Both studies show that technology has a positive impact in understanding subjects that are deemed as difficult by students (Boster et al. 2002; Saha, Ayub & Tarmizi 2010).

Compass Learning (2013) combined data from more than 100,000 K–12 students across the UK to explore students' learning interests and preferences in classroom learning. Their findings showed that integrating technology in teaching and learning is preferred in roughly 30% of the study population. Also, the study indicated that more than 38% of the students liked to express themselves using audio visual display, and believed that using technology in a classroom can enable them to analyse, adjust and engage in learning more.

2.6.2 Student Attitudes and Behaviour

Literature suggests that technology has the potential to increase students' self-esteem. A study by Hurd (2006) indicated that students who are introduced to technology are likely to have higher self-esteem than those who do not use technology in their classrooms. A similar study by Bester and Brand (2013) also indicated that technology has a positive impact on students' confidence, self-esteem and attitude towards learning. Additionally, studies have also shown that technology can increase school attendance and decrease dropout rate (Apple 2002).

Numerous studies have shown that technology is important for engaging and motivating learners. Hurd (2006) argues that the use of technology by students increases their interest in education. Similarly, Pollak (2009) states that technology increases students' intrinsic motivation. It helps students to become more motivated and attentive, work more in cohesion with their own learning styles, assume greater responsibility for their own learning, work

more independently and effectively, and encourage collaborative work. In addition, students paid more attention when interactive materials were used (Balanskat, Blamire & Kefala 2006). Likewise, Richardson (2000) reported that information and communications technology implementation in schools showed an improvement in behaviour, attitudes, and capacities of students in ICT rich environment, as well as a greater autonomy, collaboration, more sustained efforts and more personalized teaching. Korte and Hüsing (2006) pointed out that 86% of teachers in Europe state that students are more motivated and attentive when computers and the internet are used in class. The students take greater responsibility for their own learning when they use ICT and tend to work more independently and effectively. In addition, pupils, teachers and parents consider that ICT has a positive impact on pupils' learning, pupils' subject-related performance and basic skills (calculation, reading and writing) (Balanskat, Blamire & Kefala 2006). In the Middle East, research findings reflect similarities.

Tubaishat, Bhatti and El-Qawasmeh's (2006) research targeted students from a university in Jordan and in the UAE. The findings indicated that adoption of technology has improved the motivation and confidence level of students, improved their communication and technical skills, encouraged students to collaborate using Information and Communication Technology tools and allowed students to be more independent and overcome their shyness. Bester and Bran (2013) investigated the effect made by technology on attention and the level of accomplishment in a classroom setting, with the added consideration of both motivation as well as concentration. Remarkable levels of differences were seen when the average level of attention of a group of participants using technology were compared to a group that did not use technology. Additionally, a highly positive association was found between motivation and concentration as well as a high association among concentration, attention, and motivation taken together as independent variables whereas achievement was the dependent variable (Bester & Bran 2013).

The use of technology in education has also helped to maintain equity among learners. Different learning institutions come from different regions with the disparity in the level of wealth. Students residing from the low-income regions, therefore, gain important skills and merits in the learning process as a result of using technology. Loucky and Ware (2016) noted that the schools become at a flat rate with those from well-off regions as a result of adopting

the technology. Students have been motivated through the use of technology as they get instant feedback on certain issues in the process of learning. Finally, studies have shown that technology also benefits students with special needs. Technology improves reading and writing as well as opening several brain sections for students with dyslexia (Pollak 2009). It is also considered helpful for dealing with a student with behaviour problems, as it improves student's cooperation in the classroom.

Moreover, students have modified their knowledge from the experience of using computer technology, through technology opportunities are created for instant playbacks in movies, videos, and sounds that provide the learners with a faster and easy access to various sections of instructions as compared to using normal class note and textbooks. The internet provides learners with access to authentic materials such as news and literature, and videos deliver linguistic and cultural materials to the students. A student can be involved in authentic communication with their instructors through the e-mail, chat rooms and other media platforms which help in boosting their academic performance (Pritchard 2014).

2.7 Teachers' role in technology integration

2.7.1 Advantages for teachers

ICT's positive effect is not limited to students, but it also offers a lot of benefits for teachers. Balanskat, Blamire and Kefala (2006) argue that the use of ICT has led to a positive impact among teachers. For instance, they indicated that "ICT increases efficiency in planning and preparation of work due to a more collaborative approach between teachers" (Balanskat, Blamire & Kefala 2006, p. 4). Their report emphasizes the importance of teachers having ICT capabilities due to its positive effect on supporting existing pedagogies as well as enhancing what is already practiced. Interestingly, the authors stress the fact that the maximum positive impact is found when the teachers are experienced users and have a certain level of mastery in ICT integration in their teaching.

In the study from Cullen and Greene (2011), the participants were strictly on the view that ICT does not have the capability to replace the teacher. However, they stated that the addition

of ICT has provided a new facet to efficacious teaching. The creation of an interactive forum to quicker distribution of knowledge, overcoming distance challenges to allow the learning by challenged students, and assistance in improving the relationship between students and teachers when conducting virtual classes are all examples of how ICT has propelled academics towards a newer horizon. Statements made regarding the appropriate use of ICT shed light on several managerial advantages such as the ability to use a dual shift system (day/evening) within the university, multi-grade schools, a more dynamic scheduling and better transparency with regards to policy development right from admission until graduation. Several other advantages are increased capabilities of learning due to the wealth of information, efficacious teaching via ICT tools, breaking down geographical challenges through virtual classrooms, wider approach to students who are challenged with the use of assistive technologies and assistance of radio and satellite to expand beyond geographical masses and increased speeds of communication.

2.7.2 Factors that influence teachers' willingness and abilities to integrate technology

Bitner and Bitner (2002) acknowledge that there are many obstacles for technology integration in the classroom, such as funds, hardware and software. However, they believe that the primary obstacle is a teachers' weak capabilities. A teacher's skills and attitudes determines the success of technology integration. Through research and observation, they found eight main areas of consideration that has proved to be important for teachers to integrate technology. These areas are fear of change, training in basics, personal use, teaching models, learning based, climate, motivation and support. In relation to this thesis, it can be stated that if higher education institutes contributed in enhancing some of these areas before a student graduates, it would ease the pressure on schools once the pre-service teachers become in-service teachers and enhance the chance of successful technology integration by these new teachers.

Additionally, Staples, Pugach and Himes (2005) have pointed out several disadvantages with the use of ICT in the field of education. Several of such disadvantages are increased demand for monetary resources, frequent critical training of the staff for the correct use of such material, increased risk of distraction to student due to the availability of chat forums, pc games which requires constant supervision which adversely hinders the quality of teaching

provided, accidental entry into illegal sites containing unsuitable matter, strain on the teacher-student bond as opposed to the more traditional talk and chalk method. The most significant constraints are the discipline and attention of the students along with the personal views of the teacher within the class as well as preparation for such.

ChanLin et al. (2006) explored the views of teachers on factors that influence technology integration in their teaching. They identified four different categories: environment factors, personal factors, social factors and curricular factors. Of the environmental factors, teachers mentioned barriers such as issues related to computer facilities, available support and management of resources and manpower provided by the school, and allocation of time for using the computer lab by different teaching subjects. Moreover, opportunities for in-service training provided by the school influenced their initiatives of using technology in the classroom. Personal factors such as teachers' beliefs about teaching, their experience in using technology and interest in trying new things were found to be affecting their willingness to integrate technology. Social factors that were most frequently mentioned were having colleagues to work with as a team, an open atmosphere within a school society and reactions from students, parents and the community. The attitudes of school management were also a critical factor. An important social factor the teachers were concerned about is that low-income families might not have the financial sources to provide their children with the necessary technological tools (ChanLin et al. 2006). Finally, curricular factors were issues related to the goals and instructional settings within particular courses and the level of control in relation to the use of technology. Also, teachers showed a concern for integrating new strategies with existing strategies. Some teachers needed extra time and effort to learn new skills and prepare new activities with the use of ICT (ChanLin et al. 2006).

Similarly, Simard and Karsenti (2016) tried to understand how pre-service programs contributed in preparing future teachers to integrate ICT to develop students' information literacy skills. While their findings covered a number of areas, one important significant finding suggested that the pre-service teachers also perceived lack of training and time constraints as main barriers to developing students' information skills. In a study in the UAE from Ismail, Almekhlafi & Al-Mekhlafy (2010) teachers indicated that they would be able to better utilize technology in the classrooms if time is taken into account when scheduling

their teaching loads. Teaching with technology obviously takes more time than teaching without technology (ChanLin et al. 2006).

Teacher motivation and attitude towards technology is another main factor that influences the success of technology integration into the classroom. This is shown in the study by Sang et al. (2003), who conducted a survey that involved Chinese primary school teachers. The results showed that classroom use of ICT directly depends on teachers' computer motivation and the supportive use of ICT. Teachers' attitudes towards computers in education and perceptions about the ICT-related school policy influence ICT integration in an indirect way. The researchers state that successful ICT integration is largely reliant on the opinions and beliefs of the principal, the ICT coordinator, and the teachers. Similarly, a study revealed that when the key focus in schools is teacher development with strong support for curriculum leadership and development, these schools displayed more student-centred work, more innovative teacher practices, and were more likely to adopt innovative pedagogical practices such as collaborative problem-based learning tasks and projects (Afshari et al. 2008). This is aligned with the results from the study by Blackwell, Lauricella and Wartella (2016), who emphasized on the importance of support provided by the school management. They found that support provided by the school affects the traditional view and attitudes of the teachers. The study stressed the requirement for preschool teachers and teacher trainers to gain knowledge about the critical contextual factors pertaining to technology use within the preschool setting and to respond to such factors.

2.7.3 Required knowledge and skills for teachers

"Teachers must have the knowledge and skills to use the new digital tools and resources to help all students achieve high academic standards" (UNESCO 2002, p. 10). For education to reach its utmost benefit it is essential for teachers to have basic ICT skills and competencies. Higher education must not only provide new pedagogical models for ICT integration and learning, it also needs to develop strategies to enhance teaching-learning process inside teacher education programs and to guarantee that all future teachers are well-prepared to use the new tools for learning. Their primary role is to facilitate means for students to access technological applications for learning in a dynamic learning environment. Different from a traditional learning environment where the teacher has more control than

the student, teachers in technology-based learning environments - which are student-centered - need to have knowledge and skills on how to organize e-learning programs to assist students in learning (Mahini, Forushan & Haghani 2012).

A proper integration of ICT in education requires certain variables as defined by numerous studies. A noteworthy research conducted in Kenya defines these variables. Among them, the following were found to be the most significant: resources, rewards and incentives, the time factor, pedagogical factors, teacher attitudes, professional development, pedagogy, leadership and attitudes of administrators (Martin, Khaemba & Chris 2011). It can be concluded that the teachers' role is vital in the integration process. They need to have proper skills and knowledge to develop technology-rich learning experiences for students (Bitner & Bitner 2002; Olofson, Swallow and Neumann 2016; Powers & Blubaugh 2005; Sang et al. 2010). Therefore, their ICT competencies are essential for a successful integration of technological resources in the teaching-learning process. The study from Almerich et al. (2016) focused on creating a basic framework to define the ICT competencies that teachers should possess in order to successfully integrate ICT into the classroom. The results of the study indicated that the ICT competences of the teacher formed a unique set that consisted of two parts, pedagogical and technological competences.

Additionally, Kitschner and Davis (2003) identified the following competences required by lecturers in ICT utilization in instruction in education: competence to make personal use of ICT in instruction, competence to master a range of educational paradigms that make use of ICT in instruction, sufficient competence to make use of ICTs as mind tools, competence to make use of ICT in instruction as a tool for teaching, competence in mastering a range of assessment paradigms which make use of ICT in instruction, competence in understanding the policy dimensions of ICT use in instruction for teaching and learning. Moreover, Farmer and Ramsdale (2016) created a teaching competency matrix that included five competency areas needed for teachers to successfully integrate technology into their teaching. The five competency categories are community and netiquette, active teaching/facilitating, instructional design, tools and technology, and leadership and instruction.

The Sheikh Saud bin Saqr Al Qasimi Foundation for Policy Research conducted a study to examine the perceptions of professional development among public teachers in the UAE.

Their aim was to explore the types of professional development available to teachers, the obstacles to professional development they face, and their needs for additional professional development. Their quantitative findings indicated that 43% of the participants believed that they needed professional development in new technology in workplace, 32% needed ICT skills, while 15% asked for pedagogy competency building workshops. Also, 10% of the participants requested for training in subject knowledge and 9% wanted workshops in acquiring curriculum knowledge (Buckner, Chedda & Kindreich 2006). Interestingly, many teachers stated that they had access to technologies such as smartboards but needed support in understanding how to use it. The report emphasizes the importance of technology in education by suggesting adding it into any professional development programs. Implementing technology into a teaching curriculum is a first step, but the teachers as active agents who are expected to work with the technology, should be fully equipped with the knowledge and skills to use the technology to its full potential by practicing in professional development courses. The practical knowledge possessed by a teacher not only includes the basic skills needed to use a tool but also an understanding of how technology is related to key contexts in pedagogy, additionally improving the skills to allow the teacher's as well as the student's learning on how to function the new tools (Haines 2016).

An additional study that emphasizes the importance of teacher training in technology use is the study by Powers and Blubaug (2005). They explored the teachers' perceptions and needs regarding technology integration. Teachers argued that they would attempt to incorporate technology in an appropriate manner within their classes as long as they are adequately comfortable in handling it and if they had positive encounters with it during their training periods. Importantly, teachers who are equipped to use modern day technology will also be more open to taking use of future technology also (Powers and Blubaug 2005).

It is important to note that ICT is never a substitute for good teaching. Without capable instructors, no electronic delivery can accomplish good results. But neither can traditional classroom teaching if the teacher does not have the necessary skills (Cairncross 2003). Nonetheless, ICT can be used in education to disseminate teaching and learning materials to teachers and students, improve the ICT skills of teachers and students, allow teachers and students access to sources of information from around the world and share ideas on education

and learning. When collaborating on joint projects, ICT provides the possibility to conduct lessons from a remote location and improve administrative efficiency (UNESCO 2006).

2.7.4 Importance of teaching the instructors

Since the rise of technology in the 80's, there have been extensive improvements by schools and educators to create strategies to use technology for the advancement of learning and teaching. These have not generally been converted into practical implementation, which has brought up an attention to develop pre-service teachers' education program before these students will be joining the teaching profession. Technology must be integrated into teacher training to develop and maintain ICT capabilities to prevent the capabilities and competencies from becoming underutilized or isolated (Tondeur et al. 2016). Tondeur and colleagues (2016) pointed out that it is a truly difficult task for teacher training institutions to assist pre-service teachers to develop an ICT-based lesson and to provide the necessary aid for them.

(Tondeur et al. 2016) state that Teacher Training Institutes (TTIs) have incorporated technology into teacher training modules to give the pre-service teachers an understanding of not just the usage of, but also the pedagogical significance of technology usage in 21st century teaching environment. Technology offers an efficient medium for communication and hence it can be used to accentuate the pedagogical knowledge of teachers. Furthermore, the constant developments in technology make it imperative for both in-service and pre-service teachers to continue learning about new technological tools, its capabilities and applications in learning and teaching (Haines 2016). Thus, it is very important to train teachers, not just in the use and application of technology but also to constantly upgrade their capabilities to keep abreast of latest developments in technology which can be applied in teaching. Gronow (2007) emphasizes that teachers are ongoing learners of ICT and consequently, as they accept and adjust ICT as an essential component of their work place, they will improve their ICT understanding, leading towards its pedagogical advantages. So, it is rather important to offer teachers' training and professional development on both the technical and pedagogical aspects of ICT use across the curriculum.

Awan (2011) studied teachers' professional development in the context of the UAE and the impact of conducting training sessions that focus on how to use multimedia games for teaching and learning purposes. Their findings indicated that teachers' attitudes towards ICT integration became more positive after the training. It also showed that teachers needed to be trained when planning for changes in teaching and learning practices in schools, in order to achieve the targets and objectives. Also, Johari (2003) asserts that teachers need to master modern pedagogy that includes a student-centred approach, group and teamwork, independent learning and project-based instruction. In addition, teachers must use interactive multimedia and internet to familiarize students with new technologies. Finally, Al-Mekhlafi (2004) reports that many teachers in the UAE show positive attitudes towards ICT integration.

A Dutch study emphasized on the reasoning provided by the teachers concerning the application of technology in teaching (Heitink et al. 2016). The results highlighted that the majority of the technological use was directed to enhance and improve either both pedagogy and subject matter or just pedagogy singly. Reasons addressed transforms learning into a more attractable activity, achieving goals of education and assisting the process of learning. Technology tools were utilized to assist an educational activity; the utilization of technology was absolutely required in only a handful of the video cases. Nearly half of the cases showed an adequate association between the reasoning offered and practice. The results assisted in obtaining a clearer picture of the professional reasoning offered by teachers to justify their use of technology (Heitink, et al. 2016). The study shows how teachers are developing their understanding about the use and purposes of technology over time. However, the focus should not only be on understanding, but also on the practical implementation of the different concepts of TPACK and its interaction, and how to implement the technology in the classrooms.

In a recent study conducted by Hargis et al. (2013) about faculty perceptions of iPad deployment in Higher Colleges of Technology in UAE, it was noted that the use of technology had positive impact on faculty engagement unofficial professional development activities and adoption of dynamic student-centred pedagogy. The study indicated the following: student engagement increased as they were empowered and became more independent, assignment submission deadlines were met more often, teachers' role was

transformed into a facilitator rather than lecturer and peer coaching among faculty increased. Additionally, instructors started catering to different learning styles. Students and teachers started generating better quality material and deliverables, by using applications. Courses then became more accessible due to the videos and materials posted in the iPad. Finally, students and teachers got more involved and enthusiastic with the new experience (Hargis et al. 2013). They emphasize that "The Technology, Pedagogy, and Content Knowledge model area of content is an emphasis in the next stage of our expansion" (Hargis et al. 2013, p. 57)

It is important for pre-service teachers to have adequate knowledge of each section of the comprehensive TPACK model. According to Koehler and Mishra (2005), "We view technology as a knowledge system that comes with its own biases, and affordances that make some technologies more applicable in some situations than others" (p. 132). In this context, Archambault and Crippen (2009, p.73) claim that "TPACK considers the relationships among students, teachers, content, technologies, and practices". Therefore, by using Shulman's (1986) PCK framework and combining the relationships between content knowledge (subject matter that is to be taught), technological knowledge (knowledge about the use and purposes of technological tools), and pedagogical knowledge (practices, processes, strategies, procedures, and methods of teaching and learning), high quality instruction in classroom is ensured. Hence, teacher education programs must guarantee that these elements are covered and focus on how they can be enhanced.

Similarly, Finger et al. (2010) assert that educational programs have the duty to prepare future teachers to teach students who are living in a world with ongoing technological changes. They point out that in Australia teacher education programs have been designed using Shulman's Pedagogical Content Knowledge (PCK). However, they argue that this is insufficient in building the professional competences of future teachers in the use of ICT to enhance learning and teaching in the 21st Century. Therefore, he suggests TPACK as the total package' for teaching in this new era of technological advancement. They also state that "where ICT initiatives have failed, there has not been any TPACK conceptualization informing the thinking, design and implementation. In many instances, teachers tend to find the professional development focused on technological knowledge through introducing them to new hardware or software applications, without considerations of context, pedagogy and content" (Finger et al. 2010, p.116). TPACK capabilities gain importance in the endeavour

to bring down the gaps and instances of inadequate instructions in high-poverty schools due to technologically ill-equipped teachers (Paratore et al. 2016). An understanding of TPACK and possession of necessary technological skills will assist teachers in successfully and effective integrate technology into the teaching and learning activities (Pamuk et al. 2015) thereby assisting in achieving the objectives of PCK more effectively.

Chai et al. (2013) reviewed 74 studies that used TPACK as a framework to investigate ICT integration into education. Based on the studies reviewed they provided a number of suggestions, arguments and recommendations regarding the importance of teachers' TPACK capabilities. They state that TPACK can be used as a framework for teachers' acquisition of knowledge for ICT integration, and it can be used as a guide for educators to face challenges of teaching and learning in the ever-changing technology society. For example, lessons can be created using "problem-based learning (PK) supported by simulation (TK) for Earth Science (CK)" (Chai et al. 2013 p.41). In addition, its construct can be used to evaluate the quality of instruction in classrooms, where educators can identify the weaknesses and strengths of the lessons that use ICT. Chai et al. (2013) also argue that TPACK can enhance the use of new technologies such as mobile technologies, multi-touch collaborative software, multi-users virtual environment etcetera, by engaging teachers in learning by design using the TPACK framework. Similarly, TPACK can be used to analyse policy documents to examine the use of its constructs in formulating standards. Finally, Chai et al. (2013) reviewed studies related to pre- and in- service teachers and argue that their TPACK understanding needs to be built so that they can help their students in sense making of lessons.

Archambault and Crippen (2009) studied K-12 online teachers to measure their knowledge of the three domains of TPACK framework: technology, pedagogy, content, and the combination of each of these areas. Their findings indicated that the online teachers were very confident about their knowledge in these domains, however, their confidence in technology was less. A small correlation was found between the domains of technology and pedagogy, as well as technology and content. Yet, there was a strong correlation between pedagogy and content. The authors concluded that the field of teacher education needs to adapt their way of teaching to better prepare future teachers to teach in unconventional settings which include integration of technology throughout content courses. Janssen and

Lazonder (2015) conducted a research to highlight the importance of lesson plans in facilitating the integration of technology in classrooms. Researchers used TPACK as their theoretical framework to investigate the type of supplementary materials preferred by in-service teachers and pre-service teachers. The participants were both in-service and pre-service teachers who opted for different types of materials and approaches. The in-service teachers' choice was consistent with TPACK framework, but the pre-service teachers were more future-oriented and favoured support that would help increase their skills rather than enhance their existing knowledge. The study also highlighted that TPACK framework has enhanced the application of technology and the three domains should be learned hand in hand. In short, it is important that when creating and shaping teacher trainings to keep in mind that pre-service teachers and in-service teachers have different needs and ambitions to learn about ICT integration.

On another note, suggestions for the education policy development contains increasing the models of funding over and above the basic technology access to incorporate continuous educator support, establishing new modalities which assists newer professional development models built upon the very learned-centred practices which the educators are motivated to use (Blackwell, Lauricella & Wartella 2016). Moreover, Koh, Woo and Lim (2013) claim that pre-service teachers' ICT course experience influences their TPACK perceptions. Their study was conducted in Singapore and data was collected from pre-service teachers who had taken a compulsory ICT course during their teacher training program. Their findings showed that pre-service teachers' perceived TPACK and willingness to integrate ICT in their teaching was influenced by their perceptions of course experiences that supported the development of TPACK knowledge components. This is aligned with several other studies that discuss the importance of teachers' positive skills and attitudes toward ICT, as these are key factors in the likelihood that a teacher will start implementing ICT in the classroom (Alayyar, Fisser & Voogt 2012; Albirini 2006; Christensen & Knezek 2008; Mumtaz 2000; Tearle 2003)

2.8 Perception Theory

The current study will explore the perceptions of pre-service teachers and their instructors regarding the pre-service teachers TPACK capabilities. Bern's (1972) perception theory will be used in this study to create an understanding of how the pre-service teachers develop and express their views and perceptions. Bern's (1972) self-perception theory is based on two claims. Firstly, the theory claims that people understand their beliefs, attitudes and perceptions by understanding their own behaviour and the circumstances behind it. Secondly, the theory states that if an individual doesn't have full understanding of his behaviour, he or she acts like an outsider who observes the actions and conducts and tries to make a sense out of it and deduce their own inner characteristics (International Encyclopedia of the Social Sciences 2008). Bern (1970, p. 8) also asserts that individual's "own behaviour will be used by him as a source of evidence for his beliefs and attitudes". The below sections will highlight the theory in detail.

2.8.1. Self-Perception Concept

The self-perception theory is considered to be counterintuitive (Guadagno et al. 2010). Conventionally, it is believed that personalities and attitudes drive individuals' actions and behaviours, such is not the case with the concept of self-perception (Ito, Chiao & Devine 2006). The concept is based on the assumption that people are what they do (Bern 1967). The self-perception theory is based on the argument that individuals interpret their actions the same way they interpret others' actions and every individual's action is influenced by social surroundings and not influenced by one's free will (Bern 1972). According to Bern (1967), individuals' attitudes are developed from observing one's own behaviour and making a conclusion on what attitude caused that behaviour. The theory further assumes that individuals can induce attitudes without retrieving their internal states (Guadagno et al. 2010). People are believed to interpret their unconcealed behaviours in the same manner they interpret others' behaviour.

The self-perception theory is considered to be among the most influential theories that explain how self-knowledge is gained. The theory was developed by Daryl Bern (1972) and has two assertions as indicated earlier. The first assertion is that people become aware of their inner states, such as attitudes and beliefs, by assessing their behaviours and

circumstances under which these behaviours occur (Bern 1972). An example of this assertion is that an individual who observes that he or she loves listening to classical music may infer an interest in classical music. The second claim is that individuals who do not have a clue of their internal states are in the same position as external observers who have to rely on external clues of their behaviour to deduce or infer their internal states (Bern 1972). In short, people depend on their behaviours and the circumstances in which these behaviours occur, to infer their inner states such as beliefs and attitudes.

The self-perception theory simply claims that people become aware of themselves by observing their behaviours. However, beyond this theory's simplicity, it is also influential because of its ability to contrast the most prominent psychological theories that explain how behaviour associates with self-knowledge (Bern 1967). The Self-Perception Theory is mostly known for its ability to contrast the cognitive dissonance theory (Bern & McConnell 1970). The Cognitive dissonance theory is based on the assumption that people have a tendency of maintaining consistency between self-beliefs and whenever they are faced with two inconsistent beliefs about the self, they experience a dissonance state (Bern 1967). For instance, the inconsistency between the thought that one does not like something and another that he or she constantly does the same thing, causes dissonance. The individual in such a state is motivated to resolve dissonance by altering one of the inconsistent thoughts. Bem and McConnell (1970) suggest that one of the ways to reduce dissonance is to alter prior belief to align with the behaviour. For instance, if one does not like football but constantly finds himself watching football games, he or she needs to change the belief to align it with the behaviour. In short, an individual can resolve his dissonance by changing prior attitude or belief to become more favourable to behaviour.

The Cognitive Dissonance Theory and the Self-perception Theory are differentiated in two ways. First, different from the cognitive dissonance concept, the self-perception concept is not based on the assumption that a motivational state is required which is dissonance reduction in cognitive dissonance theory to change self-knowledge (Bern & McConnell 1970). Instead, the self-perception theory assumes that individuals only need the willingness to infer their inner states by considering circumstances under which their behaviours occur to change their self-knowledge (Bern 1967). Second, self-perception theory is again based on the belief that individuals can use their behaviours to infer their self-knowledge if their

internal knowledge of their prior beliefs is weak or ambiguous (Bern & McConnell 1970). On the other hand, cognitive dissonance theory assumes that individuals can only change their self-knowledge with the existence of clear clues or knowledge of prior beliefs and conflicts (Bern 1967). Besides, different from self-perception theory which assumes that behaviours are not within individual's free will, cognitive dissonance theory assumes that individual's behaviours are freely chosen (Bern & McConnell 1970). Although the two theories contradict each other, psychologists suggest that both can be used to explain changes of self-knowledge in different circumstances (Bern 1967). The self-perception theory provides an explanation on how new self-knowledge is created from behaviour that does not conflict with prior self-belief whereas the cognitive dissonance theory explains how self-knowledge changes from freely chosen behaviour that conflict with prior self-beliefs (Bern & McConnell 1970).

The comparison of the cognitive dissonance theory with the self-perception theory is considered to be a significant contribution to the latter. Yee and Bailenson (2007) argue that the field of psychology has been advanced by criticizing cognitive dissonance and other old theories. However, Bern (1967) argues that the self-perception theory's contributions go beyond cognitive dissonance theory because of its ability to explain various self-attribution phenomena. Most importantly, self-perception can be used to explain how individuals can develop self-knowledge from behaviour even with the existence of inconsistency between behaviour and initial beliefs. In short, the theory helps to understand how individuals can infer that they intrinsically like doing some activities that they thought they do not enjoy doing when there are no motivations to explain their behaviour. Besides, however, self-perception can be used to explain how individuals deduce that they do not intrinsically like doing a certain activity that they initially believed to be enjoyable when there were obvious situational motivations that could be used to explain their behaviour (Burmann, Hegner & Riley 2009).

Cognitive dissonance cannot be used to explain how self-views changes when there is no inconsistency between initial belief and behaviour (Bern 1967). In contrast, the self-perception theory explains the change in self-views without assuming that inconsistency has to occur between behaviour and initial self-beliefs. In short, the individual must infer that their behaviours are supposed to earn them external rewards rather than meet their intrinsic

interest in the activity. Self-perception not only explains how individuals change their self-views due to external motivations that cannot be associated with cognitive dissonance but also stresses the risks of offering motivations to people for them to engage in tasks or behaviour that they already love (Burmann, Hegner & Riley 2009). The ability to explain how self-knowledge changes under different condition makes the self-perception theory one of the most important theories.

2.8.2 Self-Perception Experiments

The originator of self-perception theory, Bern (1972) conducted the first experiment that involved individuals who were tasked with listening to a recording of a man describing the peg-turning task. One group of participants were told that the man had been rewarded with USD1 to give his description while the second group was told that the man had been rewarded with USD20. The first group believed that the man enjoyed his work more than the second group. These conclusions of the two groups showed a correlation with the feeling that was expressed by the individuals involved. The fact that the participants were able to infer the man's feelings correctly helped to conclude that they were able to guess their own feelings from observing their behaviours.

Other studies have also provided a similar conclusion to Bern's experiment and have also confirmed that self-perception influences people in different, unexpected contexts. Ito, Chiao and Devine (2006) conducted a study to investigate whether facial changes can trigger racial bias among participants. Participants in the study were required to use their mouths to hold a pencil (which shaped their mouth in a smile automatically) while looking at pictures of anonymous white and black subjects. The findings indicated that participants who smiled while looking at pictures of black men had less implicit prejudice than those who were made to smile while looking at pictures of white men.

Blascovich et al. (2002) conducted a study that involved participants who were placed in a virtual environment. Some individuals were made to watch their virtual doppelgänger do similar exercises, some watched their doppelgänger stand still, and some watched other people's virtual doppelgänger exercise. Those who were made to watch their own doppelgänger exercise reported greater beliefs than the other two groups that they could

exercise successfully. Chaiken and Baldwin (1981) conducted a study that focused on environmental attitudes. Each participant was found to have well or poor prior attitudes towards the role of an environmentalist. They were grouped into two, with one group required to fill a questionnaire that was supposed to arouse past pro-ecology behaviours and the other group filled questionnaire that aroused past anti-ecology behaviours. Individuals who had prior attitudes towards the role of the environment were not affected by the manipulation of questions. The study therefore showed that past behaviours could affect individuals' attitudes.

The most recent study was conducted by Guadagno et al. (2010) to investigate individuals' attitudes towards recruitment by terrorist organizations through the internet. The authors were interested in understanding how new converts acquire radical attitudes that affect their radical behaviours. The study concluded that the self-perception theory could be used to understand social influence and identity in terrorist recruitment scenario. Critcher and Gilovich (2010) conducted several studies to investigate the relationship between mind wandering (unobservable behaviours) and the self-perception theory. They were interested in determining whether mind wandering can allow individuals to infer their preferences and attitudes. They found that allowing the mind to wander to current events rather than past events, many events as opposed to just one and positive events is associated with boredom, and therefore lead to dissatisfaction.

2.8.3 Application of the Self-Perception Theory

The self-perception theory is mostly used in changing people's attitude (Yee & Bailenson 2007). In the therapeutical field, self-perception is used differently from other psychological theories. Conventionally, it is believed that inner states of individuals cause mental issues. Different for the other psychological perspectives, the self-perspective theory considers external behaviours as the cause of psychological problems. The assumption is that behaviours and perceptions that are unfavorable may affect individual's ability to adapt their behaviours and will then cause psychological problems (Yee & Bailenson 2007). Using this assumption, the self-perception concept can be used to address psychological problems affecting individuals. Psychological problems are addressed by guiding individuals on how to change their behaviours to more favorable behaviours that allow them to develop positive

attitudes and consequently solve their psychological problems. Treating social anxiety is an example of a therapy that uses self-perception theory to help individuals with poor social skills to learn social skills (Grover et al. 2013). The concept can also be used to change people's self-image. For instance, young people may be engaged in community work to help them improve their self-image. Self-perception theory is also used in marketing and persuasion (Burmann, Hegner & Riley 2009). Marketers may engage individuals in certain activities that will later change their attitude towards a product that is being marketed. The main aim is to ensure that individuals are guided towards preferring certain products after performing certain tasks that allow them to observe their behaviours.

2.8.4 Self-perception and Education

Different studies have shown that attitudes and perceptions of teachers and students affect the integration of technology in education. Chai et al. (2017) suggest that understanding students' perceptions of learning with technology can help in improving educational programs. In a study to investigate students' perception on weblogs, Lui et al. (2005) found that students' perceptions are essential in promoting successful adoption of technology in education. They further argue that since technology does not have inherent pedagogical value, students should pursue to adopt sound behaviours such as interaction with technological application to improve their acceptance of technology and learning. Ramey (2013) argues that the use of technology by teachers helps to reduce the difficulties that are often experienced in teaching. Abdullahi (2013) argues that teachers' perception towards technology integration into education can change if they are trained and allowed more time to interact with technology. A study by Schuck and Kearney (2008) indeed found that initial use of interactive whiteboards (IWBs) increased students' positivity towards this technological tool. Chai et al. (2012) argue that TPACK perceptions are associated with teachers' capabilities. In short, teachers' repeated use of the TPACK elements help to improve their perceptions regarding their abilities. These studies show that perceptions towards technology are important in facilitating its implementation. Also, it is essential for designing educational programs.

For this specific study, understanding pre-service teachers' perceptions in TPACK areas would help teachers, educators and designers to design more effective lessons and programs.

In this context, Chai et al. (2013 p. 38) suggests that "survey studies about students' perception of learning with technology could also provide important information to help ministry and schools in planning education programs". Bern's theory can support the study in gaining a better understanding of the current pre-service teachers' perceptions regarding their TPACK capabilities.

2.9 The UAE educational context

2.9.1 Initiatives in the UAE

The search for studies in the UAE context indicated shortage in extensive formal research related to technology readiness of the teachers in the UAE. However, there were reports that slightly highlighted this issue. For example, reports published by Knowledge and human Development (KHDA) in Dubai, and by Abu Dhabi Education Council in Abu Dhabi as well as newspaper articles. For instance, The National (2014) reported that His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, launched Mohammed bin Rashid Smart Learning Program in April 2012. His UAE Vision 2021 to become a knowledge-based economy through the integration of technology in education has led to investing AED 1 billion to provide students an electronic tablet and access to high-speed 4G networks by 2019. Initially the program covered 123 schools and fully implemented Smart Learning techniques with 11,000 students in the 2013/2014 school year (Pennington 2014). The program intends to cover all government schools by 2019. The Smart Learning website states "Emirati students will be equipped with skills and competencies that will enhance achievements and competitiveness to be leaders of the future" (The Mohammed Bin Rashid Smart Learning Program 2015). Mr. Mohammed Gheyath, director general of the program says, "The main goal is to reform education in the UAE to become one of the best education systems in the world" (Pennington 2014).

ESCWA (2011) also reports that a number of public sector entities are involved in concrete projects moving the UAE closer to maturity as an information / knowledge-based society. Most of these projects are centred on educational institutions and governmental sectors. For instance, the K-12 educational system of public schooling (Intel Teach to the Future Initiative); Higher Colleges of Technology iPad initiative, Cisco initiative at a number of

universities (UAE university and American University of Sharjah); Microsoft initiative with the computer literacy driving license (ICDL) (University of Sharjah); and the Oracle Educational initiative (American University of Sharjah). The demand for such policy is derived from the massive and widespread ICT initiatives across the UAE. For instance, His Highness Sheikh Mohammed Bin Rashid Al-Maktoum Vice President and Prime Minister of the UAE launched an initiative, which saw 14,800 iPads distributed in 17 campuses belonging to the three UAE Federal Higher Education institutions in 2012 (AlTaher 2012). A similar initiative was launched across the UAE with AED 1 billion being budgeted for it, where the first phase saw 100 tablets being distributed among schools (Barakat 2012).

Education, especially higher education is essential for the growth of any economy in the world. Within the last two decades, the United Arabs Emirates (UAE) has experienced a remarkable growth in all dimensions, becoming one of the most dynamic nations in the world. The sector of higher education is among the sectors that have experienced explosive growth, making the UAE become an international hub for higher education in the world (The Young Vision 2017). The country hosts many universities, both public and private. The government funds public Higher Education institutes to guarantee that the UAE citizens can enrol free of charge. The UAE is among countries with the highest enrolments into institutions of higher learning in the world (UAECD 2017). The next section will discuss the landscape of higher education in the United Arab Emirates.

2.9.2 The landscape of higher education in the UAE

Since the inception of UAE, the country has developed economically due to strategic plans set by its leaders. Higher education is regarded as a critical tool for UAE growth. The government is committed to ensuring that majority of citizens are educated by 2021. It supports establishment and maintenance of both public and private institutions of higher education.

The Higher Education sector began in 1976 after the inception of the UAE in 1971 as a result of seven self-governing emirates uniting (Alhebsi, Pettaway & Waller 2015). The establishment of the first university, the United Arab Emirates University in Abu Dhabi marked the start of higher education in the UAE. Since then, all government and private universities have been focusing on improving the quality of Higher Education in the country.

Education in the UAE was emphasized by its founder, Sheikh Zayed bin Sultan Al Nahyan, who indicated that education was essential for the UAE growth. Currently, the country has a 2021 agenda to ensure that the higher education is improved and accessible to all young people (Vision 2021 2017). The aim is to ensure that the UAE population can address various issues facing modern society. Since the inception of the UAE, it has managed to achieve overall literacy rates of 90 percent (UAECD 2017).

Three government bodies regulate the higher education institutions in the UAE, namely the Ministry of Education, Abu Dhabi Education Council (ADEC) and the Knowledge and Human Development Authority (KHDA). The Ministry of Higher Education oversees higher education institutions through the Commission for Academic Accreditation (CAA). CAA was established in 1999 with the aim of promoting educational excellence in higher education institutions. The agency promotes quality in higher education through licensure of institutions and accreditation of programs. The main aim is to ensure that education provided by institutions of higher learning in the UAE is consistent with international standards. In short, the CAA's mission is to ensure that students have confidence in higher education institutions in the UAE (CAA 2011). While the Ministry of Education operates on the federal level, operations of ADEC and KHDA are at Emirate level. Their main responsibilities are to promote quality education, innovation and align higher education outcome with the labour market.

The UAE has two types of accredited universities: universities that are accredited by the Ministry of Higher Education through the CAA and foreign Universities that are accredited jointly by their nations of origin and KHDA for Dubai and ADEC for Abu Dhabi. Foreign Universities are known as free-zone universities and are mainly international universities' branch campuses. These universities provide a similar academic system to the main campuses in their countries. The KHDA and ADEC mandate is to ensure that free-zone universities provide quality education to students. CAA on the other hand promotes educational excellence in all Higher Educational institutions and operates as a Federal Government agency for quality assurance.

Currently, there are many institutions for higher education available to both local and international students desiring to pursue their higher education in the UAE. The UAE public

universities include: United Arab Emirates University (UAEU), Zayed University (ZU) and Higher Colleges of Technology (HCT).

The United Arab Emirates University is the first university in the UAE that is considered to be leading in terms of teaching and research. The UAE University started with an enrolment of 502 students, a number that has expanded with about 30-fold over the years (Embassy of the United Arab Emirate 2017). Currently, most of the students at the university are women. The UAE University has six colleges and offers more than 70 undergraduate degrees that are accredited by both domestic and international bodies (UAECD 2017). In academic year 2016/2017, the UAE University enrolled 13,310 students with 81 percent of enrolled students representing female students (United Arab Emirates University 2017). The Zayed University (ZU) is another prominent university in UAE that was established in 1998 as a women's institution but has recently opened men's campus. The ZU is US accredited with five colleges. The Higher Colleges of Technology (HCT) is considered to have the highest number of students in the UAE with an enrolment of about 16,000 students (UAECD 2017). HCT has 16 colleges for both male and female students, with women being more than 10,000. The UAE University, HCT, and Zayed University are public universities. In other words, they are funded by the government of UAE. Private universities, on the other hand, are privately funded and operated, which are mostly the international universities. Different from public universities which are established at the federal level, private universities are funded at emirate level or by private entities. However, there are some public universities that are established at Emirate level and overseen by emirates level regulator like ADEC and KHDA. Most of the public non-federal and public higher education institutions were established from the year 2000, which is a reflection of government's commitment to achieving its economic vision of 2030. Some of the prominent private universities include Sharjah University, Abu Dhabi University, American University of Sharjah, American University in Dubai and Khalifa University of Science and Technology. The country has been able to increase the number of universities through a partnership with international education providers.

The UAE government also partners with several international universities to ensure that the country has enough higher education institutions. Campuses that are set up through the partnership are located in special zones and are intended to provide chances for students who

are seeking to study abroad but are not able to do this. These partnerships are also aimed to improve education provision and also encourage the integration of western and Arab cultures. International partnerships include New York University, The Rochester Institute of Technology and the Sorbonne (UAECD 2017).

The government funds the UAE public universities with the oil funds. The main aim is to ensure that citizens of the UAE can access Higher Education without having to pay for it. In 2009, the budget for higher education amounted to approximately AED 10 billion (USD2.7 billion), which was about 28 percent of the federal budget (Warner & Burton 2017). Compared with other GCC nations, education is considered a priority in the UAE. The government has been increasing budget for education funding which has resulted in an increase in students' enrolment in higher education institutions, however, international students are expected to fund their own schooling in the UAE. For instance, undergraduate students from foreign countries at the University of Wollongong are expected to pay tuition fee between AED 217, 600 (USD59,243) and AED 257,000 (USD69,970) (Richards 2016). Students are also expected to fund other expenses such as accommodation and transport.

Higher education institutes are supposed to play three major roles in the UAE. They are supposed to engage in teaching, research and community services. The teaching role, in this case, is considered the core of the three functions. It involves transferring important knowledge and skills in respective fields to students. Students are helped to develop applications from the skills and knowledge they acquire from universities with the aim of addressing issues faced by the society. Teaching and research are expected to provide services to society indirectly while service to the community is provided directly to the society.

Given that the focus of this thesis is students from college of education, literature showed that various institutions of higher education have colleges of education. These colleges of education offer different majors to students. Institutions of higher education that offer bachelors in education include Ajman University, Al Ain University of Science & Technology, Al Ghurair University, Al Hosn University, American University in Dubai, American University in The Emirates, American University of Ras Al Khaimah, City University College of Ajman, Emirates College for Advanced Education, Jumeirah University, United Arab Emirates University, University of Sharjah, Zayed University, and Higher Colleges of Technology.

CHAPTER THREE: METHODOLOGY

3.1 Overview of the Chapter

This chapter discusses the methodology that was used in the research project. It begins by justifying the research paradigm. It also presents the research design and approach. Further, it discusses the sampling techniques, data collection, research instruments, piloting, procedures and data analysis. It also looks into the issues of reliability, validity, and research ethical considerations.

3.2 Research Approach

The purpose of this mixed methods study with an explanatory research design was to examine the perceptions of pre-service teachers' knowledge on their TPACK capabilities, and their instructors' perception of the same with regard to their students (pre-service teachers). Taking into account that the purpose of the research determines the methodology and design of the research, a mixed methods approach was adopted in the present study as it was found to be the most appropriate design to answer the research questions appropriately (EPPI-Centre 2017; Hedström & Swedberg 1996). Morgan (2007) describes four key features to be outlined in a research approach: the epistemology that informs the research, the philosophical paradigm (e.g. post positivism, constructivism, pragmatism), the methodology, and, finally the data collection processes.

Blackstone (2017, p. 39) argues that "paradigms are a way of framing what we know, what we can know, and how we can know it". In social science, there are numerous major paradigms and each with its own significant perspective. Blackstone highlights four of the most common social scientific paradigms that can be used in research; positivism, social constructionism, critical paradigm and postmodernism. In this study, the importance of two paradigms subside the others, namely constructivism and positivism. These two major paradigms are either subjectively constructed by individuals (constructivism) or are objectively that needs to be measured by the researcher (positivism). Hence, these two paradigms dictate us to use mixed methods, the quantitative phase (survey) is based on positivism and the qualitative phase (interview) is based on constructivism.

3.2.1 Mixed methods design

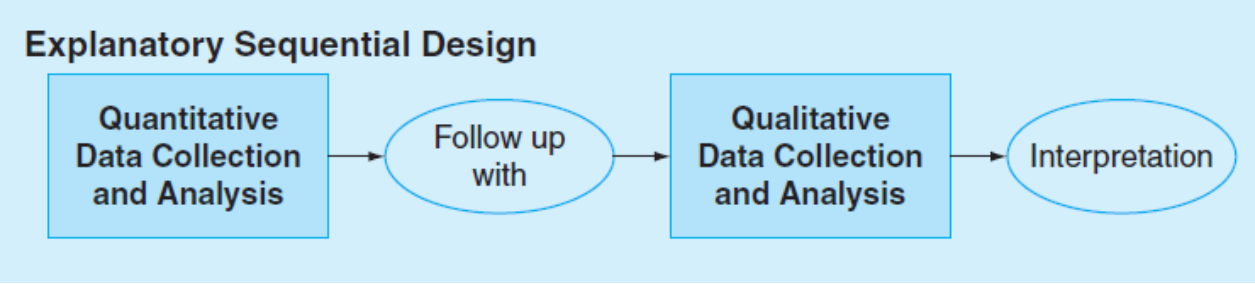
Using the mixed methods design, a researcher collects data using a quantitative survey instrument and follows up with interviews with a few individuals who participated in the survey to learn more detail about their survey responses (Cresswell & Clark 2006). It involves philosophical assumptions, the use of qualitative and quantitative approaches and the mixing of both approaches in a study (Creswell & Creswell 2017). Therefore, it is more than just collecting data, it is a way of involving both approaches in tandem in order to enhance the strength of the study. The combination of quantitative and qualitative data can offer an in-depth understanding of the research problem, as collecting both kinds of data can overcome the weaknesses related with solely relying on information gathered from either source. Quantitative data can yield results, which describe trends in the behaviour of a population, and the qualitative data can uncover the complex causes underlying these trends (Creswell 2012).

Understanding the perceptions of pre-service teachers' TPACK capabilities benefits from a mixed methods approach rather than one method approach because one data source is not being enough to understand the phenomena. Also, the results need further explanations and therefore, the use of a second method can enhance the primary data. The combination between quantitative and qualitative research is widely accepted in academia as stated by Fraenkel, Wallen and Hyun (2015, p.11): "its advantages is that by using multiple methods, researchers are better able to gather and analyse considerably more and different kinds of data than they would be able to use just one approach. Mixed-methods studies can emphasize one approach over the other or give each approach roughly equal weights".

Interestingly, the literature review conducted for this study indicated that most researchers preferred a mixed methods approach to tackle research questions associated with ICT in education, such as, Almekhlafi and Almeqdadi (2010); Serhan (2007); Goktas, Yildirim and Yildirim (2009); Siragusa and Dixon (2008); Tamim (2013); Parahoo and Tamim (2012); Al-Mekhlafi (2004); Ismail, Al-Awidi & Almekhlafi 2012). Moreover, quantitative and qualitative data collection increases knowledge and supports the understanding of the study problem (Creswell 2012). The combination of the both methods add deep understanding that might be missed while using only one method (Leedy & Ormrod 2010). Researchers believe

that “the mixed methods approach produces insightful results, and is used to develop the scope of research to balance the weaknesses of either approach” (Driscoll et al. 2007, p. 19). Also, Glesne (2006, p. 36) argues that “to increase confidence in research findings may also involve the incorporation of multiple kinds of data sources”. Qualitative and quantitative parts of the mixed methods approach individually contribute to the study differently. Quantitative methods highlight the factors that might affect the research problem while the qualitative method is based on the participants’ views that can be independent and subjective. This mixed methods study follows an explanatory sequential design (Creswell 2012). Firstly, quantitative data is collected and then followed up with qualitative data. The quantitative data is collected through surveys, whereas the qualitative data is collected through interviews with pre-service teachers and their instructors (Fraenkel, Wallen & Hyun 2015). Figure 2 below clarifies the process of the current study.

Figure 2: Explanatory Sequential Design



Creswell (2012) asserts that collecting qualitative data after collecting the quantitative data supports the elaboration on the results. Also, this approach emphasizes the quantitative data, while the qualitative data is used to refine and elaborate on phase one findings. He also argues that this approach captures the best of both methods. In addition, Terrell (2012) maintains that mixed-method gives equal importance to both methods, and attempts to integrate data during interpretation. Also, the approach explains quantitative results by investigating certain findings in more detail. However, the weakness of this approach is that it is time consuming.

Furthermore, the benefits of sequential mixed methods have been used by different scholars, for example, Lisle (2011) asserts that sequential mixed methods studies are able to grasp multifaceted issues in education and social studies and can explain and expand on findings.

Also, merging different information from qualitative and quantitative data enhances transferability, generalizability and practicality. Ivankova et al. (2006) believe that the advantages of sequential mixed methods are its straightforwardness, the chance to discuss all aspects of quantitative results and being able to address unexpected results from quantitative results. Finally, Creswell and Clark (2010 p. 69) argue that "sequential approaches are useful when a researcher needs qualitative information before the intervention, to shape the intervention, to develop an instrument, or to select participants, or after the intervention, to explain the results of the intervention or to follow up on the experiences of participants with certain types of outcomes". They also point out that the analysis of quantitative data provides a general answer to the research questions, while the qualitative data refines the statistics by investigating its complexity and meanings.

The majority of the studies conducted on the topic of TPACK used a mixed methods approach. The researchers primarily integrated the qualitative method in their survey through open-ended questions in questionnaires or survey instruments. In this regard, a study carried out by Drysdale, Graham, Spring and Halverson (2013) investigated research trends among 205 doctoral and masters' dissertations in the field of blended learning in the last decade. They found that the methodologies used were inferential statistics (34%), combined inferential and qualitative (26%), and only qualitative (20%). Glesen (2006) emphasizes that using different methods to gather data contributes to the trustworthiness of the data. However, he believes that to increase the confidence in research findings it must involve multiple sources.

3.2.2 Research Questions

The present study aimed to explore the following four research questions which were elicited from the literature review:

1) *What are the pre-service teachers' perspectives on their preparedness to use ICT for future classroom practices?*
2) *What are the instructors' perspectives on pre-service teachers' preparedness to use ICT for future classroom practices?*

3) *What factors influence the acquisition of knowledge and skills regarding ICT integration in the classroom?*

The research questions have been explored with the use of the adjusted survey that consisted of 55 questions, followed by an interview with both pre-service teachers and their teachers that consisted of 10 questions. Such interviews were expected to reveal the level of cogency and validity of the students' perspectives and the degree to which the teachers' opinions support the findings as well as underlie the recommendations of the study. This would be particularly important if the teachers' opinions match or have a significant amount in common with the students' perspectives.

3.3 Data Collection

3.3.1 Scope and site studied

The focus of the current study was to investigate the UAE universities regardless its legal standing whether public or private. Therefore, all universities in the UAE that offer bachelors in education were contacted and asked to participate in the study, see appendix A for the email sent to the universities. The universities were identified through Ministry of Education website, these institutions include Ajman University, Al Ain University of Science & Technology, Al Ghurair University, Al Hosn University, American University in Dubai, American University in The Emirates, American University of Ras Al Khaimah, City University College of Ajman, Emirates College for Advanced Education, Jumeirah University, United Arab Emirates University, University of Sharjah, Zayed University, and Higher Colleges of Technology. After sending the email, researcher followed up with a phone all and out of the above institutes only 3 responded to the invitation and participated in the study.

3.3.2 Participants

Sampling means selecting a particular group or sample to represent the entire population. Sampling methods are majorly divided into two categories, probability (random) sampling and non-probability (non-random) sampling. In the first case, each member has a fixed, known opportunity to belong to the sample, whereas in the second case, there is no specific

probability of an individual to be a part of the sample. Non-probability sampling relies on the assumption that the characteristics are evenly distributed within the population, which makes the sampler believe that any sample so selected would represent the whole population and the results drawn would be accurate (Key Differences 2017). Purposive or judgmental sampling is a type of nonprobability sampling in which the units to be observed are selected based on the researcher's judgement about which ones will be the most useful or representative.

Hence, purposeful sampling was the sampling method selected for this aim. Merriam (2009, p. 77) argues that purposeful sampling "is based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned". The target population of the current study is all pre-service teachers enrolled in a Bachelor of Education's program the 3 universities. The sample used for this study were three universities in the UAE, with a total of 359 pre-service teachers participating. As stated by Long, Convey & Chwalek (1985) samples should be representatives in order to generalize the results. Nevertheless, the sample size of the current study is 359, which can be considered small given the large numbers of the students in these universities. However, Fraenkel, Wallen and Hyun (2015, p. 101) assert that if the researcher has previous knowledge of the population and recognizes the underlying aim of the study, he or she can judge "whether or not a particular sample will be representative". For the quantitative data collection, 359 participants completed the revised TPACK survey. The 359 participants were students from universities that served as a representative to the population in college of education. Hence, the findings were significant for a wider population than if the sample had been limited to a smaller population. Moreover, the criteria specified for the selection process is that the participants must be in a teacher education program and not in any other discipline in the college of education. Table 2 below represents the demographic details of the 359 participants.

Table 2: Demographic details of the participants

	Independent variable	Frequency	%
Gender	Male	7	1.9
	Female	352	98.1
Age	18-22yrs	220	61.3
	23-26yrs	110	30.6
	27-32yrs	23	6.4
	32yrs and older	6	1.7
Institute	A	133	37.2
	B	142	39.6
	C	83	23.1
Degree	Bachelor's Degree	346	96.4
	Diploma	7	1.9
	Higher Diploma	2	0.6
	Others	2	0.6
Specialization	Elementary/primary Education	98	27.3
	Early Childhood Education	156	43.5
	Art Education	35	9.7
	Special Education	6	1.7
	Educational Technology	1	0.3
	English Language	17	4.7
	Mathematics	2	0.6

Only 1.9% of the participants were males, the other 98.1% were females. 61.3% of the participants were 18 to 22 years old, 30.6% were 23 to 26 years old, 6.4% had an age of 27 to 32 and finally, 1.7% was older than 32 years. 37.2% of the participants were students from institute A, 39.6% from institute B, and 23.1% from institute C. 96.4% of the participating pre-service teachers had completed their bachelor's degree, 1.9% had a diploma, 0.6% had a higher diploma and 0.6% completed another degree. 27.3% of the participants specialized in Elementary/primary Education, 43.5% were from the Early Childhood Education

specialization, 9.7% from the specialization Art Education, 1.7% specialized in Special Education, 0.3% in Educational Technology, 4.7% specialized in English Language and 0.6% in Mathematics.

During the data collection phase that was done in the academic year 2016 - 2017 the following enrolment figures were identified through statistics and fact sheets on the respective institutes' website. Given the anonymity of the institutes in this study, reference to the websites cannot be made, however the figures are highlighted below:

Table 3: Number of enrolments in college of education

Institute	Number of enrolment in college of education 2016-2017	Number of participants in this study	% of participation
A	634	133	21%
B	213	142	67%
C	90	84	93%
Total	947	359	38%

3.3.3 Instruments

The findings of any research are primarily affected by different aspects of data collection, it is known that the quality of research findings is based on reliability and validity of its instruments. The two instruments that were developed for this study were a survey based on Schmidt et al.'s (2009) TPACK survey that measured pre-service teachers' capabilities in the three domains of technology, content and pedagogy; and interviews followed based on the outcomes of the survey.

3.3.3.1 Survey

The quantitative part included a survey created by Schmidt et al. (2009), based on the TPACK model. This survey was selected for the current study because of its high reliability and validity as discussed by Schmidt et al. (2009). Also, it was found to be a user-friendly instrument which was important to prevent survey bias to take place. In this study, the

quantitative data highlighted the TPACK capabilities of the pre-service teachers. Creswell (2012) argues that surveys are preferably used to describe trends in a large population of individuals. If a researcher wants to examine attitudes, opinions, behaviours, or characteristics of the population, then a survey would serve the purpose. Additionally, the choice of a survey enables the researcher to gather a much wider range of views than if the researcher had chosen to interview participants, which because of time-constraints, would have necessarily restricted the sample size (Cohen, Manion & Morrison 2005). Furthermore, a survey enables effective and cost-effective data collection and reduces bias since all participants are presented with the same questions in the same order (Creswell 2012). Finally, surveys offer participants anonymity which few other research techniques allows. This encourages wider participation and is more likely to result in trustworthy responses (Munn & Drever 1990). (Creswell 2012, p. 376) affirms that researchers "use surveys to collect quantitative, numbered data (e.g., mailed surveys) or interviews (e.g., one-on-one interviews) and statistically analyse the data to describe trends about responses to questions and to test research questions or hypotheses". They also interpret the meaning of the data by relating results of the statistical test back to past research studies. This brings us to the fact that quantitative researchers use techniques that are likely to produce quantified and generalizable conclusions (Johnson & Onwuegbuzie 2004).

Research has shown that surveys have their own weaknesses and strengths. Munn and Drever (1990) identify three main limitations to surveys; first, the data collected usually describe rather than explain a phenomenon. Second, the data can be superficial. Third, researchers do not give sufficient time to develop a survey, and therefore it loses value and lacks quality. These drawbacks were addressed during the adaptation of the survey in this research paper.

Abbitt (2011) claims that many researchers use the TPACK framework to evaluate and monitor the role of ICT in teacher knowledge. Therefore, he examined the development of the TPACK framework with focus on evaluating it in the context of pre-service teacher preparation programs. His aim was to draw attention to the rising instruments and methods currently available for use with this specific group. He approached this objective by conducting a literature review to identify studies that used a measurement of TPACK in the context of a teacher preparation program. The interesting point in this article is the challenges faced by the researchers to evaluate the accuracy of measuring TPACK, where the studies

developed instruments that could measure how teacher knowledge influenced actual teaching practices, as well as the challenges of the efficiency, reliability, and validity of the measurement methods.

However Young, Young and Hamilton (2013) contradict Abbitt's point, where he conducted a research that utilized the survey of pre-service Teachers' Knowledge of Teaching and Technology (TKTT), which is designed specifically to measure pre-service teachers' TPACK competences. The study advocated that this can be measured - using pre-service teacher knowledge of teaching and technology (TKTT) - with consistency and precision in many construct domains with internal reliability that ranges from .80 to .92. In addition, Karadeniz and Vatanartıran (2013) conducted a study that confirmed the reliability of the survey. They administered the TPACK survey to 285 teachers in a secondary school in Turkey and found that the survey was a valid and reliable instrument to measure teachers' TPACK competences.

The current study uses the TPACK survey developed by Schmidt et al. (2009) to measure pre-service teachers' TPACK competences in several UAE universities. In order to make the survey more suitable for the Arabic educational context, some minor modifications were done to the original survey. Therefore, the adjusted survey was piloted among these pre-service teachers.

Furthermore, the TPACK survey from Schmidt et al. (2009) is designed to investigate and understand pre-service teachers' technological, pedagogical, and content knowledge capabilities throughout their years at the university. The questions are designed to evaluate pre-service teachers' understanding of and self-reported ability in the domains of TPACK. The original survey consists of nine demographic questions, fifty-four Likert scale items with a score ranging from 'Strongly Disagree' to 'Strongly Agree', with no negative formulated questions. These questions are categorized into domains that measure TK (technology knowledge), CK (content knowledge), PK (pedagogy knowledge), PCK (pedagogy content knowledge), TCK (technology content knowledge), TPK (technology pedagogy knowledge) and TPACK. Since this survey was developed for elementary teachers, under the categories there are questions for Mathematics, Social Studies, and Science and Literacy dimensions. In addition, there are three questions about TPACK scored

as percentage, and finally 3 open-ended questions requesting specific examples of TPACK models they were or are exposed to within the university or field experience.

The TPACK instrument has been tested for validity and reliability by Schmidt et al. (2009), Jamieson-Proctor et al. (2010), Nordin (2014) and Albion, Jamieson-Proctor and Finger (2011). To establish the extent of the validity and reliability of the instrument, Schmidt, et al., (2009) assessed each TPACK knowledge domain subscale for internal consistency using Cronbach's alpha reliability technique. Then they investigated construct validity for each knowledge domain subscale using principal components factor analysis with varimax rotation within each knowledge domain and Kaiser normalization. Schmidt and her colleagues ran factor analysis on each item and the below table shows Cronbach's alpha of each construct:

Table 4: Cronbach's alpha for Schmidt Survey

	Domain	Cronbach's alpha
1	Technology Knowledge (TK)	.82
2	Content Knowledge (CK)	mathematics .85 social studies .84 science .82 literacy .75
3	Pedagogical Knowledge (PK)	.84
4	Pedagogical Content Knowledge (PCK)	.85
5	Technological Content Knowledge (TCK)	.80
6	Technological Pedagogical Knowledge (TPK)	.86
7	Technological Pedagogical Content Knowledge (TPACK)	.92

Given the above information, the researcher adopted the original survey with only minor modifications that would reflect the UAE's context. The modification is done to reflect UAE universities' study program, particularly specializations and majors. The added questions collected data about the year of study, practicum, GPA and major. The extra questions served the quantitative analysis as well. In addition, some questions were deleted and others grouped together to reflect the academic structure of the UAE federal universities' programs, such as

narrowing the questions to the general discipline rather than using words such as math and science. Therefore, local reliability and validity checks was established through a pilot study including 17 pre-service teachers who were not be part of the main study. Creswell (2012, p. 385) argues that "when survey researchers design an instrument for data collection, they typically perform a pilot test of the questions. This consists of administering the instrument to a small number of individuals and making changes based on their feedback". After the second round of modification it was shared with the Director of Studies, co-supervisor and colleagues from the researcher's current university to help ensure the validity (Creswell 2012).

3.3.3.2 Design of the revised TPACK survey

The revised TPACK survey was based on the survey of Schmidt et al. (2009) and is designed to measure pre-service teachers' capabilities in the three domains of technology, content and pedagogy. The revision of the original survey was based on the context of the United Arab Emirates (UAE) and the educational system of the country. The titles of the TPACK scales (TPACK, TCK, TK, CK), etc.) were removed to avoid socially desirable responding as well as influencing their answers. Socially desirable responding reflects the tendency to endorse self-describing statements that are perceived as socially desirable and rejecting statements that are socially undesirable (Edwards 1957). As described by Tijmstra & Brinkman-Engels (1978), when participants are aware of the concept that is measured, it's more likely they will respond with socially desirable answers which will in turn lower the validity of the research.

Firstly, all six items from the TK dimension of the original survey have been used without adjustments. Secondly, for the CK scale the items that mention a subject have been merged into one item, which states 'my subject'. For example, an item "I have sufficient knowledge about mathematics" was changed to "I have sufficient knowledge about my subject".

For the PK scale, the item "I can assess student learning in multiple ways" has been removed, in order to avoid questions related to assessment, given that some universities don't teach assessment courses. In addition, the item "I know how to organize and maintain classroom management" has been added because it is more related to the courses they take.

The items of the PCK scale have also been converted into one items that states, ‘my subject’ instead of considering the different subjects one by one. For example, the item “I can select effective teaching approaches to guide student thinking and learning in mathematics” was changed to “I can select effective teaching approaches to guide student thinking and learning in my subject area”. These modifications result in one item remaining for the PCK scale. Therefore, the PCK scale was not used for statistical analyses. The same procedure was used for the TCK scale, whereby one item was left that discussed ‘my subject area’ instead of assessing each subject separately. Therefore, also this scale was not included in the statistical analyses.

Both the TPK and TPACK scales have not been modified. Also, the scale Models of TPACK (Faculty, PreK-6, teachers) has not been changed. Finally, the Models of TPCK scale been removed due to its irrelevance in the UAE context. In order to make up for the removal of some of this scale, the questions were addressed through open-ended questions in the survey and interviews. At the end of the survey, additional open-ended questions have been added based on the study of Nordin (2014) for the purpose of qualitative data collection. See appendix D and E for the original survey by Schmidt (2009) and the revised version of the TPACK survey for the purpose of the current study, respectively.

The final adapted version of the TPACK survey consists of 40 Likert-scale items and seven open-ended questions which were used to measure pre-service teachers’ perceptions of TPACK within the United Arab Emirates federal universities. The 40 items use a five-point Likert scale, ranging from “strongly disagree” to “strongly agree”. To enhance validity, the open-ended questions could be answered in Arabic or English. Further details on the instrumentation, which includes number of items and sample items, are provided in appendix D and E. In order to complete the re-design stage, the revised TPACK survey was distributed to the pilot group of pre-service teachers to examine the reliability and usability of the instruments.

3.3.3.3 The pilot study

Archambault and Crippen (2009) state that because validity requires that the items adequately measure the proposed constructs and that respondents correctly interpret what each item is asking, piloting of the survey was essential. A pilot study is a small-scale research study that is conducted before the main data collection to evaluate the instrument or data collection methods to improve or change the study design. Creswell (2012, p. 385) argues that "when survey researchers design an instrument for data collection, they typically perform a pilot test of the questions. This consists of administering the instrument to a small number of individuals and making changes based on their feedback". The factors that could be changed based on the feedback include time, costs, errors in procedure, to identify instrument efficiency, and more (Payne 2017).

Therefore, a pilot study has been conducted in January 2016 to explore the reliability and usability of the survey. A total of 40 surveys have been distributed for the pilot study, of which 16 surveys have been returned, which results in a response rate of 40%. The piloting was done in one of the universities in the UAE. The researcher included a sheet with the survey that requested their input to the survey questions in terms of its clarity. Due to the small number of respondents, conducting a reliability analysis was not possible. Feedback from the students' instructors clarified the cause of the low response rate, which was the need of translation to Arabic as a lot of students did not understand the English version. The survey has then been translated by back translation method. Due to the language barriers, the researcher decided that the collected data from the pilot was not adequate for the pilot study. Therefore, after making changes based on the feedback of the pilot study, the data collection was commenced for the main study.

Several changes were made based on the feedback of the pilot study. Firstly, the institute requested three documents to be read and signed by the participants. The feedback received was that there were too many documents to be filled and signed. Taking this into consideration, the number of documents was limited to two, the consent form (appendix L) and the survey (appendix E). Secondly, instructors in charge of distributing the pilot survey indicated that the participants thought there were too many open-ended questions and the answers required were too long. However, the researcher didn't take any action due to the importance of the questions. Thirdly, the participants experienced difficulties with the

language level, therefore the survey was translated to Arabic to avoid bias due to language barriers. Finally, the feedback suggested removing the section 'Models of TPCK' from the survey because it was too complex to understand, but it was kept due to its importance.

3.3.3.4 Translation of the survey

Achieving equivalency between two different languages is the main goal of back translation (Herdman, Fox-Rushby & Badia 1997). But, as Birbili (2000) states, when data is collected in one language and the findings are presented in another language, the validity of the research and its reports are threatened. Researchers therefore have to take well-considered decisions regarding the translation of the instruments or data to maintain the validity of the study as high as possible. As a researcher, it is important to describe the steps and decisions, the translation procedures and the used resources in detail. The linguistic competence of the translators; the translator's knowledge of the culture of the people under study; the autobiography of those involved in the translation; and the circumstances in which the translation takes place are all factors that influence the quality of translation.

The first step in the process of a back translation is translating the document from its original language into the target language (forward translation). Next, the document is again translated from the target language to its original language by another bilingual translator (backward translation). The second translator is blinded to the original document in order to ensure the equivalency of the translation. Both versions (the original and the back-translated documents) are then compared for accuracy. If there are questionable items identified, they are again blindly back translated into the original language by another bilingual translator. This process is repeated until it is mutually agreed upon that the translated document is equivalent and unambiguous (Lee, Arai & Puntillo 2009).

The purpose of a high-quality, cross-cultural back translation focuses on equivalency across four areas: semantic, technical, criterion, and conceptual equivalence (Flaherty et. al, 1998): 1) Semantic - similarity in meaning for each item in each culture, 2) Technical – similarity in the method of data collection, 3) Criterion - translated terms are consistent with the norms of each culture and 4) Conceptual equivalence - cultural equivalence, constructs have the same meaning and relevance in the different cultures.

According to Hulin (1987), any discrepancies between two groups being examined can indicate the reasons for differential item functioning. He used parameters ‘a’ and ‘b’ whereby ‘a’ refers to item discrimination parameter and indicates cultural differences while ‘b’ refers to item difficulty parameter, which indicates translation errors. Hulin (1987) suggested that culture is a major influencing factor in how examinees respond to the translated piece and that differences emerging from item difficulty means that translated items are more difficult for one group than the other.

For the current study, this back-translation method was adopted. A professional Arabic translator completed the first translation of the survey, version 1. Next, version 1 was revised for Arabic accuracy by two professional Arabic translators with a background and degree in education. Once version 1 was reviewed, an English translator then translated it into English, version 2. Finally, version 2 went to two English Arabic translators to check for equivalency between the original and the translated version.

3.3.4 Interviews

The qualitative part included interviews based on the outcomes of the quantitative survey. There are six types of questions that need to be included in an interview (Patton 1987; Merriam 2009): (1) experience/behaviour, (2) opinion/belief, (3) feeling, (4) knowledge, (5) sensory, and (6) background/demographic. Therefore, the questions tried to capture those types. In addition, the questions also addressed students’ and instructors’ recommendations and suggestions for better improving the program based on TPACK’s survey’s analysis.

Semi-structured interviews were used to interview pre-service teachers and instructors with different subject concentration. This method was selected in order to allow the participants to give better thoughts to the research question and understand their perception of being prepared to integrate technologies into their classroom strategies after graduation. Also, these interviews gave the opportunity for new information to emerge (Merriam 2009). The interviews were conducted using one-on-one approach to elicit their views and opinions. On another hand, the open-ended questions at the end of the TPACK survey served as part of the qualitative data collection.

The interview questions consisted of 10 questions that covered different aspect of pre-service teachers' perceptions on their TPACK knowledge and technology integration in education. Each of the questions had a certain focus. Firstly, question one enquires about the participants' specialization and future aspiration. Question two attempts to understand the participants' definition of educational technologies and its different types. Question three tries to understand the participants' notion of how important integrating technology is in classroom practices. Question four introduces the TPACK model by asking about how the participants perceive it as well as how they reflect on their own TPACK knowledge. Question five builds on the question four and attempts to understand if the participants believe their institutes equipped them with TPACK knowledge. Question six focuses on the positive side of the program they are studying. During the interviews, the researcher referred to TPACK in order to link their answer with the model's domains. Question seven and eight focuses on technology integration examples from their current institute. Question nine tries to provoke participants' critical thinking in terms of suggestion and ideas on ways to develop the program they are studying.

3.4 Procedure

Since the research questions are investigating the perception of pre-service teachers in the UAE, all the universities and institutes in the UAE that offer a program for Bachelor of Education were approached in September 2016. The names of the institutes were taken from the Commission for Academic Accreditation of the Ministry of Education website. Eleven universities were found to offer the program: The United Arab Emirates university, Zayed university, Higher colleges of technology university, Ajman university, Al Ain university for of Science and Technology, AlGhurair university, Al Hosn university, American university in the Emirates, Emirates college for advanced education, the Jumeirah university and finally the University of Sharjah. The eleven universities were contacted via email and followed up by a phone call after two weeks. The email consisted of a request to collect data from pre-service teachers and their instructors, as well as a synopsis about the study. The email can be found in appendix A. Three universities showed interest and agreed to participate in the study. To protect their anonymity and confidentiality, they were assigned a code to represent their name in this study. The three universities are labelled as Institute A, Institute B and Institute C. The labelling was based on the number of enrolments in the

institute, institute A had a larger number of student body. This information was obtained from the respective institute's website and the Ministry of Education website.

Based on the feedback from the pilot study, changes have been made in the original TPACK survey from Schmidt et al. (2009). A detailed description of the changes was presented in section 3.3.2.1. A total of 500 surveys have been distributed in the three participating universities, where it was distributed in 19 classes, 8 classes from institute A, 7 classes from institute B, and 4 classes from institute C. Out of these, 359 surveys returned which results in a response rate of 72%. At the end of the survey, the pre-service teachers were requested to participate interviewed on voluntary basis. Out of these 359 surveys, 56 students showed interest in being interviewed. 23 were students from institute A, 23 from institute B and 10 from institute C. All of these students were approached via emails, phone messages and phone calls. Out of the 56 students that showed interest, 12 agreed to participate in the interviews. The email that was sent to the students to invite them to participate in the interviews is presented in Appendix C.

Before commencing the interview, the researcher discussed the anonymity and confidentiality of the interview data. It was discussed how their participation will be kept confidential, which means that no one other than the researcher will have information about the participants' identity and actual name. False names will be used in all future reference to the feedback provided by the student, and no identifying information will be used. Any identifying participant information will be kept in a locked file cabinet in the personal possession of the researcher. When no longer necessary for research, all materials will be destroyed. Also, it was highlighted that their participation was voluntarily and they could withdraw from the study at any moment and without giving a reason. After the participants agreed, they signed a consent form. An example of the consent form is shown in appendix L. Ten interviewees agreed to be recorded, for the two students that refused this, the interviewer took notes. To ensure validity, the interviews were sent back to the interviewees for their verification after being transcribed verbatim. All participants agreed with the content of the transcriptions. The interview guide for student interviews is shown in appendix G.

Finally, the pre-service teachers' instructors were invited to participate in interviews to analyze their view on the students' TPACK capabilities. The instructors of the students who participated in the survey were contact by email requesting their participation. Six of the instructors agreed and the interview was conducted face to face. The same steps were followed regarding receiving consent and transcriptions as described above. The email that was sent to the instructors to invite them to participate in the interviews is presented in appendix B and the interview guide for instructor interviews can be found in appendix I. the interviews lasted between 30 to 40 minutes. It is worth mentioning that the whole process of data collection took 11 months to complete.

3.5 Data Analysis

3.5.1 Quantitative data analysis

The revised TPACK survey (Schmidt et al. 2009) exists of Likert-Scale questions and open-ended questions. The five-point Likert-scale answers were defined as 1) Strongly Disagree, 2) Disagree, 3) Neither Agree or Disagree, 4) Agree, 5) Strongly Agree. The quantitative data was analysed using the Statistical Package for the Social Sciences (SPSS) version 24. Different types of analyses were conducted. Lincoln and Guba (2005) emphasized the importance of ensuring the validity and reliability of the results of a study. Since the quality of research findings, inferences and conclusions are depending on the level of validity and reliability of the study, a confirmatory factor analysis and reliability analysis were conducted to ascertain the validity and reliability of its findings and conclusions.

The confirmatory factor analysis was used to verify the number of underlying dimensions of the instrument (factors) and the pattern of item-factor relationships (factor loadings) (Brown & Moore 2012). The Confirmatory Factor Analysis is a statistical technique used when investigating the structure of multivariate data (Fox 1983). Afterwards, reliability analysis was conducted for the full survey and the separate scales to ensure an acceptable reliability of the survey exists. Next, Pearson product-moment correlations between the six dimensions of the TPACK scales were analysed. Thereafter, descriptive statistics described the details of every scale to answer the first research question '*What are the pre-service teachers'*

perspectives on their preparedness to use ICT for future classroom practices?'. The mean, range and standard deviation were presented as well as a distribution of response frequencies per scale. To answer the research question, '*What factors influence the acquisition of knowledge and skills regarding ICT integration in the classroom?',* independent samples t-tests were used to analyse the impact of practical experiences on TPACK knowledge and one-way between groups analysis of variance (ANOVA) were conducted to explore the impact of several factors such as institutions, age groups, specializations and degrees.

3.5.2 Qualitative data analysis

The interviews were recorded with the interviewee's permission and transcribed using Creswell's (2012) guidelines, which states that data analysis of text involved dividing it into groups of sentences, called text segments. Then the data was interpreted by reflecting on it and drawing recommendations for the universities to better equip pre-service teachers with TPACK capabilities.

For analysing the interviews, Kvale and Brinkmann's (2009) method was adopted, which defined six steps of analysing interviews; (1) subjects describe (2) subjects themselves discover (3) interviewer, during interview, condenses and interprets (4) recorded interview is analyzed by the interviewer alone or with co-researchers (5) re-interview through sharing the transcript for self-correction (6) taking action by approaching therapeutic interview.

The table below presents an overview of data collection and analysis for this study.

Table 5: Data collection, instruments and analysis methods

Research Question	Research Instrument	Data Analysis
What are the pre-service teachers' perspectives on their preparedness to use ICT for future classroom practices?	TPACK survey Semi-structured interviews	Quantitative analysis • Descriptive statistics Qualitative analysis
What factors influence the acquisition of knowledge and skills regarding ICT integration in the classroom?	TPACK survey	Quantitative analysis • Independent samples t-test • One-way between groups ANOVA
What are the instructors' perspectives on pre-service teachers' preparedness to use ICT for future classroom practices?	Semi-structured interviews	Qualitative analysis
What are the pre-service teachers and instructors' suggestions for future action plan to maximize the preparedness?	TPACK survey Semi-structured interviews	Qualitative analysis

The first, second and fourth research questions will be answered through both the quantitative and the qualitative paradigm as they require both the measurement of variables and the information from interviews. The third research question will be answered with the use of quantitative analyses.

3.6 Delimitations

The current study has a number of delimitations that will be discussed below.

Firstly, the current study focused on Bachelor of Education Undergraduate Students, as these students are most likely to develop a career in teaching after graduation. Secondly, universities selected for the sample were limited to universities in the seven Emirates of the UAE. The current study focuses only on the country of the United Arab Emirates, as there is a clear aim for Vision 2021, whereby the National Agenda emphasizes the development of a first-rate education system, a complete transformation of the current education system and teaching methods is required. Since there is a lack of literature focusing on TPACK pre-service teacher education in this country, this study is a first important step in this field within the context of the UAE. In the future, it might be interesting to include other countries of the Middle East to explore their TPACK status and make a comparison between different countries. Finally, the current study emphasized on collecting data regarding the students' perspectives, since they are the main group of focus. Interviews with a number of instructors are included in the study as they are the ones who are closest to the students and therefore their perspective was relevant as well. Since this is the first study in the UAE that is exploring pre-service teachers' perspectives, it was not doable to involve more participants. However, for future studies it might be relevant to also interview individuals with other backgrounds, such as deans and in-service teachers. In addition, there could be a comparison between degree structure and courses between universities.

3.7 Ethical Considerations

3.7.1 Principles of ethical considerations

Ethical considerations are an important part of social science research. During every research study, some ethical concerns will arise and it is important to pay attention to this in order to protect the participants from any potential risk (Robson 2005). Through the current study, some ethical concerns regarding the confidentiality of this study might arise and should be reduced to a minimum risk. Creswell (2008) pointed out the importance of ethical considerations in all the phases of a study: collection, analysis and reporting of research data.

He emphasizes the need to obtain permission from the research site stakeholders and to obtain the informed approval of individual participants. Moreover, maintaining confidentiality is extremely important to prevent any harm for the participants. For this reason, a consent form was created for participants before they participated in the study (appendix L). The consent form first addressed the details of the study such as the purpose, relevance and methods of data collection. It also discussed the protocols for the survey and interviews, as well as the confidentiality, anonymity of the participants and destruction of materials after the end of the project and dissemination of the results. The participant will be provided with the researchers' contact details and they are allowed to contact her at any time, with questions, remarks or concerns regarding this study.

The possible risks and discomfort that might arise from this study are limited to discomfort feelings caused by the survey or interview. As students are asked to evaluate their own competences and are being evaluated in general by their instructors, it might make them feel uncomfortable. Therefore, they are informed about and ensured of a strict confidential treatment of the data by the researcher. The foreseeable benefits are mostly related to the society: by gaining insights in the current TPACK capabilities of pre-service teachers in the UAE, we can hopefully provide practical recommendations for teacher training institutes to improve their programs and provide the students with a better preparation for technology implementation during their career as a teacher. Also, if this study could motivate other researchers to take the initiatives for future extensive studies regarding in-service teachers training or professional development in the area of TPACK, these participants might not only benefit during their teacher training program, but also career as in-service teacher.

The information that was be gathered in this study was be kept strictly confidential and anonymous. All surveys and audio tape recordings are locked in a safe, and all electronic information is coded and secured with a password. Furthermore, when publishing and presenting this paper, information that might reveal the identity of the participant will not be included and pseudonyms will be used to protect the identities. In the consent form, a section is created with information about the study to provide the pre-service teachers with sufficient information to allow them to make an informed decision to take part or to decline (Hammersley & Traianou 2015). The results of this study will be shared with the participants after dissemination of the report.

Before starting the process of gathering data, the researcher approached the British University in Dubai (BUID) to request an approval to obtain ethical clearance. The BUID provided a form to fill in order to assess the risk. After carefully studying the request, the approval was granted. The ethical approval contained the names of the institutes approached and to remain the confidentiality and anonymity of the participants it is not enclosed in the appendix.

To minimize the ethical issues, this study adopted and followed Bryman and Bell's (2007) principles of ethical considerations:

- *Research participants should not be subjected to harm in any ways whatsoever*.

359 students and six instructors participated in this study. Neither the students nor teachers were harmed in any way during the study. All participants were treated in a way that put them at minimal risk in any way. The surveys were distributed and the interviews were conducted in their own institutions and classroom to ensure a trusted environment in which the students were comfortable (Yin 2009).

- *Respect for the dignity of research participants should be prioritized.*

Both the participants who filled in the survey and the people who took part in the interviews were informed about the purpose and procedures of the data collection. It was emphasized that their participation was voluntarily and no further action was taken from the researchers' side until the participant signed the consent form. Furthermore, the participants were free to stop the survey or leave the interview at any moment. Also, they were asked for permission to record during the interviews. Two participants did not give permission for recording. Their wish was respected and notes were taken instead of the recording.

- *Full consent should be obtained from the participants prior to the study.*

The consent form was introduced and discussed with all participants before the data collection process started. They were asked to sign the consent form, which acknowledged understanding and permission of the study process and its data collection. The data collection did not start before the consent form was signed (Appendix L).

- *The protection of the privacy of research participants has to be ensured*.

This study prioritized the confidentiality of the participants. A consent letter was given to the participants assuring them that their anonymity would be protected indefinitely. The demographic data of participants did not reveal identity or details which could lead to revealing the identity and remained anonymous to all but the researcher.

- *Adequate level of confidentiality of the research data should be ensured*.

The data in this study was number coded before the data analysis to ensure confidentiality. Cohen, Manion and Morrison (2007) state that in social sciences research, the researcher should not link the individual to unique, actual behaviour, therefore the data should be transferred to a coded and unnamed sheet. The confidentiality of the research data and anonymity of the participants was protected indefinitely.

- *Any deception or exaggeration about the need, aims and objectives of the research must be avoided.*

It is highly important to identify the true gaps and needs in the literature without exaggerations. Besides identifying the needs and gaps in the existing literature, this study tried to clearly discuss the aims and objectives of the study without overstating any aspects and followed the necessary precautions and guidelines to avoid any deception or exaggeration.

- *Affiliations in any forms, sources of funding, as well as any possible conflicts of interests have to be declared*.

This study had no affiliations in any forms, nor was it funded by any organization. It had no conflicts of interest in any form.

- *Any type of communication in relation to the research should be done with honesty and transparency*.

Honesty is a key essential in the research field, as all studies that are published should be based on true facts and honest intentions. The researcher of the current study ensured that the approaches, methods, instruments and procedures used to obtain the data were piloted, well-considered and accurate. The protection and well-being of participants was always

prioritized and the researcher ensured the best possible protection of participants for any possible risks. It also ensured through piloting and double checks that the data was accurately analyzed and reported. All information in this thesis is based on true facts and findings.

3.7.2 Role of the researcher

Research is a dynamic process in which the researcher plays an active role, Carter and Hurtado (2007) point out that the role of the researcher is important but should not overshadow the purpose of the study. Therefore, a brief account of the researcher is given here in order to put the study in context.

The researcher is an Emirati female with more than twenty years' experience in the education sector. She worked as a teacher in public schools for 10 years and engaged in various projects dealing with public schools' curriculum and leadership. In 2005, she left teaching and moved to management positions in public and private entities that handled school operations. In 2012, she started her PhD that lead to a shift in her interest, and with her new job as an instructor in college of education in a public university she started developing interest in teacher education. She is currently in charge of internship and practicum in her organization and this study has built her knowledge about competencies and capabilities.

Moreover, her role in this study was to ensure that all ethical considerations were followed and she was available for participants to respond to any of their questions or concerns regarding the research. In each stage of the study, the well-being of the participants and confidentiality of the information they provided was a key focus. Prevention of bias and gaining the highest trustworthiness of the data collected was another important focus of the researcher.

3.8 Validity, reliability and generalizability

To ensure a high validity for the quantitative data, a confirmatory factor analysis and reliability analysis have been done. For the qualitative data, methodological triangulation has been used to ensure a good validity for this study. Methodological triangulation involves using different methods such as surveys, focus groups or interviews for comparing to see if

similar results are found (Hussein 2015). If the conclusions from each of the methods are the same, then validity is established.

For the qualitative coding, the researcher first coded all the data. Thereafter, all data was analysed by an independent researcher using the same method. Aiming for a reliable qualitative data analysis, outcomes and themes were discussed until agreement was reached between both researchers on all content of the analysis.

Generalizability refers to the extent to which findings from a study apply to a wider population or to different contexts. (Horsburgh 2003, p. 307–312) explains the difference between quantitative and qualitative work when it comes to generalizability: "In quantitative work generalizability is statistical, i.e. the study sample is matched to the study population at large to ensure comparability of demographic characteristics and, if this is done correctly, then it is assumed that the findings from the sample are generalizable. In qualitative work, however, participants are selected by means of theoretical sampling, i.e. for their ability to provide information (and consequent theory development) about the area under investigation". Generalizability is always considered to be an issue in qualitative data analysis. Looking at the current study, the participants from this sample were selected to represent the population of UAE pre-service teachers who were studying for a bachelor in education, in both public or private universities. The researcher believes that the sample selected for the current study does represent the population and therefore, results are generalizable. However, it should be noted that in order to improve the generalizability, future studies should select participants from other Emirates to represent the pre-service teachers of the UAE including all its seven Emirates. Also, a larger sample with participants from more universities should be included in future studies.

CHAPTER FOUR: RESULTS

4.1 Overview of the Chapter

Chapter four provides the results from both quantitative and qualitative analyses. First the results of the quantitative data will be presented, which include the reliability, validity and correlational analyses, followed by the descriptive statistics, the independent samples t-tests and the one-way between groups ANOVA's. Thereafter, the answers to the quantitative research questions will be discussed in the summary of quantitative results. Qualitative results will be present then, which included the interviews with the instructors and the interviews with the pre-service teachers. Finally, a summary of the instructos' interviews and the students' interviews will be presented.

4.2 Results of quantitative data

This chapter describes the process of development of the revised TPACK survey Schmidt et al. (2009), the description of validity (by confirmatory factor analysis) and reliability tests (Cronbach's alpha). Thereafter, Pearson product-moment correlation analyses, independent-samples t-tests and one-way analyses of variances have been conducted to explore further relations and differences between the variables. Finally, the interpretation of the results and the findings to the two quantitative research questions 1) '*What are the pre-service teachers' perspectives on their preparedness to use ICT for future classroom practices?'* and 2) '*What factors influence the acquisition of knowledge and skills regarding ICT integration in the classroom?'* is presented.

4.2.1 Data screening

For the main study, three universities in the United Arab Emirates were selected after they responded to an email invitation. In September 2016, the data collection for the main study took place. A total of 500 surveys have been distributed in the three participating universities, of which 359 surveys have returned, which results in a response rate of 72%.

The data collected for the main study was screened before the statistical analyses were conducted. Data screening process involves: 1) checking for accuracy of data input; 2)

missing values; and 3) assessing normality and detecting univariate and multivariate outliers (Tabachnik and Fidell 2007).

1) Accuracy of data input

First the researcher checked that item has been entered correctly and items have been labeled. To facilitate the interpretation of the scores, the Likert-scale items have been reversed so that a lower score on an item means a lower estimation of abilities, and vice versa. To ensure the accuracy of the data input, a research assistant then re-checked all data input. No unusual data was detected, all items with a five-point Likert scale were within range. Looking at the results of the means and standard deviations, all values looked credible.

2) Missing values

In dealing with missing data it is important to figure out if the data is missing randomly or if a pattern in missing data points can be found (Tabachnick & Fidell 2007). For the variables practicum, institute, year college, degree, specialization and all TPACK scales missing values were found. However, after critically analysing these values, it was concluded that there was no pattern in the missing data points and was therefore considered randomly. The file was split based on institute categories and the missing values were replaced for continuous variables with the group mean per institute.

3) assessing normality and detecting univariate and multivariate outliers

From inspection of the data, all scores on the different dimensions are quite symmetric, within the range of a normal distribution. On all dimensions, there was an acceptable negative skewness, which means that scores were asymmetrically spread towards higher values than the average. Hence, students' answers were clustered on the positive side of the graph. On the other hand, kurtosis values were found to be positive, indicating that the distribution is rather peaked, with long thin tails. Although the values of the skewness and kurtosis are not perfectly, they are acceptable due to the sample size used in this study. With reasonably large samples, skewness will not 'make a substantive difference in the analysis' (Tabachnick & Fidell 2013, p. 80). They state that kurtosis can result in an under-estimate of the variance, but this risk is also reduced with a large sample of more than 200 cases, such as the current study. A closer observation of the data found that some of the cases were identified as multivariate outliers. These outliers with extreme values have been removed.

4.2.2 Reliability and validity

Reliability

Cronbach's alpha was used to examine the internal consistency. Internal consistency describes the extent to which all the items in a test measure the same concept or construct and hence it is connected to the inter-relatedness of the items within the test (Tavakol & Dennink 2011). Therefore, it is important to determine the internal consistency before using the instrument for research purposes. Table 4 presents an overview of the reliability per subscale.

Table 6*:* Reliability of the TPACK scales

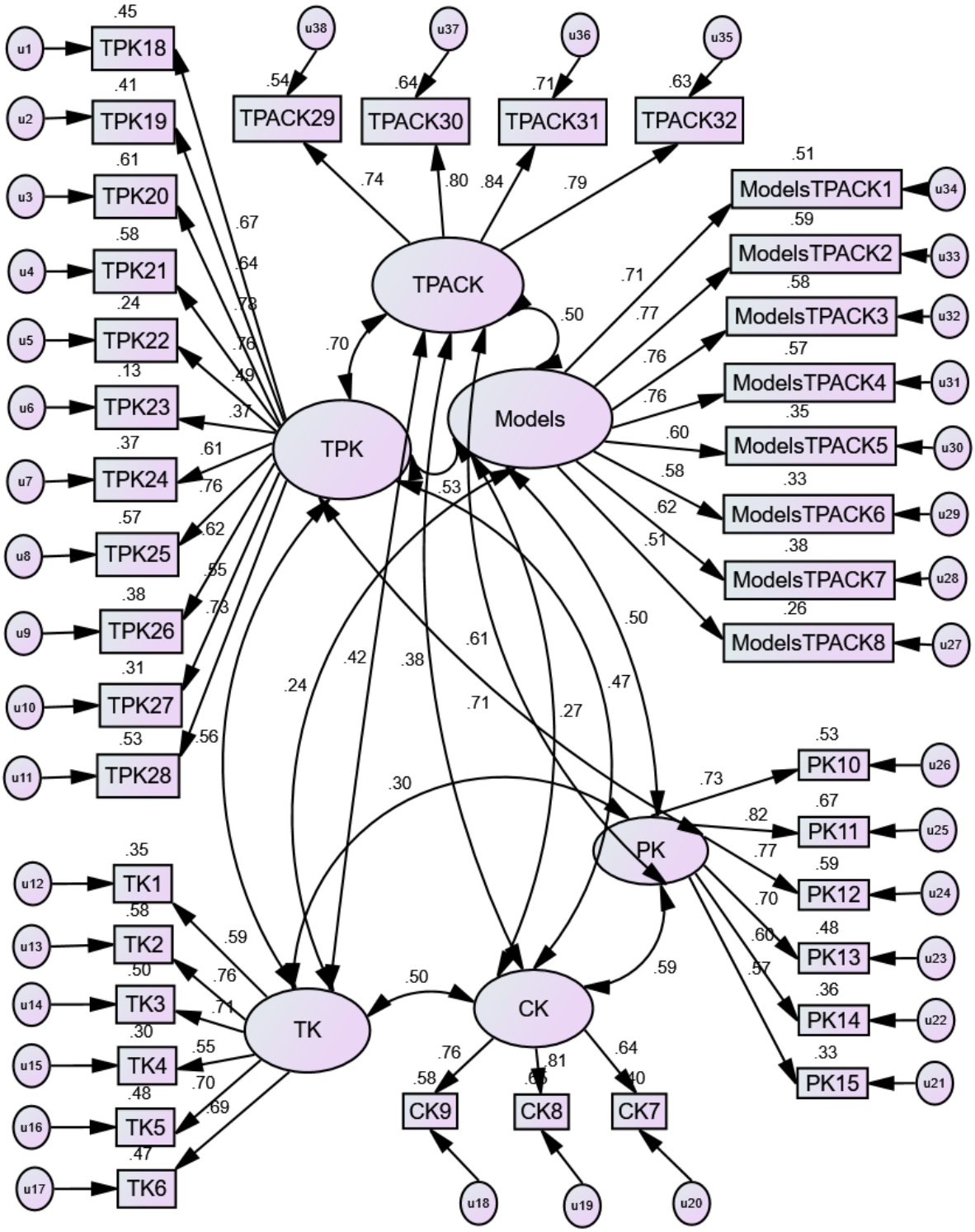
Subscales	Cronbach's alpha α
Technological Knowledge (TK)	.82
Content Knowledge (CK)	.78
Pedagogical Knowledge (PK)	.85
Technological Pedagogical Knowledge (TPK)	.88
Technological Pedagogical Content Knowledge (TPCK)	.87
Models TPACK	.87
Total Scale	.94

Findings from the survey analysis show that the reliability of the different subscales ranges from Cronbach's alpha (α) .78 to .88, with a Cronbach's alpha of .94 for the total scale. The widely-accepted social science cut-off is a value of .70 or higher for Cronbach's alpha, which makes the outcomes from the current survey analysis highly acceptable (Streiner, Norman & Cairney 2015).

Construct validity

Construct validity is used to examine the relationships among different constructs. Harrington (2009) describes that in case of earlier available work, Confirmatory Factor Analysis (CFA) can be used to verify the pattern of factors and loadings that were found. As the current study utilizes an existing survey but with several modifications, a CFA was conducted to assess the construct validity of the adjusted TPACK survey. The results for the model with six dimensions fits the data reasonably well, $\chi 2$ /df = 2.328 ($\chi 2$ = 1512.92, df = 650) and p = .000. TLI = .844, CFI = .86, RMSEA = .06 (p=.000). Fit indices suggest an acceptable model fit (Brown 2006).

Figure 3: TPACK measurement model



Factor loadings showed that all factors were strongly related to their latent factors. Table 5 presents the factor loadings on all six dimensions measured by the adjusted TPACK survey.

The correlations between the items and the connected dimensions were all positive, ranging from the lowest value of .40 to the highest value of .82. Based on Comrey and Lee (1992), factor loadings are ranging from good until excellent, with exception of two poor factor loadings and two fair factor loadings. Table 5 presents factor loadings per item on TPACK domains.

Table 7: Factor loadings for TPACK scales

	TK	CK	PK	TPK	TPACK	Models
TK1	.59					
TK2	.76					
TK3	.71					
TK4	.55					
TK5	.70					
TK6	.69					
CK7		.40				
CK8		.65				
CK9		.58				
PK10			.73			
PK11			.82			
PK12			.77			
PK13			.70			
PK14			.60			
PK15			.57			
TPK18				.67		
TPK19				.64		
TPK20				.78		
TPK21				.76		
TPK22				.49		
TPK23				.37		
TPK24				.61		
TPK25				.76		

TPK26	.62		
TPK27	.73		
TPK28	.56		
TPACK 29		.74	
TPACK30		.64	
TPACK31		.71	
TPACK32		.63	
ModelsTPACK1			.71
ModelsTPACK2			.77
ModelsTPACK3			.76
ModelsTPACK4			.76
ModelsTPACK5			.60
ModelsTPACK6			.58
ModelsTPACK7			.62
ModelsTPACK8			.51

4.2.3 Correlational statistics

A correlation analysis is used to describe the strength and direction of the linear relationship between the dimensions (Pallant 2013). Table 6 presents the correlation matrix for the TPACK domains.

Table 8: Pearson Product-moment Correlations Matrix

	TK	CK	PK	TPK	TPACK	Models
TK	1.00					
CK	.502**	1.00				
PK	.303**	.594**	1.00			
TPK	.557**	.468**	.706**	1.00		
TPACK	.418**	.378**	.615**	.696**	1.00	
Models	.238**	.272**	.498**	.527**	.496**	1.00

**Correlation is significant at the 0.01 level (2-tailed).

The correlations between the six domains of the TPACK survey are all positively correlated, with values ranging from r = .272, p <.01 on Models and CK, to r = .706, p <.01 between TPK and PK. Based on Cohen's guidelines (1988, pp. 79-81), the strength of these relationships range from small to large. This means that all domains are positively linked to each other, some relationships stronger than others, but altogether measuring the concept of TPACK.

In summary, the results from above statistical analyses show that the revised TPACK survey has an acceptable goodness of fit, which means it can be used in the current study with the purpose of measuring pre-service teachers' perceptions of their TPACK levels.

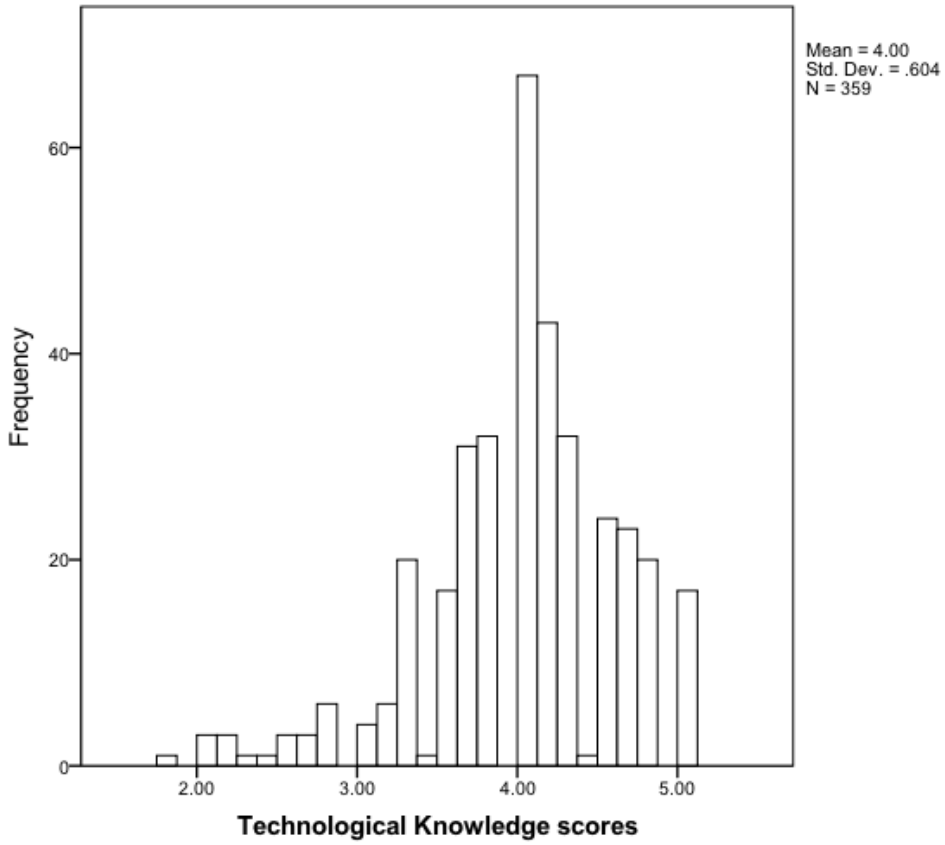
4.2.4 Descriptive statistics

To measure TPACK levels, a five-point Likert-scale was used: 1) Strongly Agree, 2) Agree, 3) Neither Agree or Disagree, 4) Disagree, 5) Strongly Disagree. To facilitate the scoring process, the scores on the items have been reversed, so the higher the score, the more positive the perception is. Pre-service teachers in the UAE estimate their levels on technology knowledge (TK) to be the highest of all TPACK scales with a mean of M = 4.12 (SD = .57), which means most of the participants scored between 'agree' and 'strongly agree'. The pre-service teachers estimate pedagogical knowledge and TPACK overall to be their lowest

capabilities with means of *M* = 3.84 (*SD* = 0.57 and *SD* = .68, respectively), which means most participant scored between 'neither agree or disagree' and 'disagree'.

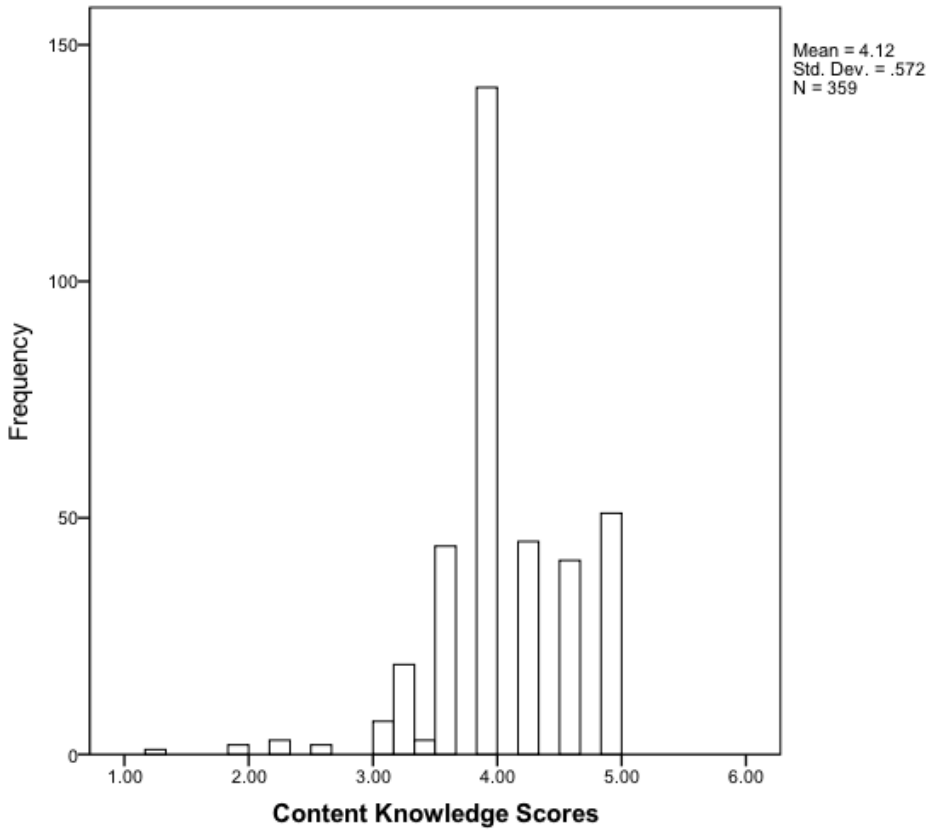
Technological knowledge was described by Koh and Chai (2016) as '*all knowledge associated with the use of ICT related tools*'. For the pre-service teachers in the UAE, technological knowledge was found to have a mean of *M* = 4.00 (*SD* = .60), meaning that on average, pre-service teachers mostly scored the technological knowledge items as 'agree'. Figure 4 presents an overview of the scores frequencies.

Figure 4: Frequencies of Technological Knowledge scores



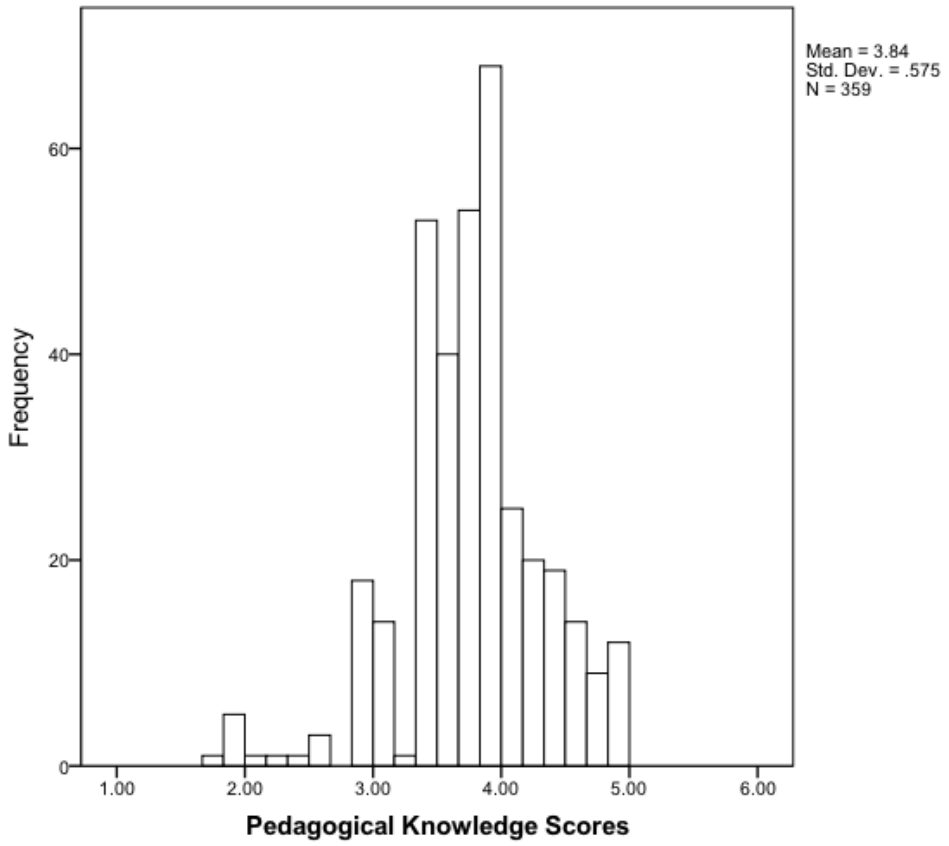
Content knowledge was described by Koh and Chai (2016) as '*knowledge pertaining to the subject matter*'. For the pre-service teachers in the UAE, content knowledge was found to have a mean of *M* = 4.12 (*SD* = .57), meaning that on average, pre-service teachers mostly scored the content knowledge items between 'agree' and 'strongly agree'. Figure 5 presents an overview of the score frequencies.

Figure 5: Frequencies of Content Knowledge scores



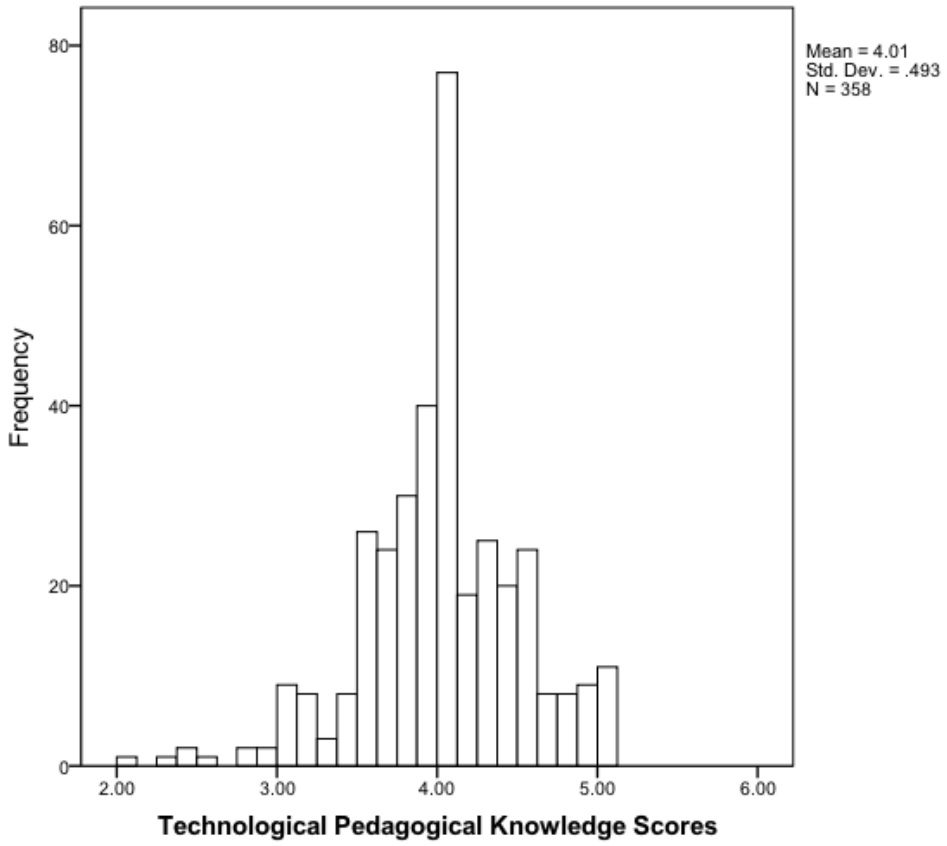
Pedagogical knowledge was described by Koh and Chai (2016) as '*General knowledge about learning, instruction, assessment and students'*. For the pre-service teachers in the UAE, pedagogical knowledge was found to have a mean of $M = 3.84$ ($SD = .58$), meaning that on average, pre-service teachers mostly scored the pedagogical knowledge items between 'neither agree or disagree' and 'agree'. Figure 5 presents an overview of the score frequencies.

Figure 6: Frequencies of Pedagogical Knowledge scores



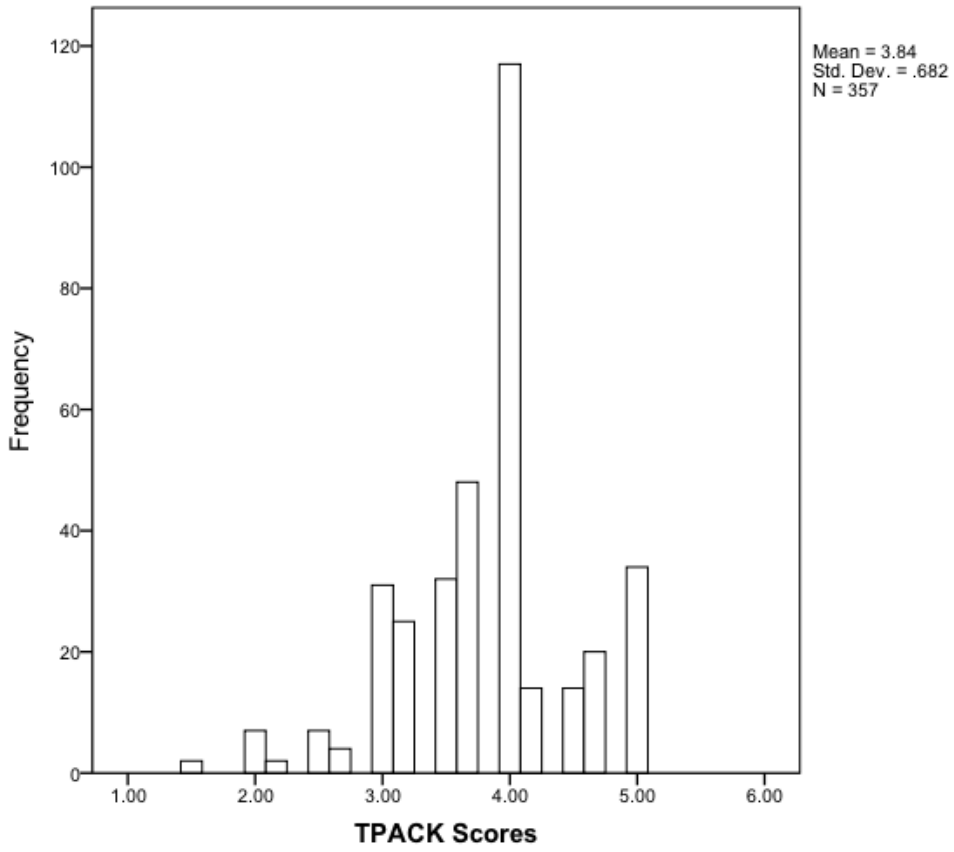
Technological Pedagogical knowledge was described by Koh and Chai (2016) as *'Knowledge of pedagogically sound ways to use specific ICT tools'*. For the pre-service teachers in the UAE, technological pedagogical knowledge was found to have a mean of *M* = 4.01 (*SD* = .49), meaning that on average, pre-service teachers mostly scored the technological pedagogical knowledge items around 'agree'. Figure 7 presents an overview of the score frequencies.

Figure 7: Frequencies of Technological Pedagogical Knowledge scores



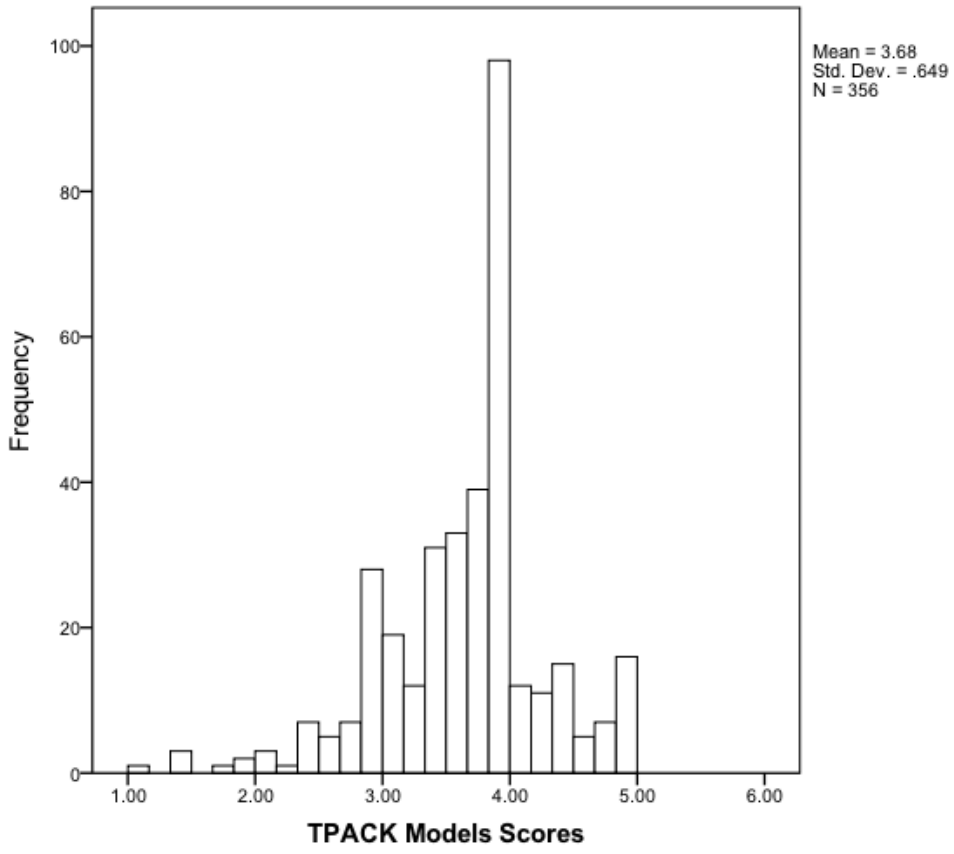
Technological Pedagogical Content Knowledge (TPACK) was described by Koh and Chai (2016) as *'Synthesized knowledge that reflects elements of technological, pedagogical and content knowledge'.* For the pre-service teachers in the UAE, TPACK was found to have a mean of M = 3.84 (SD = .68), meaning that on average, pre-service teachers mostly scored the TPACK items between 'neither agree or disagree' and 'agree'. Figure 8 presents an overview of the score frequencies.

Figure 8: Frequencies of TPACK scores



Finally, items in the scale 'Models of TPACK' discuss the quality of modelling TPACK by professors per subject. For the pre-service teachers in the UAE, the models of TPACK were found to have a mean of $M = 3.68$ ($SD = .65$), meaning that on average, pre-service teachers mostly scored items between 'neither agree or disagree' and 'agree' when looking at the quality of their professors as models of TPACK. Figure 9 presents an overview of the score frequencies.

Figure 9: Frequencies of TPACK Models scores



The table below summarizes the mean and standard deviation per TPACK dimension.

Table 9: Descriptive statistics

Variable	Number of items	Mean	Standard Deviation
GPA	-	2.99	0.42
TK	6	4.00	0.60
CK	3	4.12	0.57
PK	6	3.84	0.58
PCK	1	3.88	0.68
TCK	1	3.90	0.73
TPK	11	4.00	0.49
TPACK	4	3.84	0.68
Models	8	3.68	0.65

4.2.5 Independent samples t-tests

What is the impact of practical experience (practicum and internship) on pre-service teachers' perceptions of their TPACK levels?

To investigate the difference in TPACK scores for students who did and did not complete a practicum, an independent-samples t-test was conducted. A significant difference in scores was found on TPACK scores between students who did complete a practicum (M = 3.96, SD = .67) and who did not complete a practicum (M = 3.76, SD = .67; t (352) = -2.853, p = .005. The magnitude of the differences in the means (mean difference = 0.17, 95% CI: -.25 - .08) was small (eta squared = .02) according to Cohen's guidelines for interpreting the eta squared (Cohen 1988, pp. 284-287). A second independent samples t-test was used to compare the TPACK scores for students who did complete an internship and students who did not. A significant difference was found between the students who did complete an internship (M = 4.06, SD = .63) and students who did not (M = 3.77, SD = .68; t (355) = -3.44, p = .001. The magnitude of the difference in the means (mean difference = .29, 95% CI: -.45 - -.12) was small (eta squared = .03) according to Cohen's guidelines for interpreting the eta squared (Cohen 1988, pp. 284-287).

4.2.6 Analyses of variance

What factors influence pre-service teachers' perceptions of their TPACK levels?

Multiple one-way between-groups ANOVA's have been conducted to explore the differences between institutions, age groups, specializations and degrees on pre-service teachers' perceptions of their TPACK capabilities. As mentioned before, the educational technology specialization has been excluded in the analyses, as this group consisted of only one participant.

Institutions

Firstly, a significant difference was found between the pedagogical knowledge (PK) for institute C students and institute B students, whereby the institute C students had a significant higher score on pedagogical knowledge (M = 4.00, SD = .53) than the institute B students (M = 3.76, SD = .59).

Specializations

All specializations that were included in the bachelor's programs in the participating universities were included in the analysis to explore if there is a difference in the specializations for TPACK scores. The following specializations were included: Elementary/Primary Education, Early Childhood Education, Art Education, Special Education, Educational Technology were included, as well as a 'rest category' which included Special needs, Social worker, Science, Arabic and Islamic studies.

A significant difference was found for 'other' specializations (M = 3.33, SD = .71) on pedagogical knowledge (PK) the elementary/primary education specialization (M = 4.00, SD = .46), early childhood education (M = 3.88, SD = .53), art education (M = 3.76, SD = .65) and English language specialization (M = 3.94, SD = .53). Thus, compared to the other specializations, the category 'other specializations' scores significantly lower on pedagogical knowledge. Also, 'other' specializations (M = 3.66, SD = .64) were found to be significant lower than elementary/primary education (M = 4.05, SD = .45) and early childhood education (M = 4.08, SD = .45) in technological pedagogical knowledge (TPK) scores.

Thirdly, on the TPACK scale the students from the other specializations also scored lower (M = 3.33, SD = .69) than the specializations elementary/primary education (M = 3.90, SD

= .62), early childhood education (*M* = 3.95, *SD* = .63) and art education (*M* = 3.81, *SD* = .73).

Finally, for the models a significant difference between the other specializations (*M* = 3.38, *SD* = .73) and elementary/primary education (*M* = 3.72, *SD* = .62) and the other specializations and early childhood education (*M* = 3.81, *SD* = .60).

Degree

No significant difference was found for the degrees.

4.3 Summary of the quantitative results

In the quantitative section of the current study, the following research questions were investigated:

1) '*What are the pre-service teachers' perspectives on their preparedness to use ICT for future classroom practices?'* and 2) '*What factors influence the acquisition of knowledge and skills regarding ICT integration in the classroom?'*

The results of the quantitative outcomes and the possible conclusions that can be drawn from outcomes will be discussed below.

To measure pre-service teachers' TPACK levels, Schmidt's TPACK survey (Schmidt et al. 2009) was revised with the aim of creating a survey that better fits the (educational) context of the United Arab Emirates. To explore the construct validity, a confirmatory factor analysis was conducted. The results showed that the revised survey with 6 dimensions had an acceptable goodness of fit for use in the current study. Also, the reliability of the survey and the six dimensions have been explored with the Cronbach's alpha (α) of .94 for the full scale. The subscales had a reliability of Cronbach's alpha ranging from .78 to .88.

What are the pre-service teachers' perspectives on their preparedness to use ICT for future classroom practices?

Descriptive statistics have shown that in general, pre-service teachers are confident when it comes to their TPACK capabilities. With the highest mean score of M = 4.12 for Technology Knowledge and the lowest mean score of M = 3.68 for Models of TPACK, the pre-service teachers answers to the items of these scales all fluctuate around a score of 4, which means 'agree'. The overall status of the pre-service teachers' preparedness to use ICT for future classroom practices seems to be pretty good. A more in-depth qualitative analysis will be discussed in the next section to create more insight in the factors that have contributed to these high scores, and possible areas to focus on in order to improve the teacher training programs even more.

What factors influence the acquisition of knowledge and skills regarding ICT integration in the classroom?

The analyses that have been conducted to investigate the impact of practical experiences, have shown that students with practical experience (both practicum and internship) score significantly higher on the TPACK dimensions. Looking at TPACK specifically, when pre-service teachers learn by practical experience, they have to implement the learned theory about the TPACK concepts into real practice. This is an important step in the learning cycle: the first step is studying in the classroom to gain the basic knowledge about theories, the second step is learning how to build the bridge between theory and practice by participating in practicums or internships (Korthagen & Kessels 1999; Tom 1997). The outcomes of the current study emphasize the importance of establishing a connection between campus courses and field experiences in order to optimize the learning experience and construction of both the necessary knowledge and skills. Many studies have discussed the benefits of implementing authentic practical field experiences and how they are of high importance for the learning process. For example, Darling-Hammond et al. (2005) and Zeichner and Conklin (2005) concluded that the research on pre-service teacher education programs shows that when the field experiences are carefully coordinated with coursework, teacher educators are better able to accomplish their goals in preparing teachers to successfully enact complex teaching practices.

In another example, Hascher, Cocard and Moster (2004) looked at the learning experience of field-based and practice-based learners. Their results indicate that in each practicum students improved significantly in preparing, conducting and post-processing lessons. As stated by Bandura (1997), pre-service teachers do not benefit from the so-called 'protected' teaching situations (i.e., observations, tutoring, peer teaching, small group simulation instruction) as much as they do from more authentic teaching practical experience. If the students only experience the protected teaching situations, they will create false success experiences and thereby false expectations of the real teaching experience. When confronted with their first authentic teaching experience, there is a big chance of feelings of failure and discouragement. The results from this study support Bandura's theory that through experiences that allow authentic challenges to be offered and met, pre-service teachers will better learn the teaching skills necessary for successful experiences create and thereby create more self-efficacy (Bandura 1997).

Moreover, the results from the independent samples t-tests showed a significant difference on TPACK scores between students who did complete a practicum and internship and who did not complete it. This indicates that internship and practicum plays a big role in strengthening TPACK among pre-service students. In this regard Erdogan and Sahin (2010) assert that the more knowledge domains teacher candidates have, the higher vocational self-efficacy beliefs they have. This indicates that if the instruction using TPACK is performed more effectively, this will help teacher candidates increase their professional competence and employment opportunity. Hence, TPACK is an important knowledge baseto increase teacher candidates' professional competencies. In addition, TPACK development within a teacher preparation program is no doubt a multifaceted attempt where students may need to experience a range of learning opportunities to maximize their growth. Field experiences contributes to TPACK development and growth (Hofer & Grandgenett, 2012).

On another note, it is worth mentioning that the results showed a significant difference between pre-service teachers from the institute C and the institute B on pedagogical knowledge, whereby institute C students score significantly higher and are thus more confident about their knowledge and skills on this dimension. Since this study is keeping the institutions anonymous, it is not appropriate to further discuss details regarding the differences between the institutions. However, for future studies it might be interesting to

take a close look at the institutions and the details of their bachelor programs, to identify promoting or inhibiting factors when it comes to teaching pre-service teachers TPACK skills.

Also, it was found that students with 'other categories' specializations score significantly lower on several TPACK dimensions than students from the defined specializations, namely elementary/primary education, early childhood education, art education, special education and English language. The specializations that are categorized under 'other specializations' are Special needs, Social worker, Science, Arabic and Islamic studies. Also, for the TPACK models a significant difference was again found for the other specializations in comparison to the students who specialize in elementary/primary education and in early childhood education. This means that students in other specializations feel that their professors are less attributing as models of TPACK than the students from the other two specializations. In general, outcomes of the ANOVA have shown that according to the students, 'other' specializations seem to least prepare them for TPACK competences.

4.4 Results of qualitative data

4.4.1 Interviews with Instructors

Six instructors from three institutes in the United Arab Emirates were interviewed. The instructors were specifically selected to represent the pre-service teachers' interviewee's instructors. Open coding was used as a method to analyse the qualitative data from the interviews.

1) Tell me about yourself and your role in this institute. What modules do you teach?

Qualifications and backgrounds

The instructors showed a variability in backgrounds and qualifications. Two instructors hold a PhD, one in special education and applied behaviour analysis and the other in workforce education and development. Master's Degrees were held in educational leadership, early intervention. One teacher held a bachelor's degree in Deaf Education. Additionally, their backgrounds and previous work experience were all related to the educational field, showing a long experience in teaching and familiarity with their roles. One of the instructors has a

long working history as educational psychologist before she started teaching in the UAE. Another teacher has worked as a teacher in American Sign Language. Finally, one of the teachers used to work as a Director of the Center on Deafness in Tennessee and taught online graduate courses in Research, Special Education and Classroom Management

Current position and responsibilities

Most of the participants have a teaching position. Besides their teaching activities, some of them have multiple responsibilities such as: teaching, supervising interns and Masters students, teacher trainings, conducting research and publishing in journals, doing community service like conducting workshops and trainings, and administrative tasks. One teacher is also a Division Head and another teacher is Chair of the Math and Science department.

Courses

Courses that are taught by the instructors include both undergraduate and graduate courses. All instructors are teaching within the Education college, with the exception of one teacher who is also teaching in Business College. A number of different subjects were mentioned by the instructors, such as Special Education, Classroom Management, School- and family culture, family-, diversity- and educational ethics, education research, Early Childhood Development, Adolescent Adult Emerging Childhood, Science Education and finally Language Development in Business College.

2) How do you define educational technologies? And what is your understanding of the types of technologies that can be used in classrooms? (Prompt = name few?)

Definition and purpose

In general, educational technology was described by the instructors as a digital tool or materials that can be integrated into teaching to facilitate learning. Some teachers mention that educational technology is the facilitator for transition of knowledge. It can be used to acquire knowledge by retrieving information. For successful integrating technology in a course, it is important to select the right type of technology. T3 explained that:

"..you select the type of technology that fits into your teaching and that helps you in achieving your outcomes and objectives of the course".

T1 describes two different types of educational technology:

"Educational technology to me can be both hi-tech and low-tech. Hi-tech things like computers, smartphones, iPads and all of their accompanying software programs and apps that go with them, low-tech can be anything from books to models, to just concrete materials to try and help people to learn".

T6 explicitly described the difference between technology usage and technology integration:

"We in education differentiate between technology usage and technology integration. Technology usage could be random, could be unplanned, could be arbitrary, but technology integration is planned, part of the system, you follow certain models, you follow certain approaches, you integrate it with teaching strategies, it is totally different. And our goal is technology integration not technology use".

According to the instructors, technology can be used either to help the students learn or to help the teachers effectively deliver the teaching material. T2 stated:

"There are two separate points in tech integration; it helps teachers to teach and students to understand".

Examples of technology tools

The instructors mentioned several examples of technology they use in their classes. Whatsapp is regularly used for interaction and communication and Blackboard is a common used tool to present materials to the students and make the materials available for them outside of the school environment. Also, the Whiteboard is a technology tool that is used frequently to deliver presentations in the classrooms. Dropbox was mentioned as a storage tool, to save all lesson materials in a safe online environment. iPads are used for different purposes and one teacher used QR codes for treasure hunts. Less common technology tools that were mentioned are Socrative, Kahoots, Plickers, Zaption and Mindjet.

Ways to use technology

The most used feature of educational technology is sharing content and materials from the courses, but also keeping track of students' information such as attendance, schedules, gradings, etcetera. T1 explained:

> *"We have blackboard, we have an e-services system where we can follow up students' attendance, we follow up students' schedule, everything. We can follow up students' information grading system, blackboard and everything we put on. Blackboard, students can access that from home from their rooms we use power point slides we use computer definitely every day or every class.".*

The same instructor (T1) also pointed out that technology integration should be utilized in a way to support the teachers and not take over the teaching:

> *"Tech integration should not affect the concept, but rather help in delivering the lessons effectively. The main aspect of tech is its interactivity, unlike putting a picture on a board. There are two separate points in tech integration; it helps teachers to teach and students to understand".*

T2 described a way to use technology for reinforcing the material that was taught:

> *"I personally think it's good for reinforcement, like if you want to reinforce something after a session in a classroom, you might want to send a few questions that students can respond to in their own time. It's a memory aid used as a tool for reinforcement".*

Communication and interaction, within the classroom or outside, was often mentioned as a way to use the technology. For example, T5 said:

> *"I rely on technology a lot when my students are in the school doing internship because that is really the best way for me to communicate virtually. Yeah blackboard collaborate is actually very interesting if you want to run a session on long distance".*

3) Is it important to integrate ICT in the classroom? Why or why not? Do you integrate ICT into your teaching? Give an example.

Importance

Many of the instructors stated the high relevance of using technology in the classrooms. Integration of technology might enhance the students' knowledge regarding the teaching content, test the knowledge they acquired, and increase the level of motivation that students experience. An example mentioned by T1 of testing knowledge and motivation:

> *"..if I'm teaching teachers how to teach let's say grammar and there is a way where they can incorporate a little game that would test students' knowledge informally in the classroom and the same time motivate them".*

T6 described a project in which the institute tries to integrate the technology into courses, called 'smart learning courses':

> *'Right now, at 'xxx' we have a project called 'smart learning transformation' courses, it is a project where courses are transformed to a smart learning courses, technology is a major part of this transformation, so if you adapt or apply for course transformation, that means technology is part of your teaching and learning, integrated in with other areas such as the content and teaching style and teaching approaches and strategies".*

The second section of the interview enquired about some best practices used by them to integrate technology in their lessons. The instructors stated that they use software and applications such as Shockwave for interactive activities, LMS for formative assessment, feedback and grading. LMS is also used to integrate rubrics into the evaluation page. They also use videos, Microsoft word, PowerPoint presentations, and excel. In addition, using blogs, Wikis, discussion boards and discussion forums. The techniques used to utilize it is described by T4 as:

> *"..but for me I use discussion boards for posting questions and discussing the answer to this question, I use blogs for summarizing what we learned or what students learn during the week, and I use Wikis for collaboration on certain topics. So, I think these three tools are a must in increasing students' interaction in a course".*

Comments

A remarkable theme that was highlighted in the interviews is that integration of technology into the classrooms must be used in the right way, if not used properly it can obstruct learning instead of improving. An additional concern might be that students 'overuse' the technology and thereby lose track of the material's learning purpose. T4 said:

> *"I expect my students to use technology but then again a lot of the times they over use it. They focus on the games and their interactive learning proses and they forget the pedagogy behind it".*

One instructor stated that some students are better at using technical tools than others, and the learning process might be inhibited for the students who are not used to working with technology. According to this instructor, writing things down has benefits as well, and therefore technology should not be used when it's not necessary. For example, T6 stated:

> *"I don't think that it should just be used unnecessarily because some people are better at technical things than others and sometimes actually it avoids the physical necessity to go and do something like writing for example. That whole process of writing gets something solidified in your head better".*

4) How would you describe your students' Technology Knowledge, Pedagogy knowledge and Content Knowledge? How about TPACK?

Overall, instructors are quite positive about the TPACK knowledge of their students and state that the college of education students possess the knowledge in the three domains. T4 said:

> *"So, within the college of education I guess at a lot of times the students have the knowledge in these three elements: content, pedagogy and technology".*

However, there might be an imbalance in the three domains, students who are strong in one domain, might lack knowledge in another domain. T3 explained:

"I think some of them have, it's actually there is quite an imbalance in some students would have a lot of the content knowledge but not really very brave with technology, you would find some who are very much into technology and actually over use it because they are very tech savvy and probably lack the knowledge".

Technology knowledge

Their general, everyday technology knowledge is high. Technology was evaluated as the strongest domain of knowledge. This is due to the fact that millennials were brought up with technology and are therefore not afraid to integrate the technology in their class work.

T4 differentiates between the use of IT or the real knowledge about technology:

"So, student has technology in term of how to access how to use the technology. They are pretty good at it. But we are talking about educational technology, educational area I think in IT they are supper very good in technology, but student technology knowledge they have I think medium to high scale of knowledge in technology"

Pedagogy knowledge

Pedagogy knowledge was seen as the lowest domain of knowledge for the students. According to the interviewed instructors, the students need to develop more knowledge in pedagogy. They are aware of the importance of teaching pedagogy. T2 and T5 stated, respectively:

"I think the pedagogy is the part that really needs to be focused on when technology is introduced. I think when they are learning how to use technology when the course really focuses on the use of technology in education, they need to be very clear".

"Their pedagogical knowledge is "in process". Their knowledge of how to teach with technology, may be more limited. All students take a class in Integrated Technology and it is a challenge, as I'm told. If I were to hazard a guess, I'd say English is a barrier and integrating knowledge is also a barrier".

An explanation for the lower knowledge in pedagogy might be the young age of the students, a lack of self-esteem/confidence, and a lack of experience. T2 emphasizes the importance of

experience in practicing with technology integration, which will then enhance the pedagogy knowledge:

> *"In terms of Pedagogy knowledge, I think they have a problem it's because lack of self-esteem and of confidence lack, and lack of experience. I think in their age, I don't blame them because it's an early stage for them. Pedagogy comes with experience this is what I think".*

Content Knowledge

One of the instructors described the content knowledge of the students to be good. This is based on the fact that students are not allowed to start their internship if they are really struggling with their content knowledge. All of her students are completing their internship so therefore their content knowledge should be fine.

T6 stated that he is not able to measure it, but he assumes the content knowledge is good.

> *"I think their Content knowledge, I can't say I can measure it, but I think they have good amount of knowledge in their disciplines".*

5) How do you think the modules you are teaching are equipping your students with pedagogy, technology and content knowledge to prepare them for integrating ICT into their future classroom practices?

When the instructors were asked about the modules and courses they are teaching and to what extent those courses were equipping the students with TPACK, a number of instructors are affirmative about the courses covering TPACK. Students do get enough credit hours for learning these parts individually including technology, field experience, and methodology. Instructors believe that such kind of courses distribution over the three areas help student for better equipping themselves for future classroom practices.

Technology Pedagogical Knowledge

T1 pointed out that their program covers all TPACK elements:

> *"We have courses covering all the three areas. For example, the numbers of hours the students have to complete are around 120 or 122 I think. 48 courses are major and 18 methodology courses and so on so forth, 3 for technology, and 9 for field experience, so the credit hours the students have to complete are spread all over between major and methodologies and technologies as well".*

No elements

Not every course was focused on equipping the students with skills to integrate ICT in the classroom. For example, T5 stated:

> *"In this course, we do not prepare students for integration of IT other than the use of PPT or Prezi. It's not in our Learning Outcomes and so far, we're integrating some technology into our classes but we are not preparing the pre-service teachers to integrate it into their instruction".*

Practical examples

Other than educational technologies, instructors are also found to encourage pre-service teachers to use different interdisciplinary tools and prepare class assignments/tasks. Consequently, this will develop an understanding among the pre-service teachers and they will be able to integrate different disciplines, technologies, and tools within their own classrooms. Some provided examples of the technology they use in their classes, and how they encouraged their students to use it more often. T4 and T1 stated that:

> *"Technology and content knowledge, I allow them to use technology programs that they can bring, sometimes I allow them to use statistics program they have to go out and conduct research and distribute questionnaire and bring data back in my class especially in my education research class".*

> *"Also in ethics course I do that, some of the students do that. Also in the class of ethics they can perform, they can act, they can use group facilitation, they can use TV show, they can act as TV show".*

The above statement indicates that instructors are aware of the current status of implementation of technology as it is used as a form of an activity by some teachers only, whereas it should be integrated into the teaching modules in order to get best learning outcome.

Even though most of the instructors are found to not rely too much on the use of educational technologies, they still use and ask their students to apply educational technologies within the classrooms in different assignments and presentations. Besides, instructors also assist students to learn different technological skills and gain pedagogy/content knowledge.

6) What is the strongest point in the pre-service teachers' program at your institute where you believe it is preparing the students to integrate technology into their future classroom practices?

Courses

The question related to the instructors' perception of the strongest point in the education program in their institute revealed that courses are considered to be important. Courses like "Integrated Technology in Education" and courses related to teaching methodologies were mentioned by the instructors. The course teaches them to link technology and content into a lesson. T6 said:

> *"The Integrated Technology course and any other courses in IT that they take are clearly the strongest method we have in helping students learn how to integrate and teach with technology".*

T4 believed that the whole program is strong because it is benchmarked against international standards:

> *"It is not one course, it is a package, and when the program was revised it was revised according to international standards, because college of education is applying for accreditation, we got recognition at one point, now we are planning again to get it from another association, so this is why I think our programs are solid and built based on*

international standards, so students get all they need to be good teachers, with some variations of course".

Furthermore, instructors believe that the pre-service teachers (students) are well taught for content knowledge, teaching methodology and pedagogy knowledge during their training programs. Pre-service teachers study many courses related to methodology, teaching strategies and fundamentals with core course for technology integration. Hence, pre-service teachers get equipped during their training for the integration of educational technology.

Practical experience

Few instructors believed that the strongest point is the application part in which they can gain practical experience. They believed that by given the opportunity to apply, they are learning more. For example, T3 stated:

"I think it is where they have got to apply it in schools, yeah, the opportunity to actually do it, under supervision of course by us as university supervisors but also by their mentor teachers".

Weak program

T1 believed the program was not strong and teachers are not encouraged to use technology in classrooms:

"Unfortunately, our early childhood programs do not actually encourage the use of technology and in fact they discourage it, and obviously there are pedagogical reasons for it, however the times we live in today I think that needs to be somehow reconsidered".

7) Do you anticipate any challenges that your students might experience in the process of integrating ICT in their classrooms later on? Like what?

Question seven focused on the anticipated challenges the students might face once the pre-service teachers become in-service teachers.

No challenges

The majority of the teachers were very optimistic. T5 was fully confident that his institutes' graduates will not face any challenges:

> *"I don't think so, based on my experience we hear good things from school principals about our students, when they go there they are aware of technology (ICT) integration strategies and most of them do well with that … "*

T2 emphasized how students who grew up with technologies are experienced enough to be able to integrate them in the classroom:

> *" You know I don't think they will experience big challenges because they have all been brought up with that technology … "*

Students' abilities

T3 pointed out that the students need to keep updating their technological skills:

> *"But in new technology many problems they might face it in future but they need to update them self they need to work more on their PD's they need work more on their own instruction on how to deliver the content, transition of knowledge is still and remain the most important emphases because you need to transfer knowledge … "*

It was pointed out by T6 that it is important that the students do not lose sight of the actual goal of the technology used when integrating it in the lessons they teach:

> *"..the only concern I have is how well that their discretion to when and how, like when is it really serving a purpose and when is it just a distraction and a form of entertainment. Which is not necessarily a bad thing if they're aware that doing this is just to entertain, and not think that just because I did this interactive online activity that I have taught ".*

Environmental limitations

The success of integrating technology in their lessons also depends on the school where the pre-service teachers will end up teaching. The better their facilitations, the better teachers can integrate the technology in their lessons. It was pointed out by several instructors that they expect the technology limitations in the school they will work for might be one of the

challenges their pre-service teachers will experience. However, T4 discussed that if students face technological challenges in their school then:

> *"Pre-service teachers will need to be able to adapt to the settings in which they find themselves".*

8) What are the areas in which you like to be developed by the college in order to prepare the students for future classroom practices?

This question attempted to capture instructors' suggestions regarding how to develop their institutes' education program. Instructors argued that regardless of the training they received from their colleges they tend to design their own teaching methodology that integrates technology into their classroom practices.

Personal development

Moreover, instructors seek additional trainings, however, they do attend conferences to improve their current skills. T6 explained:

> *" I actually train myself, so I always go to a conference, that is called Tec knowledge in America they actually focus on the use of emerging technologies for training purposes so it's not just specifically teaching and such but for training purposes and I find those tools actually work better with my students because they aim at adults".*

Courses

Furthermore, instructors believe that the science and technology studies should be more integrated for the use of educational technologies and IT instructions. At the same time, students should be instructed regarding how to use the technology. College should provide additional training and symposiums or conferences regarding the best use of technology and to sharpen the current tech skills of the student. According to T1, students should be allowed to take application design course if they want.

> *"I guess I like to see our students be given more IT instructions and how tech works how things are put together. Maybe they could take an "App" design course. We should push the use of ICT and get a detailed background. Teachers are coming up with new education technology, not off the shelf".*

In addition, T5 feels that the current program contains a lot of overlapping information that makes it less effective:

> *"… I'd like to see a program review and a course-by-course review that removed content that overlaps too much and an increase in specific research-based strategies that the pre-service teachers can take into their practicum experiences and use them right away".*

Furthermore, instructors expect that there should be an increase in the number of technology courses as there is only one core course of technology at the present. This course should be expanded to include two more courses as per the instructors' viewpoints. Instructors mention that the number of technology courses will help to include a significant number of hardware and technology integration strategies. Instructors suggest that from two core technology courses, first course would include theoretical framework and application while the second course will include practical sessions. Further, instructors mention that two technology courses were proposed long time ago, but due to course time limitation, it was not implemented. T2 states that if two core technological courses would get six credit hours, then it will be possible to implement them properly:

> *"Maybe I sometimes think if they increase the number of technology courses, we have only one core course in technology, if that course is expanded to include two courses that might be good, because technology is very wide and there are so many applications so many hardware to talk about so many integration strategies"*

Instructors expect the universities to provide different facilities; especially, for a class with large number of students. Consequently, the larger the number of students the more use of ICTs and the more facilities are required.

9) How is ICT integration articulated in the national institutional policy and practices?

<u>Limited understanding</u>

Instructors' understanding of technology integration in national policy is limited, they did not have enough information about the ICT integration within the National Institutional Policy and Practices.

Instructors doubt that they have proper information about the ICT integration within the National Institutional Policy and Practices. They stated that they have not been taught ICT as a subject. They believe that there should be ICT modules with policies for teachers, this will help them understand how to develop technology during teaching. Also, instructors are aware of the absence of any mandatory policy for technology integration and conceive that there should be ways for the development of lots of ideas with realistic goals. As schools have limited resources, one must try finding way for getting the resources.

ICT for future development

More so, instructors think the national institutional policy and practice is yet to cover ICT integration. However, instructors have a futuristic view of ICT as a major driver of the economy. They believe that at the national level, the country is working hard to integrate ICTs within the classroom. Thus, universities are required to implement and provide educational technologies to instructors, students, and within classrooms. Additionally, according to T6, e-services are also introduced by universities due to the state level policy and practice:

> *"... UAE is wanting to go in the directions of having E-services, you see that everywhere you go that E-services in all of the government departments, smart government yes, okay smart universities that is the direction clearly the UAE is going and taking huge steps in that direction and internationally things are going in that direction as well ..."*

Connection between universities and government

Moreover, instructors describe that their university always connect its action plans and strategies with the higher government policies and that's how ICT integration is articulated in the national institutional policy and practices. Also, the government has its policies and strategies to be articulated with different universities. T1 states:

> *"You see when the university here, when they have their action plan and strategy planning they always connect that with the higher government policies, so my assumption is that the government has its own strategy planning which feeds into the other institutions strategy plan and our institute is one of these institutions, so that is the way it is integrated and everything is connected".*

T3 strongly believed that it is articulated:

" It's very well integrated … "

T4 stated that UAE Vision 2021 addresses technology and education:

"UAE Vision 2021 addresses two areas where education and technology merge. There is an expectation that the UAE continue its goal toward a "Competitive Knowledge Economy." To that end, the UAE intends to set itself aside as a "First-Rate Education System".

10) Do you have anything to add? Your thoughts about the study?

The researcher tried to grasp some final thoughts from the participants by asking this question.

Evaluation

The answers of the instructors showed that they are interested in evaluating the students' technological skills, but also the impact of the teacher training program after they leave: will they really be able to integrate ICT successfully in their classrooms?

Some instructors showed interest in the outcomes of this study: they wanted to know their students' perception (pre-service teachers). Consequently, it will help them to improve their courses and teaching techniques.

Additionally, the instructors want to test the technological skills of their students through another program or a system. Eventually, this will help the universities to increase the effectiveness of their programs, and it will also help the instructors to improve their teaching techniques and methodologies, according to T1:

"… ICT integration makes life of a teacher easier …"

T5 suggested continuing this research in order to understand the students' TPACK after they start teaching:

"… but I would actually be myself interested in someone collating information as to how our students after they leave the program actually use it. The technology, it would be

interesting I just observe it during an internship and I walk away but it would be interesting to see how much of that do they continue to use, do they use it less? Do they use it more?".

Instructors are interested to know more about the use of ICTs in different universities and want to stay updated with such information. T6 said:

"I think it is a useful study to be doing, and I would be really interested to know your findings at the end, because you know you are so busy, you don't get much of a chance to exchange ideas within a specific area with other universities if it is in your particular area it is obviously part of my area but it would be interesting to know how people are feeling as a whole".

Need for technological facilities

The use of educational technology is integral; however, variety of ICT tools needs to be promoted within classrooms. Therefore, universities need to take serious interest and provide facilities for educational technologies within classrooms.

Instructors believe that, in comparison to private schools, most of the government schools provide their teachers with technological facilities. Therefore, pre-service teachers can implement their educational technologies within classrooms, according to T2:

"… But I know in the schools - particular in the government school - the use of technology is, you cannot escape it. They all have smart boards".

Challenges

Furthermore, instructors consider TPACK as an interesting venture for any institution. Nevertheless, reducing the gap between the integrated technological knowledge and practice still remains a challenge.

Instructors believe that the integration of technology requires time and practice. Hence, as a teacher, you need to spend time for planning and implementing technology in order to be successful with the integration of technology with pedagogy teaching, content knowledge, and teaching strategies. Further, instructors mention that in order to have the best usage of technology, teachers must have to give maximum time to hands-on practice instead of only

theory sessions. Many of the teachers say they possess technophobia. Hence, it hinders the practical usage and expertise of technology. However, the best way is to face the technology for its best applications, according to T3 and T4:

> *"What they call technophobia; if you have technophobia you need to deal with that, otherwise that will be like a hindrance for you".*

> *"Time is needed, planning, and efforts and patience. Because if you are talking about technology, if you don't try and try and try and spend time and do it as hands-on activity, it is not going to work to the best of what you are looking for".*

Instructors also describe that school principals and teachers are against technology usage due to technophobia at a worldwide level. Hence, there should be some measures to remove this anti-technology attitude of the old-generation.

Furthermore, instructors add that the fear of technology is due to lack of confidence and awareness of the teaching professionals. Due to the age restrictions and other learning attitude issues, they start resisting the use of technology and do counter-attack. They feel less confident about handling the technology.

Instructors believe that the main reason behind the technophobia is age and less exposure to the technology field due to old administrative experience and teaching strategies. Hence, they start resisting the technology integration. But this can be handled with extra precautions and training of the technology. T5 stated that the university should arrange or make specific strategies and policies for the technology integration:

> *"It could be the age or the way we are used to teaching in the past, so experience, so if you are used to teaching without using technology then anything new you start to resist it, I think it is part of our nature. New stuff sometimes gets resistance".*

<u>Positive impacts</u>

Moreover, instructors believe that the integration of technology will have the biggest impact on teaching performance. It will help in improving the existing methodology by getting the students' real-time feedbacks. Furthermore, technology will support teachers to improve their mentality towards student after understanding students' feedbacks. This will ultimately make teaching work smooth, productive and efficient.

Table 10: Themes per question for the instructors' interviews analysis

Question	Themes
Tell me about yourself and your role in this institute? What modules you teach?	• Qualifications and background • Current position and responsibilities • Courses
How do you define educational technologies? And what is your understanding of the types of technologies that can be used in classrooms?	• Definition and purpose • Examples of technological tools • Ways to use technology
Is it important to integrate ICT in the classroom? Why or why not? Do you integrate ICT into your teaching?	• Importance • Comments
How would you describe your students Technology Knowledge, Pedagogy knowledge and Content Knowledge? How about TPACK?	• Technology Knowledge • Pedagogy Knowledge • Content Knowledge
How do you think the modules you are teaching are equipping your students with pedagogy, technology and content knowledge to prepare them for integrating ICT into their future classroom practices? How?	• All elements • No elements • Practical examples
What is the strongest point in the pre-service teachers program at your institute where you believe it is preparing the students to integrate technology into their future classroom practices?	• Courses • Practical experience • Weak program
Do you anticipate any challenges that your students might experience in the process of integrating ICT in their classrooms later on? Like what?	• No challenges • Students' abilities

	• Environmental limitations
What are the areas in which you like to be developed by the college in order to prepare the students for future classroom practices?	• Personal development • Courses
How ICT integration is articulated in the national institutional policy and practices?	• Limited understanding • ICT for future development • Connection between universities and government
Do you have anything to add? Your thoughts about the study?	• Evaluation • Need for technology facilities • Challenges • Positive impacts

4.4.2 Interviews with Students

Twelve students from three institutes in the United Arab Emirates were interviewed. Open coding (thematic analysis) was used as a method to analyse the qualitative data from the interviews.

1) Tell me about yourself and your major? Are you planning to teach after you graduate? Why?

This question attempted to grab the demographic background of the participants and it was noted most of the participants were studying early childhood education. However, some of the other specializations included Integrated Strategic Communication, English Language Teaching, Applied Behaviour Analysis, Class Teacher for Elementary and Special Education (Gifted and Talented).

Future plans

Most of the students were planning to start teaching after their graduation. However, S7 didn't not show any interest in teaching. She pointed out that she didn't want to work in the Ministry of Education because of its rules and regulations:

> *" ... I don't like Ministry rules, I taught in private schools and I felt it was different, they use different techniques to teach. I loved teaching in private schools… "*

She praised the system, educational standards, and teaching techniques/methodologies of private schools. Thus, in comparison to public schools, pre-service teachers are more interested to become a part of private entity.

On the other hand, most of the interviewees have shown interest and willingness towards teaching. Whereas they want to continue teaching as their permanent profession. Several reasons were mentioned for this interest:

Students' potentials

The pre-service teachers frequently mentioned that they are planning to teach with the aim to help children reach their potentials. S11 said:

> *"Yes, I will teach because teaching is my dream since childhood. I love kids and I feel I can achieve something in this area. I want to be part of raising kids and teaching them".*

Also, S2 and S9 mentioned how they want to be a good teacher for the children so they will enjoy their time at school and feel comfortable:

> *"Yes, I am planning to teach because I noticed there are teachers who don't teach properly and therefore students don't want to go to school. I want to change that; I want to make teaching fun and interactive for kids. I want the kids to be prepared for the future".*

> *"I would like to teach because once I saw a teacher not treating a student properly and I want to be a teacher so that I treat students fair and right".*

Transfer of knowledge

Making a difference for the future generation of the UAE by delivering information to them was mentioned by S8 as an important reason to go teaching after graduation:

> *"I think that I have a passion in teaching and I love being a student teacher while I was in my practicum therefore am planning to teach after my graduation. Besides, I felt interesting in delivering information that I know of other people specially for the younger ones and I think that I will make a difference in the future generation for the UAE".*

S5 mentioned how important it is to her to be able to transfer knowledge to students in order to develop their minds:

> *"I would like to teach after graduation, it's a nice feeling to be able to transfer knowledge and information, it is really nice to build kids' mind."*

Special needs

Another point noticed in the interviews was that few of them were interested to gain higher education degrees. They also had drawn their career path band where they wanted to work after graduation. Helping low achievers and special needs students was mentioned several times. S2 and S6 said:

> *"I like helping low achievers to reach their potential"*

> *"Yes, I am planning to teach, after I graduate I will go work in "New England Centre". It's a special need centre".*

They also acknowledged the importance of early childhood education and the responsibility it entails, for example, S10 said:

> *"I believe that the most important part of elementary teaching is the early learning stage. It's like building a house, without the basics it will collapse. It is a very big responsibility and I feel that I can carry this responsibility"*

2) How do you define educational technologies? And what is your understanding of the types of technologies that can be used in classrooms? (Prompt= name few?)

Pre-service teachers described the importance and the use of educational technologies as different tools, equipment or resources that facilitate a teacher to create a high-quality learning experience.

Benefits for instructors' teaching processes

Furthermore, the pre-service teachers noted that their instructors delivered lectures with the help of educational technologies and considered it as a necessary component in the classroom.

"It is useful to explaining lessons." (S11)

"It enhances and supports a teacher" (S8)

" ... because when the instructor teaches he writes what he says on the board, so from his mind to the board" (S12)

Benefits for students' learning processes

Not only the benefits for the teachers were described, but also the benefits for the students and how it supports them in their learning process. For example, S3 and S7 stated:

"Teaching by using tech helps me to build my knowledge and skills"

"It's a type of a method in transferring knowledge and information"

Other than educational purposes, pre-service teachers also found to use technologies for entertainment and class engagement purposes. S4 explained:

"For example, I will use a website that explains adjectives and nouns called www.monkeygames, it has missing letters and multiple choice."

Examples

The interviewees identified types of educational technologies such as computers, laptops, iPhone, iPads with updated software, applications and sound system online courses, computers/laptops/iPads, game-based online learning, and different websites that support

online learning (such as YouTube, robots, 3D print, word, touch screens, class Dujo and keynote).

Some of the teachers prefer the use of combination of both new and old techniques to deliver an effective lecture; such as the use of blackboards and presentation slides together.

> S1*: "... some types of these technologies that might use in teaching and learning process are divided into hardware technology and software technology."*

As for how they will use technologies in their classroom, the respondents stated that they will use it for homework purposes, games, explaining lessons, communication with parents and students. They also argued that they will either use or plan to use a variety of technological tools; such as electronic media, smart boards, and various online platforms. For example, with the use of educational technologies teachers can teach students to design and develop websites/webpages at a very young age.

S9 describes her understanding of technology education as follow:

> *"My understanding of technology education is enriching classroom practices by using technology. This could be done by using simple apps and software or by more complex methods such as 3D board.".*

Dislikes

On the other hand, some of the pre-service teachers depicted dislike towards the use of educational technologies within the classrooms. They were not interested to deliver all their lectures with the use of technologies and stated that they will use it sparely:

> *"I hate technology, I don't like it, but it is useful to explain lessons and using power point presentations, puzzles. It simplifies things and helps us. If I teach, I will use it once or twice a week"* (S12).

3) Is it important to integrate ICT in the classroom? Why or why not? Are you using them in your current classrooms at the college?

Pre-service teachers do recognize the importance and need for Information Communication Technologies (ICTs) because it makes the transfer of information easy, fun and less time consuming. They believe that the new generation is tech savvy and acknowledge the benefits and advantages of ICTs within their classrooms such as making the lesson interesting. In addition, Sound Note, WordPress, iphunea view, and BlogSpot, Lynda (similar to Khan Academy) can be used in classrooms.

Consequently, they have attained more using different ICTs within classrooms; such as the use of online courses, game-based online learning such as "Pad List", and different web-sites that supports learning such as Edmodo. They believe that by using technology they are be equipped with 21st century skills". S10 said:

"... besides, it's equipping us with the 21st century skills ... "

Facilitate learning processes

Another interesting perception that came up few of the participants is the usage of technology with special needs students, and in particular autistic children.

S5*: "For example, in autism cases where the kids can't speak I grab an iPhone or iPad and ask them to perform an activity with it. The child can put a timer and use it. And severe special needs cases iPad can be used instead of cards. And we can use iPhone to make them talk".*

Pre-service teachers also believe that technology helps students in being creative, and promote critical thinking skills, because using technology needs a high thinking skills and cognitive abilities:

"... and helps them to be critical thinkers in using these technologies in their learning process. Also, using technology need a high thinking level which is explain the cognitive skills that the students will need". (S3)

Stay up-to-date

Students argued that instructors need to stay updated with new trend in technology because the new generation has become more advanced:

> *"Yes, it is, because we need to stay up to date with new trends. New students that come to university come with new technology so instructors need to be aware of everything new and keep updated. New technologies are coming up so we need to keep abreast".* (S1)

> *"We have a revolution in tech. I notice that the new generation is tech savvy. Tech is leading and managing our era".* (S8)

> *"Life around us is rapidly changing while the schools are not. Curriculum should change every 3 years to keep up-to-date with tech progress".* (S12)

Improve or support teaching processes

Another important aspect of technology is that it can facilitate the teaching processes for the instructors. The use of technology tools could save them time. S2 said:

> *"it makes the teaching process easier for teachers and less time consuming".*

Some of students stated that technologies can be used for communication with parents. For example, S6 explained:

> *" when I teach, I will use Blackboard and Edmodo to communicate with parents."*

Disadvantages

A few of the interviewees have shared disadvantages of constant use of educational technologies. For example, with continuous reliance on electronic mathematical tools, students can become dependent and they may lose interest in learning. According to S4:

> *"If overused, students will depend on technology, they will be lazy. For example, students use calculator for everything, but a relative of mine uses his fingers because school teaches him the use it. It is very interesting to watch".*

4) How would you describe your Technology Knowledge, Pedagogy knowledge and Content Knowledge? How about TPACK?

There were mixed answers to this question, some of the students were very confident in acknowledging their strengths in all TPACK domain, but others less confident. To express their confidence many students said, *"it's good" or "I believe I have the proper knowledge in these domains"*. They believed that their confidence comes from some of the courses they took such as "Integrated Curriculum" and "Educational Technology":

S9: *" I gained this confidence from a course I took … during the course we created a website using WIX"*

Technology Knowledge

Some students pointed out that they developed better understanding and usage of technology after entering the university. They emphasized the role of the university in teaching them how to use technology. Students mixed up between using technology in the university for home works and assignments, and the usage of technology to deliver content in classrooms. S11 said:

"*When we first came to uni we had teachers who taught us how to use technology. They download applications and software and would teach us step by step how to use it, service desk would fix the laptop, inform us of spam and virus. I wasn't aware of these things but they taught us. I would say I am very good in technology".*

Pedagogy Knowledge

S2 linked pedagogy with learning theorists work like Piaget and Vygotsky. She pointed out that by studying the work of these theorists her pedagogy skills have developed and progressed.

"For example, if I want to teach verbs, I was taught to give the meaning of verb, use flashcards, PowerPoint, video. Body gesture and movement. Then teach adverb by explicit and gradual way".

Content Knowledge

Few students believed they are weaker on the content side because of inclusion initiatives in their schools:

> *"I think my knowledge is 95% in some areas … but with special needs students I think it is more challenging." (S3)*

TPACK

However, S1 and S7 were very confident that they had good TPACK but will not use technology in their classrooms:

> *"… but I believe that kids at young age need to use their hands and develop their motor skills more".*
>
> *"They need to strengthen their body and hand muscles".*

S9 linked TPACK with Bloom's Taxonomy. She believed by using technology she can elevate her audience's thinking skills:

> *"I feel I am capable in these areas. I integrate tech in my workshops with Al Noman Research Centre and Sajaya Centre. For example, when I conduct workshops in "6 ways of thinking" I use technology because I don't want lecture and memorizing, I want my audience to elevate their thinking to the highest level of "blooms taxonomy".*

5) How do you think your education program equipped you with pedagogy, technology and content knowledge to prepare you for teaching? How?

Responses on this question were mixed: some students thought their education program prepared them well in TPACK capabilities, others provided some criticism or recommendations for the programs.

Positive perceptions

The pre-service teachers believe that they are being successfully trained on various classroom management techniques and are satisfied with the trainings and learning they have achieved. In terms of classroom management, they were taught how to use clocks and bells and applications such as 'Dujo'. They believed that their TPACK was enhanced through field experience and micro teachings:

> S8: *"It prepared us through implementing TPACK in our micro and mini micro teaching. Our instructors would give us examples of how to integrate tech in our classrooms. in addition, we took a full course about TPACK".*

Some students referred to certain courses that equipped them with TPACK. For example, S3 said:

> *"By giving us courses that taught us how to integrate tech into our teaching, such as taking a course titled 'science for young children'".*

S4 pointed out that they are taught how to integrate online games and videos into their classes such as 'Kahoot' game.

> *"Yes, especially in science, we are taught how to integrate online games and videos into our classes. Also, how to use Smartphone and tablets. We were introduced to a website called 'Kahoot'. It is very interesting and uses interactive interface to teach children".*

Negative perceptions

Respondents stated that their institute is neglecting the cultural aspect of their program. They felt that when they went teaching in schools the students were unengaged due to lack of cultural sensitivity.

> S9: *"Because our system is more American and the university system is not aware of local context and culture. We go and teach but school kids are not interested because of how we teach".*

Another student notes that the university did not prepare their TPACK skills by the content of the courses, but the related task did. This emphasizes the importance of practical experience in the field of teaching.

S12: *“I believe that my uni hasn’t exposed me to proper tech integration. I feel that the content of the course hasn’t equipped me but the tasks related have equipped me”.*

Few students were unsatisfied with their program, one student pointed out that their program is repeating itself, more theoretical and shallow:

S2: *"I think the program is a bit shallow, it doesn’t go deep into all the topics. The course outline says something and when we study it we discover that it is the basics. For example, curriculum design course was very basic and shallow".*

6) What is the strongest point in your program, where you believe it prepared you to integrate technology into your classroom practices?

Subjects and courses

According to the participants their institutes prepared them to some extent. Students perceived that some of the courses they were taught were useful and prepared them for technology integration into classroom practices. The courses mentioned were leadership courses, presentation skills, public speaking courses, media storytelling, integrated curriculum supported with technology course.

They praised how they were taught to teach multiple subjects like science and math. Students also pointed out that they were taught how to create thematic unit plan where they would integrate science, math and English in one lesson and supplement it with technology. Also, they complimented how they were taught to use a simple excel sheet to create games. In addition, they pointed out that their instructors taught them how to connect theory with practice. For example, S8 explained:

" ... for instance, Vygotsky communication theory can be done through websites. I can link everything I learned to educational technologies."

Other

In addition, they were taught to align the learning goals in the plan with ADEC's required outcomes. According to S1:

> *"... we were also taught how to align our learning outcome with ADEC's required outcome. Also, we learned how to plan correctly, we used mapping template to map three topics together. I think the strongest is the way we were taught to choose the best planning for our class".*

According to S11, the strongest point is how they are taught to be innovative:

> *"The strongest point is "innovation" they teach us how to be innovative and utilize what we have in our hands."*

Points of improvement

S6 compared her current institute with another she attended before, she argued that the other institute was better due to different reasons:

> *"The other institute really prepared us from the start in tech. All the courses we learned had tasks that linked the tasks to a certain app or tech software".*

Few students believed that their institutes didn't prepare them well because their institute focused on research more and their instructors were not qualified:

> S12: *"I don't think we are being prepared because our instructors face challenges in using technology themselves".*

7) Give an example of a lesson during your school practice where you integrated or will efficiently integrate technology into your classroom?

The response to this question revealed participants' techniques in integrating technology into their classroom practices, given that the students were asked to describe an event in future, the answers showed that they will adopt practices they saw during internship or practicum. It also revealed that they have their own ideas derived from their own passion for teaching.

Students indicated that the integration can be done in any subject, some of the subjects mentioned were English language, Math, Science, Special Education

Technological tools

Some students pointed out that they will use video to control the pace of the class and teach certain contents such as process of doing something. They also said they will use grammar websites, songs from the internet, animations to tell a story, smart boards, PowerPoint presentations and iPads. S5 described an activity she saw at a school that used iPads to teach halves:

> *"… Once I saw a teacher in her class using an iPad to take her students photo and then she cut it from the middle into two, after that she asked the students to put the photos together. She was teaching them about halves".*

Few students referred to certain types of technology they saw in different schools, such as 'Activeinspire'.

> S9: *"I saw a program in one of the 'xxx' schools called 'activeinspire'. I used it during my internship, it's very useful. I would write the lesson, questions, rules, learning outcomes, put pictures and everything, but cover it then using a smart pencil I uncover it. Perfect example of technology integration".*

Another interesting activity described by a participant was using blackboard to create a mind map about recycling. Also, a professor connecting his computer to the students of his class computer and control it.

The students indicated that they were taught how to integrate technology into their lessons using readily available resources at school:

> *"We were taught how to plan by scenario, and one of the scenarios was to teach in a one computer classroom. We were taught how to use rotation technique to allow all students to use computer. We also learned how to use soft wares like Microsoft word to teach classifying, or explain vocab words like 'push and pull'.* (S2)

Conferences

Another interesting way for students to learn about technology integration is through attending international conferences, as mentioned by S12:

"We once attended an exhibition in Singapore and I witnessed some exciting examples of tech in education. For e.g. I saw the 3D board for blood cells, and I saw how they teach making robots in grade 3".

8) Please describe the most memorable and interesting situation where your professor used technology in teaching and learning?

The students mentioned several tools that were used during interesting situations:

iPad

S4 provided an example of how iPads were used for language teaching:

"In the foundation level, our instructor used a game on iPad to teach us vocab. The game was like an airplane where we had to fill in words, sentences and letters. If we answered wrong the distance of the airplane flight would increase".

Phones

Phones provide students access to the most recent news updates. S6 said:

"In PR course we were studying about crisis management and our teacher asked us to use our phones to check news".

Blackboard

Blackboard is a technological tool which is mostly used for communication between instructors and students:

S1: *"Once we attended an online class on blackboard. We were at home and it was after 6:00 pm"*

S8: *"One of our instructors used discussion board on the blackboard to discuss our weekly progress and any topic such as art for young learners".*

Others

Another situation that was described by S3 is how a teacher used a CD to show them examples of the lesson content:

" One of my teachers taught us how to read stories to students and ask questions. Then he brought a CD and showed how reading stories are. He used videos"

On the other hand, some students felt they never had a memorable situation:

"There should be more topics about technology. They should introduce new tools similar to ppt, like Prezi or animated presentations. Also, there are websites for animated characters, where we can have cartoon like characters, but some instructors don't accept it" (S10)

"I feel that our instructors are old and outdated, they use lecturing and reading from ppt." (S12)

9) What are the areas in which you like to be developed by the college in order to prepare you for your future classroom practices?

Several themes were found in the analysis of this question, whereby the most frequent mentioned recommendations were related to practical experience, course and program restructures and tools to be implemented:

Practical experience

Most of the students discussed their need for more practical experience by more internship and practicum courses:

"We need more internships and school practice. I personally go to schools by myself to get info and practice. By having more practice, we could have better quality graduates." (S8)

"We need more internship and more options in internships. We need more practice hours". (S1)

"We want more practicum. I also think we don't need exams, instead of it we could have more practicum and training in our classrooms". (S9)

S2 suggested having in-service teachers come and talk about their experiences in schools:

> *"I suggest the college to invite teachers from the schools to come and talk about their experiences. They can talk about the challenges and struggles. It's a type of experience sharing and we can ask them any questions we have. We can learn from them. The teachers invited can be from different schools and levels."*

Courses and program restructures

By restructuring courses and education programs, the students could better be prepared for integrating technology in the classrooms when they will start teaching.

> S5: *"I think the courses needed to be restructured in terms of which we take first. There should be online classes. More courses about technology should be introduced. We also should take courses that will help us in teaching, for example we took "public speaking" course from another college, but it is very useful for us as future teachers."*

> *"I think the uni should focus and develop the content of the IT class".*

Tools

Several students gave recommendations for software and tools that should be used in their college to improve their learning process and prepare them for future classroom practices.

> *"We should be introduced to different software like instead of PowerPoint presentation we could learn about Prezi'. Also, there are animation websites we can use for presentations".* (S6)

S12 pointed out that her institute should consider developing an application for communication:

> *" I want the university to consider creating an app for communication between us and faculty and staff. The app would include all the contact info of the faculty. The app would have a notification feature so that we get informed if messages are sent or received. The platform would also have a feature for discussion transferring and sharing knowledge, expertise and experience. We could also have groups with our instructors."*

10) Do you have anything to add? Your thoughts about the study?

Future preparations

The students believed they are being prepared to teach in technology age and emphasized the importance of this:

S4: *"This study is very important, now is the time to study this topic. In this generation tech has become a part of a normal life. It's good to see someone interested in this topic."*

S1 has been thinking about their skills and future plans for teaching:

"I would like my students to use technology but in a different way, I would take my students to the library once a month and ask them to be creative about something or a topic I taught them. I would ask them to go on the internet and come up with something new. I like to do different things to break their routine. It will be a free class."

Hesitations

Some students showed fear of using technology, they believed they could not control what students do in class:

S2: *"But in general, I don't encourage technology because I cannot control what students do with it in class, if all are following then maybe one or two students would check different websites not related to the lesson."*

Needs

Also, several students pointed out that they needed more exposure to content. For example, S9 said:

"I think we need training courses to enhance our ability to integrate technology into classes, I don't feel confident in my technology competencies. We also need more focus on content like we should be taught Grammar before we are taught how to teach grammar. More literacy courses to be ready to teach. In addition, I feel the schools are more advanced in technology than university."

Students wanted more practice in schools and believed technology is good. They also asked for more integration of technology in their courses, some of them suggested tech integration in each and every course. S12 believed their institutes' system is like schools:

> *"I wish the university would mix tech in every course and there would be websites for each course so that we understand it more. Our university's system is like schools, memorize and sit for the test. I wish the university would teach us some of the things we learned at 'xxx' like writing emails. We were taught how to write and send emails and use different outlook features."*

Table 11: Themes per question for the students' interviews analysis

Questions	Themes
Tell me about yourself and your major? Are you planning to teach after you graduate?	• Future plans • Students' potentials • Transfer of knowledge • Special needs
How do you define educational technologies? And what is your understanding of the types of technologies that can be used in classrooms?	• Benefits for instructors' teaching processes • Benefits for students' learning processes • Examples • Dislikes
Is it important to integrate ICT in the classroom? Why or why not? Are you using them in your current classrooms at the college?	• Facilitate learning processes • Stay up-to-date • Improve or support teaching processes • Disadvantages
How would you describe your Technology Knowledge, Pedagogy knowledge and Content Knowledge? How about TPACK?	• Technological Knowledge • Pedagogical Knowledge

	• TPACK
How do you think your education program equipped you with pedagogy, technology and content knowledge to prepare you for teaching?	• Positive perceptions • Negative perceptions
What is the strongest point in your program, where you believe it prepared you to integrate technology into your classroom practices?	• Subjects and courses • Other? • Points of improvement
Give an example of a lesson during your school practice where you integrated or will efficiently integrate technology into your classroom?	• Technological tools • Conferences
Please describe the most memorable and interesting situation where your professor used technology in teaching and learning?	• iPad • Phones • Blackboard • Others
What are the areas in which you like to be developed by the college in order to prepare you for your future classroom practices?	• Practical experience • Courses and program restructures • Tools
Do you have anything to add? Your thoughts about the study?	• Future preparations • Hesitations • Needs

4.5 Summary of the Qualitative results

4.5.1 Instructors

Instructors mostly use technology in their classrooms to share content for courses, facilitate the communication with students, and to support their teaching activities. They feel that using technology in their teaching is beneficial for the students' motivation, increasing their knowledge and testing their knowledge. However, there is a risk of students being distracted too much by the technology and thereby losing track of the actual learning purpose.

Teachers feel that their students are best in the technology element of the TPACK model, as millennials are brought up with technology. There is, however, a difference between the ability to use technology and the actual knowledge of technology. Instructors think that students would score lowest on pedagogical knowledge which can be improved with practical experience. The content knowledge of students is evaluated as good by the teachers.

Some instructors thought that the programs in their university covered all TPACK elements, while others thought that students are not well-prepared and encouraged for integrating ICT in their classroom activities.
Teachers identified the courses as one of the strongest points in their bachelor programs for teaching in TPACK. Also, the importance of practical experience in the development of TPACK skills was emphasized.

Not a lot of challenges were expected for the students when they will start teaching and integrating technology in the classrooms. As long as the students keep updating their abilities and not lose track of the purpose, teachers expect the students to do fine when it comes to ICT integration. An external challenge might be the limited available resources in the schools where the students will work after graduating.

Recommendations given by the teachers were more opportunities for personal development, the possibility to attend conferences that discuss this subject and to prevent too much overlapping of the information in university courses.

Instructors feel that they did not get enough information and training about technology integration in the national policy. They do, however, think that a lot of effort and work has been done (and is still done) to integrate technology in the classrooms. They feel that their university is connecting its plan and strategies with the higher government policies.

4.5.2 Students

Most of the students that were interviewed are planning to teach after graduation. The most common reasons for this is to help children reach their potentials, to transfer knowledge to the future generation of the UAE, and to help Special Needs students.

Students define educational technology as 'tools, equipment or resources that facilitate a teacher to create a high-quality learning experience'. The benefits of using technology in the classroom are to assist teachers in their teaching processes and to assist students in their learning processes. Several examples were given of how they expect to use ICT when they start teaching after graduation. They think it is important to use technology to stay updated with new technology trends. A minority of students did not like technology. They stated that with continuous reliance on electronical tools, students can become dependent and may lose interest in learning.

Students felt confident about their technology knowledge, they were positive about their ideas of using technology for both their own learning processes, such as homework or assignments and their own teaching processes (delivering content in the classroom). Students were also positive about their pedagogical knowledge. A student linked their pedagogical knowledge to the work of learning theorists such as Piaget or Vygotsky. They felt they were weaker on the content knowledge side, because of inclusion initiatives in their schools.

Students felt that their university courses equipped them with the TPACK skills and knowledge, and they emphasized the importance of field experience and micro teachings. Remarks on the institutions' programs were that they lack cultural sensitivity, since the systems are usually American. Also, some said the courses did not prepare them for the actual teaching with ICT, but practical experience did. One students said that the university program is repeating the content which is not useful.

Students' most memorable and interesting situations in the classroom involved the use of iPads, phones, blackboard and CD's.

When asking for recommendations, most students said that practical experience was important. Restructuring courses (especially the order of the courses), and the content of the IT class were also frequently mentioned. Some students suggested some tools that could be introduced in their courses. Finally, students showed some fear of using technology. Also, they stated that they need more exposure to content and technology in their courses.

CHAPTER FIVE: CONCLUSION

5.1 Overview of the Chapter

Chapter five is the final chapter of this thesis. Firstly, a summary of the study is presented, followed by the key findings of this study which are linked to the research questions. Implications and recommendations are discussed, whereby the outcomes of the study are used to support the suggestions that are made. The strengths and the limitations of the study are presented as well as the scope for further study, in which recommendations for future research are made. The final section of this thesis is the concluding note, in which the researcher looks back on the process and result of this study.

5.2 Summary of the Study

The aim of the current study was to understand the pre-service teachers' TPACKs' perception of their capabilities within the context of the United Arab Emirates (UAE) educational system and their willingness to integrate ICT in classroom practice.
The following objectives were formulated to assist in achieving this aim:

1) *To acquire insight into the perspectives of both pre-service teachers and their instructors on the TPACK capabilities of pre-service teachers and their views on the action needed to enhance these capabilities.*
2) *To identify factors that impact the development of knowledge and skills related to the TPACK framework.*
3) *To create an action proposal for the UAE educational system regarding the development and implementation of technology into the teacher training programs with the aim of enhancing the pre-service teachers' TPACK knowledge and capabilities.*

For this study, the Technological Pedagogical and Content Knowledge (TPACK) model was found to be a framework which would be the best fit for the current study's research questions (Jamieson-Proctor, Finger & Albion 2010; Graham, Borup & Smith 2012; Smith 2013; Pamuk 2012; Koh, Woo & Lim 2013). Therefore, the TPACK model was used as a guiding framework for this mixed methods study. This thesis has tried to capture the

perceptions of pre-service teachers and their instructors on their TPACK capabilities to understand the current status and create recommendations for the way forward. Accordingly, the study did explore research questions that both addressed technology readiness and its affecting factors on the acquisition of TPACK knowledge and skills.

The specific research questions addressed in this study were as follows:

1) *What are the pre-service teachers' perspectives on their preparedness to use ICT for future classroom practices?*
2) *What are the instructors' perspectives on pre-service teachers' preparedness to use ICT for future classroom practices?*
3) *What factors influence the acquisition of knowledge and skills regarding ICT integration in the classroom?*

A mixed methods approach was adopted to explore the research questions. Pre-service teachers from three universities in the UAE were given a TPACK survey, originally designed by Schmidt and colleagues (2009), with some minor modifications to better fit this study context. In addition to the TPACK survey, interviews were taken with both instructors and pre-service teachers to gain more in-depth information about their perspectives on pre-service teachers' TPACK skills and knowledge, and the way their bachelor program offers education regarding TPACK.

The first, second and fourth research questions were answered through both the quantitative and the qualitative paradigm as they required both the measurement of variables and the information from interviews. The third research question was answered with the use of quantitative analyses.

5.3 Key Findings

This chapter of the thesis offers the practical grounds towards implementing the findings and the conclusions that are drawn as a consequence of undertaking the research. This part concerns itself with the discussion of the implications of the research work so as to enhance the research questions.

Due to the vast details and information that came up during the research, the findings will be categorized into key headings per research questions. The headings were derived from recurring themes, thoughts and perspectives from the data:

5.3.1 What are the pre-service teachers' perspectives on their preparedness to use ICT for future classroom practices?

5.3.1.1 Pre-service teachers' perspective on teaching profession

The findings indicated that the general feeling toward teaching profession was positive, pre-service teachers chose teaching due to a believe that it is a noble profession, has a positive effect on society and can contribute with something meaningful. However, some of the ones who pointed out that they could not teach after graduation was due to family reasons, such as traditions and men family members perspective of women working.

5.3.1.2 Pre-service teachers interest in pursuing post-graduation degree

The pre-service teachers have shown interest within post-graduation, which shows their passion for the teaching profession. However, the findings indicate that pre-service teachers believe that the only way to advance in their profession is by pursuing higher degree. This shows that the notion of professional development courses and workshops is not an option.

5.3.1.3 Use of technology by university instructors

Findings show that the course content designed by universities is interesting and grabs the attention of the pre-service teachers. It also shows that instructors implement latest

technologies within classrooms. Eventually, it helps the pre-service teachers to gain an understanding towards the use of educational technologies within classrooms.

Pre-service teachers identified how technologies are used by their instructors. They indicated that their universities provide online platforms that are accessible by both teachers and students, where teachers interact with students through these online facilities and teach via various means; such as game-based learning and online courses etc.

Furthermore, it is important that, universities should update their program courses and train pre-service teachers to design class content based on the use of educational technologies.

5.3.1.4 Vague perspective of technology among pre-service teachers

Moving on, the concept of technology is not clear among few pre-service teachers. they actually confused between the use of traditional classroom resources with the use of technology. The vagueness included misunderstanding of technology integration in teaching and learning. Pre-service teachers and instructors didn't fully grasp the effectives of integration. They saw technology integration as showing PowerPoint presentations and using online websites. Few really comprehend that technology integration is about the whole process of developing critical skills in students.

5.3.1.5 Pre-service teachers' view of the courses they are learning

According to some of the pre-service teachers, the program content or course outline is not sufficient enough and requires modifications. Pre-service teachers are willing to perform better and want to use educational technologies in more effective and efficient ways. However, the program content does not transfer better and effective learning regarding educational technologies. Similarly, pre-service teachers also identified that their instructors do not use a combination of different educational techniques within the classrooms.

Furthermore, pre-service teachers want to learn advanced level skills to design the teaching content with the effective use of educational technologies. Therefore, universities should add IT courses within the current course programs for increased learning and skill advancement, such as application development.

The findings did not identify any new learning other than the use of basic educational technologies within the university classrooms. In fact, the pre-service teachers have identified the lack of practical learning. It can be analysed that instructors are not using advanced educational technologies. Consequently, this explains the existence of less educational technological awareness among pre-service teachers. Besides, this can also be a reason behind the lack of interest to use educational technologies among pre-service teachers once they go into schools. Therefore, universities should pay more attention to the different teaching techniques used by instructors. And instructors should also revise their current teaching methods and use additional educational technologies to deliver effective lectures.

5.3.1.6 Pre-service teachers are confident about their TPACK capabilities

Descriptive statistics have shown that in general, pre-service teachers are confident when it comes to their TPACK capabilities. With the highest for Technology Knowledge and the lowest for Models of TPACK, the pre-service teachers answers to the items of these scales al fluctuate around a score of 4, which means ‘agree’. The overall status of the pre-service teachers’ preparedness to use ICT for future classroom practices seems to be pretty good.

5.3.2 What are the instructors’ perspectives on pre-service teachers’ preparedness to use ICT for future classroom practices?

5.3.2.1 Instructors' perspective of using technology in teaching and learning

Instructors firmly believed that technology integration is must for an effective outcome and successful teaching and learning, but it should be done in a very organized manner. Technology integration allows the use of technology for guiding, learning and for the specific need of students.

Moreover, instructors use blogs and Wikis for the purpose of education and learning. They believe that it is the best way for interactions and putting the thoughts of individual students without hesitation. Blogs help in collaborating on certain topics via writing about a particular topic. Instructors believe that discussion boards will contribute to discuss regarding individual questions and increase students' interaction in a course. This shows that instructors are focused, and goal oriented for implementation of technology in teaching.

5.3.2.2 TPACK understanding among instructors

In comparison to technology, pedagogy and content knowledge, some of the participants have identified the passion and interest towards pedagogy knowledge. In addition, pre-service teachers have identified that their professors do not put equal input within all the three types of knowledge. Whereas the course content is more inclined towards one specific type of knowledge; such as in case of pedagogy knowledge, but the university instructors use versatile techniques and deliver the course content. Thus, they transfer the information through various means and develop different skills and teaching techniques, which can be applied by the pre-service teachers after graduation.

Furthermore, finding showed that some instructors are technology averse because they think that students will focus more on the use of educational technologies and will lack interest within their major subject. Consequently, instructors have limited the use of educational technologies purposely. Whereas this can be identified as the weakness of the universities and instructors because they lack the ability to integrate educational technologies for the purpose of teaching and learning. Consequently, there is a need for improvement within the current educational programs, and instructors need to re-design their teaching methodologies.

Moreover, instructors believe that there are adverse effects of using technologies for the learning as many times students present more interest for the educational technologies and lack interest for the subject under study. Hence, it can hinder the real purpose of learning. They think that students may rely on technologies and not work hard to achieve

the ultimate goal of learning. However, instructors need to realize that the use of technologies also require input from them.

5.3.2.3 TPACK understanding among pre-service teachers

Findings indicated that, according to the instructors, pre-service teachers lacked in-depth understanding of TPACK. Therefore, there is a need to deliver updated information to pre-service teachers, and both the instructors and universities can revise and re-design the course content to put emphasis on the use of TPACK.

Some of the instructors suggested the use of TPACK to develop different skills among students; such as motor skills. Because the concept of TPACK is majorly considered as the use of educational technologies within the classrooms. Thus, there is a need for TPACK awareness among pre-service teachers.

5.3.2.4 Go green mindset and technology integration

The findings also indicated that technology integration is advocated in some institutes due to environmental issues. Some instructors and pre-service teachers were inclined to use it for various reasons like go green, save papers and economic advantages.

5.3.2.5 Instructors evaluation of pre-service teachers' technological efficiency

Furthermore, findings showed that instructors believe that pre-service teachers are aware of different educational technologies. However, they lack the ability to integrate educational technologies for the right purpose. Besides, instructors also identified that students may rely on educational technologies and may lose interest in teaching. Therefore, there is a need to advance the current skills of students, so that they can integrate the educational technologies and knowledge on different levels of learning.

The findings also showed that pre-service teachers have knowledge of different educational technologies but are not able to use it effectively while teaching because of personal and cultural restrictions which prevent pre-service teachers from using the

educational technologies full-heartedly. These hindrances should be eliminated at the institute level with work ethics and morality.

5.3.3 What factors influence the acquisition of knowledge and skills regarding ICT integration in the classroom?

5.3.3.1 Role of internship and practicum in developing technology integration

Findings indicated that field experience played a big role in enhancing technology integration in classrooms. Pre-service teachers as well as their instructors believed that they learnt a few techniques for better and effective technology integration in classrooms, for instance, the use of smart board to design a recycling map.

5.3.3.2 Difference between institutions and their programs

On a different note, the findings also indicated that one of the three universities have a better implementation of technology integration in their curriculum. However, the examples derived from the data were only limited to the use of videos and smart boards etc. Thus, there is a need for the pre-service teachers to learn the use of latest and innovative technological tools, and to use these tools within the classrooms for effective learning.

5.3.4 What are the pre-service teachers and instructors' suggestions for future action plan to maximize the preparedness?

5.3.4.1 Pre-service teachers need to be taught how to design courses using technology

Pre-service teachers indicated that they needed to be taught how to create meaningful course content with technology. Few instructors pointed out that students use technology without knowing why it was created and what was the objective of having this and that

application. Therefore, pre-service teachers need to be educated about the objective behind each educational technology software or hardware. The designing of the courses need profound knowledge of knowhow of technology.

5.3.4.2 Pre-service teachers need to learn how to use (new) technologies

Pre-service teachers emphasized the need to learn the use of new educational technologies to involve students within the learning process (interactive learning). Specifically, pre-service teachers in special needs field, they indicated that there is a need for educational technologies that can cater to students' requirement, and they need to be taught how to use it.

Another interesting notion that came up during this study is constructivism. Some pre-service teachers felt technology will enhance constructivism in classrooms.

Interestingly, some pre-service teachers would implement the same educational technologies that are used by their instructors within their own classrooms. Therefore, university instructors need to stay updated about almost all the latest technological trends to re-design their teaching methods for effective results. For instance, this new generation is more involved within the use of iPads and iPhones; therefore, lectures can also be designed with the use of these technologies.

5.3.4.3 Need for professional development courses for the instructors

A generation gap exists between the students and the teachers because teachers are found to have less or no technological skills before their trainings and awareness seminars at their universities. Thus, it is important that teachers need to be educated and trained upon the use of technological skills. Universities need to provide and train their teachers to use different updated educational technologies within their classrooms. Because without the assistance and training, teachers will not be able to stay aware, learn, and implement educational technologies.

Furthermore, universities also play a great role and support higher education through providence of updated educational technologies for enhanced learning. Consequently, the availability of technological assistance enables the instructors to teach through updated technological teaching methods. Additionally, instructors understand that technology is bound to change, and what is relevant today may become obsolete in future. Instructors admit that there is a knowledge gap among some instructors, which may affect how they transfer the same to the student. Even for instructors involved in the traditional career tasks, familiarizing and mastering the new educational technologies is critical. Some instructors work with both the students and other teachers as administrators and trainers.

5.3.4.4 Parent involvement through technology

Another interesting finding is when it was indicated that technology can be used for parental involvement in university academic activities. In addition, pre-service teachers want to involve parents within the education of their children once they become in service teachers.

5.3.4.5 Instructors' recommendation for a better technology integration policy

The findings also showed that the traditional government policies forming the basis of the education system as a great obstacle to the integration of new technologies in schools. The rigidity of the current law framework delays the implementation of technology integration.

5.3.4.6 Accountability and transparency when using technology effectively

Findings indicated that technology integration can be enhanced for more accountability and transparency in the universities. Some instructors believed that use of technology will bring transparency and accountability because management can monitor and observe what is happening online. Auditors can check submissions, evaluation and teaching if it

was dome online. But, that doesn't mean that new technologies can guarantee both the neutrality and the unbiasedness.

5.3.4.7 Technological infrastructure in higher education institutes

Findings highlighted that the quality and variety of some of the technological equipment found in some institutions are also questionable. To make sure pre-service teachers have the possibility to learn about technology, it is important that the schools and universities have enough up-to-date equipment.

5.3.4.8 Universities' role in spreading the importance of the teaching profession

Universities should play a bigger role in spreading the importance of teaching. The study research indicated that the teaching profession is declining among young Emiratis, and the pre-service teachers who contributed in this study pointed out that the universities should hold awareness sessions. Also, the instructors felt that young Emiratis are missing role models.

5.3.4.9 Pre-service teachers' future role in educational reform

Another key indication from the study shows that if trained and planned properly, pre-service teachers can be a good resource for an updated educational system. The interviews showed that they want to invest their time and knowledge towards the betterment of the society through improved educational system and techniques.

Additionally, with the correct training and knowledge, universities can produce change agents in the form of pre-service teachers that can further influence and change school's learning environment with their knowledge, abilities, and skills.

5.4 Implications

5.4.1 Students' contribution

The qualitative analysis has clearly shown that students have a clear picture of the strongest and weakest points of their bachelors' program. They have discussed in detail how the programs could make improvements and many students have expressed a great motivation and enthusiasm when it comes to learning about technology integration in the classroom. Involving students as partners accountable for their own learning, could therefore be a part of education reforms with the aim to improve programs and therewith the TPACK skills and knowledge of UAE pre-service teachers.

5.4.2 Motivation is key

As many studies have demonstrated and discussed, motivation is an important aspect when it comes to student achievement (Martin & Downson 2009). Especially in the case of pre-service teachers, it is important to monitor and enhance student motivation to learn about technology, but also to convince them of the importance of technology use in teaching and encourage them to implement this in their own (future) teaching activities. To reach successful implementation of technology in the classrooms, teachers are the ones who have to be shaped into agents that are able to constructively use these technologies for teaching purposes. Therefore, the accountability starts at the base of a teachers' career: the universities that offer teacher education.

5.4.3 Practical experience

The analyses in this study that have been conducted to investigate the impact of practical experiences, have shown that students with practical experience (both practicum and internship) score significantly higher on the TPACK dimensions. Looking at TPACK specifically, when pre-service teachers learn by practical experience, they have to implement the learned theory about the TPACK concepts into real practice. The outcomes of the current study are aligned with the outcomes of research done by Darling-Hammond et al. (2005) and

Zeichner and Conklin (2005), who concluded that when the field experiences are carefully coordinated with coursework, teacher educators are better able to accomplish their goals in preparing teachers to successfully enact complex teaching practices. The current study again emphasizes the importance of establishing a connection between campus courses and field experiences in order to optimize the learning experience and construction of both the necessary knowledge and skills.

5.4.4 Difference in bachelor's specializations

The quantitative analyses that have been conducted in this study have shown that there is a difference in students' TPACK knowledge between institutions. Since it has been agreed with the participating institutions to ensure anonymity, the details of the institutions and their bachelor programs will not be discussed further. However, a significant difference was also found for the specializations, whereby the 'others' category scored lower on the TPACK scales.

5.5 Recommendations

Based on the quantitative and qualitative findings of the study, several recommendations can be made for implementation and improving the TPACK education in universities across the UAE:

5.5.1 International (field) trips, conferences and speakers

By taking pre-service teachers on different international trips and to different conferences, they will be introduced towards latest innovative ICTs. Additionally, this way the students also get the opportunity to interact with different instructors or teachers across the globe. Consequently, such interaction and awareness results in enhanced skills and knowledge among pre-service teachers.

Also, it can be recommended to invite in-service teachers to come and talk about their experiences in schools. This way, students will get a better image of the real practice in classrooms and can develop a broader understanding of the different way technologies can be implemented in the classrooms. In the interviews for this study, several students have

mentioned they want to gain interdisciplinary knowledge through interaction with instructors or knowledgeable speakers/educationists outside their universities. Eventually, interviewees believe that it will help them to gain more knowledge and it will effectively increase the learning processes.

5.5.2 Re-design courses and programs

Results from the current study show that instructors believe the strongest point in the pre-service teacher's program is the revised courses as per the international standards. Also, instructors mention that all programs at their university are solid and well-structured for the pre-service teachers' program. The programs at their university are well recognized and accredited. However, perspectives of the pre-service teachers are different. The restructuring or revision of the program courses has been identified by the majority of the pre-service students. They expect their universities to re-structure the whole course outline as the needs and requirements of the original classrooms. Moreover, there is a need for more courses that transfer technological or IT skills. The interviewees expect to learn about the use of updated educational technologies.

Universities can either identify needs of pre-service teachers develop and introduce new, additional technology-related courses. Another option would be that instructors re-design the teaching methods for the existing courses. It is highly recommended, as mentioned before, to (re-)design courses in collaboration with the students. Also, universities can also design course content in collaboration with other universities.

According to some of the instructors, practical training (teaching) is important for the pre-service teachers (students) to learn technology integration within classrooms. It is suggested that universities should collaborate with different schools and have a course especially for professional teaching training. This is also supported by the quantitative findings of this study, whereby the analyses have showed that students with practical experience, whether this was gained in practicums or internships, have improved their TPACK capabilities.

Niess also outlined four components that offer a framework for the development of TPACK in teacher education programs: (a) an overarching understanding of teaching a particular subject using technology to facilitate student learning, (b) knowledge of instructional

strategies and representations for teaching a particular topic through the use of technology, (c) knowledge of students' misconceptions, understandings, thinking, and learning in a particular subject matter and how these might be represented using technology, and (d) knowledge of curriculum materials that implement technology to enhance learning in a given content area (Niess 2005).

5.5.3 Involve students in the development of the courses

Universities could involve the input from their students in the design of the program content. This action will result into a sense of acceptability among pre-service teachers and they might develop fondness towards use of educational technologies in future. Besides, self-learning is promoted within the university course programs and the course instructor acts as a facilitator. To make this possible, students should feel they have a certain level of control and responsibility over their own learning process and the design of their bachelor's program. In the current situation, instructors only transfer knowledge about, and use those educational technologies that they believe are useful, whereas it is important that instructors should understand the needs of their students rather than their own course requirements. Therefore, instructors need to involve students (pre-service teachers) within the decision-making process of using educational technologies within classrooms. This will also teach the pre-service students how to prepare lessons in which technology is used, as at this moment, pre-service teachers still use pre-planned lesson plans and do not design their own innovative lesson plans. Besides having students involved, universities also need to take responsibility for their instructors to have the essential knowledge and skills when it comes to TPACK, and should provide more training them to integrate educational technologies within all the courses other than the technology learning courses.

5.5.4 Professional development for instructors

The key findings of this study showed that the instructors from universities do not use enough innovative educational technologies. The most commonly used educational technologies in schools are; audios, videos, presentations and game-based learning techniques. However, few interviewees have identified the use of these educational technologies within universities.

Instructors have mentioned that they believe the integration of technology requires time and practice. Hence, as a teacher, it is needed to have enough time available for planning and implementing technology in order to be successful with the integration of technology with pedagogy teaching, content knowledge, and teaching strategies. Further, instructors mention that in order to have the best usage of technology teachers must have to give maximum time to hands-on practice instead of only theory sessions. Many of the teachers possess technophobia. Hence, it hinders the practical usage and expertise of technology. Instructors have identified external pressure towards the implementation of educational technologies. Whereas instructors want freewill to design their teaching techniques, universities are found to enforce instructors to implement ICT based learning methods. Consequently, this leads to lack of instructors' interest within the learning of students because they are not satisfied with the (in their eyes) unnecessary use of technologies. Besides, instructors believe that excessive use of ICT in education have both advantages and disadvantages.

Resistance against implementation of educational technologies could also be caused by a lack of knowledge. Since there is a gap between what teachers should know and be able to do for successful education of pre-service teachers when it comes to TPACK, it is important to offer in-service university teachers professional development courses in which all aspects of educational technologies are taught. Instructors should be able to recognize the different educational technologies and teaching methods used in schools; thus, there is a need for universities to pay more attention to the use of updated educational technologies.

When developing courses for in-service teachers, it is important to keep in mind that several categories of knowledge together shape the decisions that teachers make. Meijer (1999) identified eight categories of practical knowledge on which teacher decisions and the professional reasoning supporting those decisions are based. These categories cover teachers' knowledge about (1) the subject/domain, (2) student characteristics, (3) learning processes and conceptualizations, (4) educational goals, (5) the curriculum, (6) instructional techniques and (7) interaction.

Studies in the field of technology have identified similar categories of professional reasoning and knowledge. For example, Niess (2011) mentioned knowledge about instructional

techniques and representations for teaching and learning a certain subject. Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, and Sendurur (2012) found that the reasons teachers gave for using technology were related to the desire to enrich or supplement the existing curriculum and to provide a different pedagogical approach. Furthermore, Akgun (2013) emphasized that effectiveness, efficiency and attractiveness are key components in fostering student learning goals, student achievement and the appeal of the learning process. Teachers' professional reasoning should incorporate at least one of these components to accomplish successful technology use in practice (Heitink, Voogt, Verplanken, Braak & Fisser 2016).

5.5.5 Easy access to materials

Easy access to materials is important in two different ways. First of all, it is important for the pre-service teachers to have access to the learning materials. Interviews have demonstrated that the availability and easy access to course content and online books are still some things that require attention of the universities.

Second, materials should be available for actually bringing the theoretical content they studied into practice by using educational technologies. However, these should be available to them.

Pre-service teachers are observed to be pre-determined and have already brainstorm various teaching methods. They tend to develop creative thinking among their students through involvement in different activities. And with the use of available technological resources the pre-service teachers want to transfer learning. Accordingly, there is a need for availability of different technological resources for the pre-service teachers on their jobs. For instance, computers, access to digital library, and online educational websites etcetera. The low availability of technical resources and tools in the schools where they will teach after graduation was a concern of some instructors.

5.5.6 Improve teacher-student communication

Both pre-service teachers and their instructors have emphasized on the importance of improved teacher-student communication. Universities are therefore advised to develop

applications or software for easier communication to eliminate the communication gaps. This would also make it easy for teachers to understand the needs of the students and respond promptly. Universities have implemented latest technologies to interact with students through various online services, but this is not functioning best. With the use of an accessible and easy-to-understand application, instructors and pre-service teachers can interact from any location through online platform managed by universities. After all, 21st century students all own a smartphone which they always carry with them.

5.6 Strengths and Limitations

5.6.1 Strengths of the study

This study presents an in-depth exploration of the TPACK capabilities perception of pre-service teachers in the context of United Arab Emirates universities. With the use of a profound literature review, surveys followed up by interviews with both pre-service teachers and their instructors, this study reflects their perspectives on their readiness to integrate technology in the classrooms. A mixed method approach has been adopted which gives equal importance to both methods, and attempts to integrate data during interpretation (Terrel 2012). Also, the approach makes it possible to explains quantitative results by investigating certain findings in more detail. The data from the questionnaires were analysed using the appropriate statistical tests. Within the qualitative phase, the recorded interviews were transcribed and the typed transcripts were handed back to the respondents for verification so as to increase trustworthiness of the data (member checking). Hence, an honest interpretation of the cross-cultural adjustment experiences of the participants was represented by this research work.

The researcher consistently sought advice from scholars experienced in the research topic and in quantitative and qualitative methodology in the planning, developing and implementing this study. The researcher read extensively on the mixed method approach, which enabled her to design, implement and evaluate the study. The researcher remained as neutral as possible throughout the entire length of the interviews in order to appreciate the trustworthiness of the outcomes of the study.

The framework used to support this study, the TPACK framework, is a strong and understandable framework that has been used in many studies of its kind. The framework is popular in use amongst scholars in the field of education, due to its comprehensiveness and focus on the technological, pedagogical, and content knowledge (and the intersection of these elements), which is highlighted by various research studies to be the most important aspect in successful technology integration (Archambault & Crippen 2009; Mishra & Koehler 2005; Lux, Bangert & Whittier 2011; Schmidt et. al. 2009).

In addition, translating the TPACK survey is considered a contribution to the body of knowledge in relation to technology integration. Literature didn't indicate that the survey has ever been translated.

In conclusion, the key claim of the thesis is the need to improve the education programs for pre-service teachers as the importance of technology education and integration. These changes are essential in order for the UAE to achieve the goals it has set for higher education by carefully preparing, inducting, and providing the best education for pre-service teachers when it comes to technology integration and TPACK elements.

5.6.2 Limitations of the study

The current study has a number of limitations that will be discussed below.

Firstly, only pre-service teachers' TPACK capabilities are examined, which provides a lot of information about their TPACK skills and knowledge. On the other hand, this information is only one-sided, while it is also important to gain more insight about the instructors use of technology in the classrooms. After all, students will have to learn the practical side as well, for which they do internships and practicums. The current study has emphasized the importance of practical experience to improve TPACK capabilities. But if students are educated and guided by teachers who are not using technology in the classrooms, they will not be encouraged to use it themselves. Therefore, the current study lacks an exploration of a broader perspective in which multiple entities and their views on the current TPACK status in the UAE are involved.

Additionally, a self-administered survey has got some disadvantages that might influence the study outcomes. For example, it was shown that self-administered surveys usually lead to low response rates and non-response biases. Also, a self-administered survey can only ask simple questions and not ask for clarifications if the participants answers are not clear. Incorrect self-reporting can lead to the problem of over-estimation errors in self-observation. With the survey used in this study, students are asked to estimate their own TPACK capabilities. These estimations are based on subjective evaluations, which can lead to over- or underestimations of one's own competences.

Finally, during self-administered surveys, there is no interviewer who can observe the participants, which usually provides the researcher with additional information. Moreover, the open-ended part of the survey was long and required a lot of writing. Open-ended questions are a good source for extracting a lot of useful qualitative data (Turner III 2010). However, if the questions are too many or it is too time consuming to answer them, students might not be motivated to give a lot of input and information.

Although the survey went through a rigorous translation process and member check technique was adopted, yet human error is inevitable. Therefore, with translating a survey there is always a risk of language or cultural bias and students might have misunderstood the question, or the researcher might misinterpret the data. However, the risk of error because of the translation process is still bigger than the risk of error due to language barriers.

Also, there is a lack of research on pre-service TPACK capabilities in the UAE context, especially for the federal universities. Therefore, the literature review had to be focused on international studies. Comparisons between the current study and previous studies in the UAE are not possible. Moreover, the time frame of the data collection for this study was of concern, as it required distributing an extensive number of surveys and interviewing pre-service teachers and their instructors across multiple sites that are geographically split. Furthermore, it was a challenge to gain access to the target universities and gaining internal approvals that did not run smoothly, which made the phase of collecting data take more time than anticipated.

Finally, no attention has been given whatsoever to the curricula and the syllabuses of the teacher training programs. The way pre-service teachers are educated is decisive for the way they will make use of technology and implement it in their daily teaching processes. Therefore, it might have been useful to explore the content of the teacher training programs in detail. In the current study, a difference was found between the TPACK knowledge of students from two different institutions. Since the aim of this study was not to compare the institutions which might have influenced their reputation, anonymity was ensured. However, even with the institutions remain anonymous, the curricula and syllabuses could have been explored in detail, aiming to discover elements for success of a teacher training program.

5.7 Scope for further study

The current study can be seen as a first step towards more and broader research in the United Arab Emirates regarding TPACK education. Future studies could be focussing on the following:

Instead of only focussing on pre-service teachers, future studies could also involve multiple people with multiple positions to get a broader implication of the TPACK status in the UAE. If a comparison can be made between the TPACK competences of pre-service teachers and in-service teachers, it would shed a better light on the gaps in the pre-service teacher education programs. This would make it easier to provide better practical recommendations for TPACK implementation in the teacher training programs. Moreover, interviewing deans about their views on TPACK capabilities and the needs for future improvements might have been useful to gain more insight in the current status of the teacher training programs in the UAE. Since deans are involved in the design and implementation of the curricula and are involved with a lot of students, they would have a good overview of the status of their university.

Also, it would be relevant to look into elements that impact the success of a teacher training program when it comes to TPACK education and technology integration. As already shown by the current study, there is a difference in TPACK capabilities when it comes to institutions. Although this comparison was not the aim for the current study, it might be interesting to explore in-depth details of this training programs and what factors make a

program more successful, or not. Curricula and syllabuses are important to include in this investigation, as these are the key elements to shape the education of a bachelor's program. In addition , institutes can create a training kit based on TPACK constructs.

Finally, since this study has shown that practical experience is important for educating pre-service teachers and developing their TPACK skills and knowledge, more in-depth analyses can be done to explore this topic. For example, it is interesting to investigate which components of a practicum or internship should be included in a pre-service teachers' education program to make it more successful. Practical experience will probably be the first experience for pre-service teachers to stand before a classroom and design their own lessons. With this experience, the fundamentals for the pre-service teachers' will be developed to implement technology in the classrooms when they will start the actual teaching after graduation. Therefore, it is important to create a strongest possible learning opportunity for these pre-service teachers, as they are the teachers of the future who play a crucial role in technology integration in the classroom. They decide whether the educational programs that are being developed at this moment, will be successful implemented.

5.8 Concluding note

This study tried to understand the perspective of college of education students, who are known in academia as preservice teachers, in selective UAE universities about their readiness to integrate technology into their classroom practices after they graduate from their universities. The diversity of their perspective and thoughts added value to this thesis, in general the surveys indicated a positive perspective, but once the researcher met them face to face they started talking about challenges and areas of development. Their instructors had a diverse perspective as well, they believed they were trying hard to prepare their students but felt there were some shortcomings on policy makers level and curriculum too.

Achieving UAE vision starts from classrooms, and this thesis claims that future teachers are prepared to integrate technology into their classrooms practices, which in return will prepare their students to have more acceptance of technology and eventually achieve the vision.

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APPENDICES

Appendix A: Email to the universities

Dear Sir / Madam,
Assalam-o-Alaikum & Good Day!

My name is Laila Mohebi and currently
registered in the British University in Dubai (BUiD) in PhD in Education Program. I am conducting a research on pre-service teachers' perceptions of technology integration in education, and wanted to **invite you to participate in this study**. The purpose of my study is to understand the pre-service teachers' perceptions on Technological, Pedagogical and Content Knowledge (TPACK) in order to devise recommendations that can inform policy makers and practitioners in universities and ministry levels.

I am aware that all universities in the UAE are ending the semester, and collecting data right now is challenging, but I was hoping you would consider **my request for next semester**. Please be assured of complete confidentiality of any information conveyed and anonymity of university and participants' names, which is in line with the British University in Dubai (BUiD) ethical code of conduct.

If you want more information and are interested in participating I will share with you all relevant documents, forms, letters, interview questions and the survey.

Looking forward to hearing from you soon.

Laila Mohebi
Masters of Arts in Online Education Leadership and Management
Project Manager at Zayed University
Mob 0506541429

Appendix B: Email to instructors

Dear Sir,

I hope this email finds you well.

I would like to start by apologizing for contacting you without prior acquaintance. I got your contact details from your respected institute's management of College of Education. I am a PhD candidate at the British University in Dubai, and currently at the writing stage of my thesis. Last semester I contacted UAEU with a request to get access to students and faculty for data collection. Thankfully I got clearance from the ethics committee and was granted the access. College of Education distributed the survey and more than 100+ students participated.

My study is about the perceptions of pre-service teachers and their instructors about Technological, Pedagogical and Content Knowledge (TPACK). The study requires data from students and their respected instructors. Given that your good self is one of the instructors who taught or is teaching the students I collected data from, I am approaching you with an **invitation for an interview** that will take 30 to 45 minutes of your valuable time.

If you are interested to consider, I will send you a synopsis of my study and the interview questions for your information.

Looking forward to hearing favorably from you.

Regards,
Laila Mohebi
050 6541429

Appendix C: Email to students

Dear Student.

I hope you are doing well.
My name is Miss Laila and I got your email address from a survey you filled few months back related to technology integration in education. In the survey you showed interest in being interviewed for 20 minutes about your opinion about technology in education.
I am writing to you to check whether you can spare 20 minutes of your busy time to help me with my interview. We can meet, or talk on phone. I can call you when you are free at any convenient time.
Please respond to this email with your preferred time to talk and I will call you. Don't forget to send me your phone number.
Your participation will be highly appreciated.
Thank you.

Warmest Regards,
Laila Mohebi
0506541429

Appendix D: Original TPACK Survey by Schmidt et al. (2009)

Technology is a broad concept that can mean a lot of different things. For the purpose of this questionnaire, technology is referring to digital technology/technologies. That is, the digital tools we use such as computers, laptops, iPods, handhelds, interactive whiteboards, software programs, etc. Please answer all of the questions and if you are uncertain of or neutral about your response you may always select "Neither Agree or Disagree"

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
TK (Technology Knowledge)					
1. I know how to solve my own technical problems.					
2. I can learn technology easily.					
3. I keep up with important new technologies.					
4. I frequently play around the technology.					
5. I know about a lot of different technologies.					
6. I have the technical skills I need to use technology.					
CK (Content Knowledge)					
Mathematics					
7. I have sufficient knowledge about mathematics.					
8. I can use a mathematical way of thinking.					

9. I have various ways and strategies of developing my understanding of mathematics.					
Social Studies					
10. I have sufficient knowledge about social studies.					
11. I can use a historical way of thinking.					
12. I have various ways and strategies of developing my understanding of social studies.					
Science					
13. I have sufficient knowledge about science.					
14. I can use a scientific way of thinking.					
15. I have various ways and strategies of developing my understanding of science.					
Literacy					
16. I have sufficient knowledge about literacy.					
17. I can use a literary way of thinking.					
18. I have various ways and strategies of developing my understanding of literacy.					

PK (Pedagogical Knowledge)					
19. I know how to assess student performance in a classroom.					

20. I can adapt my teaching based-upon what students currently understand or do not understand.					
21. I can adapt my teaching style to different learners.					
22. I can assess student learning in multiple ways.					
23. I can use a wide range of teaching approaches in a classroom setting.					
24. I am familiar with common					
PCK (Pedagogical Content Knowledge)					
26. I can select effective teaching					
25. I know how to organize and approaches to guide student maintain classroom management. thinking and learning in					
mathematics.					
27. I can select effective teaching approaches to guide student thinking and learning in literacy.					
28. I can select effective teaching approaches to guide student thinking and learning in science.					
29. I can select effective teaching approaches to guide student thinking and learning in social studies.					
TCK (Technological Content Knowledge)					
30. I know about technologies that I can use for understanding and doing mathematics.					

31. I know about technologies that I can use for understanding and doing literacy.					
32. I know about technologies that I can use for understanding and doing science.					
33. I know about technologies that I can use for understanding and doing social studies.					

TPK (Technological Pedagogical Knowledge)					
34. I can choose technologies that enhance the teaching approaches for a lesson.					
35. I can choose technologies that enhance students' learning for a lesson.					
36. My teacher education program has caused me to think more deeply about how technology could influence the teaching approaches I use in my classroom.					
37. I am thinking critically about how to use technology in my classroom.					
38. I can adapt the use of the technologies that I am learning about to different teaching activities.					

39. I can select technologies to use in my classroom that enhance what I teach, how I teach and what students learn.					
40. I can use strategies that combine content, technologies and teaching approaches that I learned about in my coursework in my classroom.					
41. I can provide leadership in helping others to coordinate the use of content, technologies and teaching approaches at my school and/or district.					
42. I can choose technologies that enhance the content for a lesson.					

TPACK (Technology Pedagogy and Content Knowledge)					
43. I can teach lessons that appropriately combine mathematics, technologies and teaching approaches.					
44. I can teach lessons that appropriately combine literacy, technologies and teaching approaches.					
45. I can teach lessons that appropriately combine science, technologies and teaching approaches.					
46. I can teach lessons that appropriately combine social studies, technologies and teaching approaches.					

Models of TPACK (Faculty, PreK-6 teachers)					
47. My mathematics education professors appropriately model combining content, technologies					

and teaching approaches in their teaching.					
48. My literacy education professors appropriately model combining content, technologies and teaching approaches in their teaching.					
49. My science education professors appropriately model combining content, technologies and teaching approaches in their teaching.					
50. My social studies education professors appropriately model combining content, technologies and teaching approaches in their teaching.					
51. My instructional technology professors appropriately model combining content, technologies and teaching approaches in their teaching.					
52. My educational foundation professors appropriately model combining content, technologies and teaching approaches in their teaching.					
53. My professors outside of education appropriately model combining content, technologies and teaching approaches in their teaching.					
54. My PreK-6 cooperating teachers appropriately model combining					

content, technologies and teaching approaches in their teaching.					

	25% or less	*26% - 50%*	*51% - 75%*	*76%-100%*
Models of TPCK				
55. In general, approximately what percentage of your teacher education professors have provided an effective model of combining content, technologies and teaching approaches in their teaching?				
56. In general, approximately what percentage of your professors outside of teacher education have provided an effective model of combining content, technologies and teaching approaches in their teaching?				
57. In general, approximately what percentage of the PreK-6 cooperating teachers have provided an effective model of combining content, technologies and teaching approaches in their teaching?				

Please complete this section by writing your responses in the boxes.

73. Describe a specific episode where an ISU professor or instructor effectively demonstrated or modeled combining content, technologies and teaching approaches in a classroom lesson. Please include in your description what content was being taught, what technology was used, and what teaching approach(es) was implemented.

74. Describe a specific episode where one of your PreK-6 cooperating teachers effectively demonstrated or modeled combining content, technologies and teaching approaches in a classroom lesson. Please include in your description what content was being taught, what technology was used, and what teaching approach(es) was implemented. If you have not observed a teacher modeling this, please indicate that you have not.

75. Describe a specific episode where you effectively demonstrated or modeled combining content, technologies and teaching approaches in a classroom lesson. Please include in your description what content you taught, what technology you used, and what teaching approach(es) you implemented. If you have not had the opportunity to teach a lesson, please indicate that you have not.

Appendix E: TPACK amended survey

Dear Student,

Objective of the current research is to investigate pre-service teachers' perception about technology use in education context. This survey is looking at your perception on your understanding of technological, content and pedagogical knowledge as one domain of knowledge and also the combination of these three domains of knowledge. In this regard, we would like to seek your kind assistance in filling in the following sections of the below survey to the best of your knowledge. Your thoughtfulness and candid responses are highly valued. While your participation is completely voluntary, we would greatly appreciate your contribution as each survey completed helps us understand better your opinion about technology for teaching and learning and how to make best use of it. We would also like to assure you that your participation is completely anonymous and data will be seen only by the researcher.

Circle once choice for each item

A- DEMOGRAPHIC INFORMATION

1. Gender
    a. Female
    b. Male

2. Age range
    a. 18-22
    b. 23-26
    c. 27-32
    d. 32+

عزيزتي الطالبة،

إن الهدف من هذه الدراسة هو التعرف على آراء الطلبة في كلية التربية قبل التحاقهم بالميدان العملي للتدريس حول "استخدام تكنولوجيا المعلومات و التواصل في سياق العملية التعليمية". حيثُ تبحث هذه الدراسة وجهة نظرك ومعلوماتك عن تكنولوجيا التعليم و محتوى مادة التدريس و طرائق التدريس كمجال واحد للمعرفة، و الجمع بينهم كمجال آخرللمعرفة.

وفي هذا الصدد، نأمل الحصول على دعمكم الكريم من خلال الإجابة على الأسئلة الواردة في الإستبيان أدناه، حيث أن آراءكم الصريحة و الوافية محل تقدير كبير. وكما تعلمون فإن الدراسات والأبحاث المنجزة في هذا الشأن تساهم بشكل كبير في فهم أفضل الآراء حول استخدام تكنولوجيا المعلومات و التواصل في التعليم والتعلم، وكيفية تحقيق أفضل استفادة ممكنة من خلال توظيف نتائج هذا البحث والدراسة في صياغة مقترحات و توصيات للمسؤولين و أصحاب القرار في الشأن التربوي.

كما نلتزم ونؤكد لكم أن مشاركتكم تطوعية و سرية تماماً و النتائج ستكون فقط متاحة للباحث.

ضع دائرة حول إختيار واحد

أ- الخصائص العامة للعينة

1- الجنس

أ. أنثى

ب. ذكر

2- الفئة العمرية

أ. 18 الى 22
ب. 23 الى 26
ت. 27 إلى 32
ث. أكثر من 32

3. Degree pursued
    a. Bachelors
    b. Diploma
    c. Higher Diploma
    d. Other:_____

3- المسمى الدراسي والدرجة العلمية

أ. البكالوريوس
ب. شهادة دبلوم
ت. دبلوم عالي
ث. آخر _____

4. Area of Specialization
    a. Elementary/Primary Education
    b. Early Childhood Education
    c. Art Education
    d. Special Education
    e. Educational Technology
    f. English Language
    g. Mathematics
    h. Other: _____

4- التخصص

أ. التعليم الابتدائي / التأسيسي
ب. التعليم في مرحلة الطفولة المبكرة
ت. التربية الفنية
ث. التعليم الخاص
ج. التكنولوجيا التربوية
ح. اللغة الانجليزية
خ. الرياضيات
د. أخرى _____

5. Year in College
    a. 1st year
    b. 2nd year
    c. 3rd year
    d. 4th year
    e. Other: _____

5- العام الجامعي

أ. سنة أولى
ب. سنة ثانية
ت. سنة ثالثة
ث. سنة رابعة

6. Are you currently enrolled or have you completed a practicum experience in a school classroom?
    a. Yes. If yes, how many__
    b. No

ج. أخرى_____

6- هل أنت مُسجل حالياً أو أكملت تجربة التدريب العملي في الفصول المدرسية؟

ا. نعم (إذا كان الجواب نعم) اذكر العدد -----

ب. لا

7- ما هو المعدل التراكمي الخاص بك طبقاً للنتائج الصادرة من محل دراستك؟

ب- (TPACK)

التكنولوجيا مفهوم عام يحتوي الكثير من المقاصد ، لذا لغرض الإستبيان التالي سنعرف التكنولوجيا بوصفها وسائل رقمية و تكنولوجيا ذات خصائص حديثة ومحددة مثل أجهزة الحاسوب والحواسيب الشخصية والأجهزة المحمولة وألواح الكتابة التفاعلية و برامج الحاسب الآلي وغيرها.

من خلال مؤشرات التقييم الواردة نأمل من سيادتكم وضع علامة (√) أمام المعيار الذي تراه مناسب كما تجب مراعاة مادة التخصص عند إجابة الأسئلة التخصصية

7. What is your GPA?

B- TPACK

Technology is a broad concept that can mean a lot of different things. For the purpose of this questionnaire, technology is referring to digital technology/technologies. That is, the digital tools we use such as computers, laptops, iPods, handhelds, interactive whiteboards, software programs, etc.

Using the scale provided, please answer the question by rating (√) the extent to which you agree or disagree with each statement.

When answering questions related to your subject, please consider areas of specialization.

		Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree		
		أوافق بشدة	أوافق	لا أوافق ولا أعارض	لا أوافق	لا أوافق بشدة		
1	I know how to solve my own technical problems.						أستطيع أن أحل المشاكل التقنية التي تواجهني .	1
2	I can learn technology easily.						أستطيع أن أتعلم التكنولوجيا بسهولة.	2
3	I keep up with important new technologies.						أستطيع أن أواكب التكنولوجيا الحديثة المهمة.	3
4	I frequently play around with the technology.						كثيراً ما ألهو باستخدام التكنولوجيا.	4
5	I know about a lot of different technologies.						أعرف الكثير عن مختلف أنواع التكنولوجيا.	5
6	I have the technical skills I need to use technology.						أمتلك المهارات الفنية التي احتاجها لاستخدام التكنولوجيا.	6
7	I have sufficient knowledge about my subject.						لدي معرفة كافية بمادتي التخصصية.	7
8	I can use a way of thinking that matches my subject.						يمكنني استخدام طريقة التفكير التي تتوافق مع مادتي التخصصية.	8
9	I have various ways and strategies of developing my understanding of my subject.						لدي طرق متنوعة واستراتيجيات لتطوير معرفتي حول مادتي التخصصية.	9
10	I know how to assess student performance in a classroom.						أعرف كيفية إجراء تقييم لأداء الطلاب في الفصول الدراسية.	10
11	I can adapt my teaching based-upon what students currently understand or do not understand.						أستطيع تصميم طرق تدريسي وفق قدرات الطلاب على الفهم ووفق واحتياجاتهم.	11
12	I can adapt my teaching style to different learners.						أستطيع تصميم طرق التدريس وفق الفروق الفردية للمتعلمين.	12
		Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree		
		أوافق بشدة	أوافق	لا أوافق ولا أعارض	لا أوافق	لا أوافق بشدة		
13	I can use a wide range of teaching approaches in a classroom setting.						استطيع استخدام مجموعة واسعة من أساليب التدريس في الفصول الدراسية.	13

14	I am familiar with common student understandings and misconceptions.						لدي دراية بمفاهيم الطلاب الصحيحة منها الخاطئة.	14
15	I know how to organize and maintain classroom management.						أنا أعرف كيف أنظم و أدير صفي.	15
16	I can select effective teaching approaches to guide student thinking and learning in my subject area.						يمكنني تحديد أساليب التدريس الفعالة لتوجيه تفكير الطلاب وتعلمهم في مجال مادة تخصصي.	16
17	I can produce lesson plans with a good understanding of the topic in my subject area.						يمكنني وضع خطط دراسية مع الفهم الجيد لمادتي العلمية.	17
18	I know about technologies that I can use for “understanding and doing” in my subject area.						أعرف عن التكنولوجيا التي يمكن استخدامها تماشيا مع مبدأ "المعرفة والتطبيق" في مجال مادة تخصصي.	18
19	I know how my subject area can be presented by the application of technology.						أعرف التطبيقات التكنولوجية التي يمكن توظيفها واستخدامها في مجال مادة تخصصي.	19
20	I can choose technologies that enhance the teaching approaches for a lesson.						أستطيع اختيار التكنولوجيا التي تعزز أساليب التدريس في حصتي الدراسية.	20
21	I can choose technologies that enhance students' learning for a lesson.						أستطيع اختيار وسيلة التكنولوجيا التي تعزز طرق تعلم الطلبة في حصتي الدراسية.	21
22	My teacher education program has caused me to think more deeply about how technology could influence the teaching approaches I use in my classroom.						برنامج التربية في الجامعة دفعني للتفكير بعمق حول كيفية تأثيرالتكنولوجيا على أساليب التدريس التي يمكن استخدامها في فصولي الدراسية.	22
23	I am thinking critically about how to use technology in my classroom.						أنا أفكر بشكل نقدي حول كيفية استخدام التكنولوجيا في الفصول الدراسية.	23
24	I can adapt the use of the technologies that I am learning about to different teaching activities.						يمكنني تطويع تكنولوجيا المعلومات و التواصل التي أتعلمها مع أنشطة تعليمية متنوعة.	24

25	I can select technologies to use in my classroom that enhance what I teach, how I teach and what students learn.						يمكنني اختيار التكنولوجيا التي سأستخدمها في فصولي التي لدعم ما أريد تدريسهُ وكيفية تدريسهُ و دعم ما سيتعلمهُ الطلاب.	25
		Strongly Agree	**Agree**	**Neither Agree or Disagree**	**Disagree**	**Strongly Disagree**		
		أوافق بشدة	**أوافق**	**لا أوافق ولا أعارض**	**لا أوافق**	**لا أوافق بشدة**		
26	I can use strategies that combine content, technologies and teaching approaches that I learned about in my coursework in my classroom.						يمكنني توظيف الاستراتيجيات التي تعلمتها في فصولي الجامعية و التي تدمج بين المجالات المتعلقة بمحتوى المادة الدراسية و التكنولوجيا و طرائق التدريس.	26
27	I can provide leadership in helping others to coordinate the use of content, technologies and teaching approaches at my school and/or district.						يمكنني القيام بدور قيادي في تمكين الآخرين من التنسيق بين محتوى المادة الدراسية و التكنولوجيا و طرائق التدريس ذلك في نطاق مدرستي والمنطقة التعليمية.	27
28	I can choose technologies that enhance the content for a lesson.						يمكنني اختيارالتكنولوجيا التي تعزز محتوى الدرس.	28
29	I can teach lessons that appropriately combine mathematics, technologies and teaching approaches.						يمكنني تدريس الدروس التي تجمع بشكل مناسب بين مادة الرياضيات و التكنولوجيا و الأساليب التدريسية.	29
30	I can teach lessons that appropriately combine literacy, technologies and teaching approaches.						يمكنني تدريس الدروس التي تجمع بشكل مناسب بين مهارات القراءة والكتابة و التكنولوجيا و الأساليب التدريسية.	30
31	I can teach lessons that appropriately combine science, technologies and teaching approaches.						يمكنني تدريس الدروس التي تجمع بشكل مناسب بين مادة العلوم و التكنولوجيا و الأساليب التدريسية.	31
32	I can teach lessons that appropriately combine social studies, technologies and teaching approaches.						يمكنني تدريس الدروس التي تجمع بشكل مناسب بين مادة الدراسات الإجتماعية و التكنولوجيا و أساليب التدريس.	32

C- Models of TPACK

ت- نماذج من TPACK

		Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree		
		أوافق بشدة	أوافق	لا أوافق ولا أعارض	لا أوافق	لا أوافق بشدة		
1	My mathematics education professors appropriately model combining content, technologies and teaching approaches in their teaching.						استطاع أساتذتي لمادة تدريس الرياضيات الجمع بين المحتوى والتكنولوجيا وطرق التدريس في تدريسهم.	1
2	My literacy education professors appropriately model combining content, technologies and teaching approaches in their teaching.						استطاع أساتذتي لمادة تدريس مهارات القراءة والكتابة الجمع بين المحتوى والتكنولوجيا وطرق التدريس في تدريسهم.	2
3	My science education professors appropriately model combining content, technologies and teaching approaches in their teaching.						استطاع أساتذتي لمادة تدريس العلوم الجمع بين المحتوى والتكنولوجيا وطرق التدريس في تدريسهم.	3
4	My social studies education professors appropriately model combining content, technologies and teaching approaches in their teaching.						استطاع أساتذتي لمادة تدريس الدراسات الإجتماعية الجمع بين المحتوى والتكنولوجيا وطرق التدريس في تدريسهم.	4

5	My instructional technology professors appropriately model combining content, technologies and teaching approaches in their teaching.						***استطاع أساتذتي لمادة تكنولوجيا التعليم الجمع بين المحتوى والتكنولوجيا وطرق التدريس في تدريسهم.***	5
6	My educational foundation professors appropriately model combining content, technologies and teaching approaches in their teaching.						***استطاع أساتذتي في المرحلة التأسيسية الجمع بين المحتوى والتكنولوجيا وطرق التدريس في تدريسهم.***	6
7	My professors outside of education appropriately model combining content, technologies and teaching approaches in their teaching.						***استطاع أساتذتي في المواد الغير تربوية الجمع بين المحتوى والتكنولوجيا وطرق التدريس في تدريسهم.***	7
8	My school cooperating teachers appropriately model combining content, technologies and teaching approaches in their teaching.						***استطاع المدرسون في المدرسة التي أتدرب فيها الجمع بين المحتوى والتكنولوجيا وطرق التدريس في العملية التدريسية.***	8

لا تتردد في الإجابة باللغة العربية أو الإنجليزية.

1. أعط مثالاً لدرس في فصلك تمكنت من خلاله أو ستكون لديك القدرة على دمج تكنولوجيا بكفاءة فيه؟

Feel free to answer in Arabic or English.

1. Give an example of a lesson where you integrated or will efficiently integrate technology into your classroom?

2. What is the strongest point in your program, where you believe it prepared you to integrate technology into your classroom practices?

2. ما هي أقوى نقطة في برنامج التعليم الذي تدرسه، و التي تعتقد أنها أعانتك على دمج تكنولوجيا مع الممارسات الصفية ؟

3. What are the areas in which you like to be developed by the college in order to prepare you for your future classroom practices?

3. ما هي المجالات التي تُريد من الكلية تطويرها لتساعدك لاحقاً في الممارسات الصفية ؟

4. In the future, what do you plan to do to integrate technologies into your classroom practices?

4. ما الذي تنوي القيام بهِ مستقبلاً لدمج تكنولوجيا مع الممارسات الصفية ؟

5. Please describe the most memorable and interesting situation where your professor used technology in teaching and learning?	5. يرجى وصف حصة دراسية كانت الأكثر تميزاً وإثارةً للاهتمام حيث استخدم أستاذك فيها تكنولوجيا في التعليم والتعلم؟
6. What are the best practices on technology integration in teaching and learning that you are aware of outside your own current classroom environment?	6. ما هي أفضل الممارسات في مجال دمج تكنولوجيا مع التعليم والتعلم التي أنت على دراية بها من خارج بيئتك الصفية الحالية؟
7. How would you like to integrate technology in your teaching in the future when you will become a teacher?	7. كيف تريد أن تدمج تكنولوجيا في تدريسك مستقبلاًعندما تصبح معلما؟

Are you willing to participate in a 20 to 30 minutes interview or focus groups regarding the same topic?

Yes | No

If **yes**, can you provide me with your contact information please?

Thank you very much for filling the survey. I truly appreciate your participation.

If you wish to contact me for any enquiries or clarifications, please feel free.

My email address is lailamohebi@gmail.com

هل أنت على استعداد للمشاركة في لقاء يستغرق من 20 إلى 30 دقيقة حول نفس الموضوع؟

نعم | لا

إذا كان الجواب بنعم ، فهل يمكننا الحصول على بيانات وآليات التواصل معك ؟

شكرا جزيلا لمشاركتك في الاستبيان . وأنا أقدر حقاً مشاركتكم المثمرة .

إذا كنت ترغب في الاتصال بي لأية استفسارات أو توضيحات، فلا تتردد في ذلك على عنوان البريد الإلكتروني التالي :.

lailamohebi@gmail.com

Appendix F: Sample of completed TPACK survey

[redacted]

19

Dear Student,

Objective of the current research is to investigate pre-service teachers' perception about technology use in education context. This survey is looking at your perception on your understanding of technological, content and pedagogical knowledge as one domain of knowledge and also the combination of these three domains of knowledge. In this regard, we would like to seek your kind assistance in filling in the following sections of the below survey to the best of your knowledge. Your thoughtfulness and candid responses are highly valued. While your participation is completely voluntary, we would greatly appreciate your contribution as each survey completed helps us understand better your opinion about technology for teaching and learning and how to make best use of it. We would also like to assure you that your participation is completely anonymous and data will be seen only by the researcher.

Circle once choice for each item

A- DEMOGRAPHIC INFORMATION

1. Gender
   a. Female
   b. Male

2. Age range
   a. 18-22
   b. 23-26
   c. 27-32
   d. 32+

3. Institute you are enrolled in
   a. United Arab Emirates University
   b. Zayed University
   c. Higher College of Technology

4. Degree pursued
   a. Bachelors
   b. Diploma
   c. Higher Diploma
   d. Other:_____

53

عزيزتي الطالبة،

إن الهدف من هذه الدراسة هو التعرف على آراء الطلبة في كلية التربية قبل التحاقهم بالميدان العملي للتدريس حول "استخدام تكنولوجيا المعلومات و التواصل في سياق العملية التعليمية". حيث تبحث هذه الدراسة وجهة نظرك ومعلوماتك عن تكنولوجيا التعليم و محتوى مادة التدريس و طرائق التدريس كمجال واحد للمعرفة، و الجمع بينهم كمجال آخر للمعرفة.
وفي هذا الصدد، نأمل الحصول على دعمكم الكريم من خلال الإجابة على الأسئلة الواردة في الإستبيان أدناه، حيث أن آراءكم الصريحة و الوافية محل تقدير كبير. وكما تعلمون فإن الدراسات والأبحاث المنجزة في هذا الشأن تساهم بشكل كبير في فهم أفضل الآراء حول استخدام تكنولوجيا المعلومات و التواصل في التعليم والتعلم، وكيفية تحقيق أفضل استفادة ممكنة من خلال توظيف نتائج هذا البحث والدراسة في صياغة مقترحات و توصيات للمسؤولين و أصحاب القرار في الشأن التربوي.

كما نلتزم ونؤكد لكم أن مشاركتكم تطوعية و سرية تماماً و النتائج ستكون فقط متاحة للباحث.

ضع دائرة حول إختيار واحد

أ- الخصائص العامة للعينة

1- الجنس
أ. أنثى
ب. ذكر

2- الفئة العمرية
أ. 18 الى 22
ب. 23 الى 26
ت. 27 إلى 32
ث. أكثر من 32

3- موقع الدراسة الحالي
أ. جامعة الإمارات العربية المتحدة
ب. جامعة زايد
ت. كلية التقنية العليا

4- المسمى الدراسي والدرجة العلمية
أ. البكالوريوس
ب. شهادة دبلوم
ت. دبلوم عالي
ث. آخر _____

5. Area of Specialization
   a. Elementary/Primary Education
   (b.) Early Childhood Education
   c. Art Education
   d. Special Education
   e. Educational Technology
   f. English Language
   g. Mathematics
   h. Other: _____

6. Year in College
   a. 1st year
   b. 2nd year
   c. 3rd year
   (d.) 4th year
   e. Other: _____

7. Are you currently enrolled or have you completed a practicum experience in a school classroom?
   (a.) Yes. If yes, how many 4
   b. No practicum 1, 2, 3 and internship.

8. What is your GPA?

3.8

5- التخصص
أ. التعليم الابتدائي / التأسيسي
ب. التعليم في مرحلة الطفولة المبكرة
ت. التربية الفنية
ث. التعليم الخاص
ج. التكنولوجيا التربوية
ح. اللغة الانجليزية
خ. الرياضيات
د. أخرى _____

6- العام الجامعي
أ. سنة أولى
ب. سنة ثانية
ت. سنة ثالثة
ث. سنة رابعة
ج. أخرى_____

7- هل أنت مُسجل حالياً أو أكملت تجربة التدريب العملي في الفصول المدرسية؟

ا. نعم (إذا كان الجواب نعم) اذكر العدد -----
ب. لا

8- ما هو المعدل التراكمي الخاص بك طبقاً للنتائج الصادرة من محل دراستك؟

B- TPACK

Technology is a broad concept that can mean a lot of different things. For the purpose of this questionnaire, technology is referring to digital technology/technologies. That is, the digital tools we use such as computers, laptops, iPods, handhelds, interactive whiteboards, software programs, etc.
Using the scale provided, please answer the question by rating (√) the extent to which you agree or disagree with each statement.
When answering questions related to your subject, please consider areas of specialization.

ب- (TPACK)

التكنولوجيا مفهوم عام يحتوي الكثير من المقاصد ، لذا لغرض الإستبيان التالي سنعرف التكنولوجيا بوصفها وسائل رقمية و تكنولوجيا ذات خصائص حديثة ومحددة مثل أجهزة الحاسوب والحواسيب الشخصية والأجهزة المحمولة وألواح الكتابة التفاعلية و برامج الحاسب الآلي وغيرها.

من خلال مؤشرات التقييم الواردة تأمل من سيادتكم وضع علامة (√) أمام المعيار الذي تراه مناسب كما تجب مراعاة مادة التخصص عند اجابة الأسئلة التخصصية

		Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree		
		أوافق بشدة	أوافق	لا أوافق ولا أعارض	لا أوافق	لا أوافق بشدة		
1	I know how to solve my own technical problems.		✓				أسطيع أن أحل المشاكل التقنية التي تواجهني .	1
2	I can learn technology easily.	✓					أستطيع أن أتعلم التكنولوجيا بسهولة.	2
3	I keep up with important new technologies.		✓				أستطيع أن أواكب التكنولوجيا الحديثة المهمة.	3
4	I frequently play around with the technology.		✓				كثيراً ما ألهو باستخدام التكنولوجيا.	4
5	I know about a lot of different technologies.			✓			أعرف الكثير عن مختلف أنواع التكنولوجيا.	5
6	I have the technical skills I need to use technology.		✓				أمتلك المهارات الفنية التي احتاجها لاستخدام التكنولوجيا.	6
7	I have sufficient knowledge about my subject.	✓					لدي معرفة كافية بمادتي التخصصية.	7
8	I can use a way of thinking that matches my subject.		✓				يمكنني استخدام طريقة التفكير التي تتوافق مع مادتي التخصصية.	8
9	I have various ways and strategies of developing my understanding of my subject.		✓				لدي طرق متنوعة واستراتيجيات لتطوير معرفتي حول مادتي التخصصية.	9
10	I know how to assess student performance in a classroom.	✓					أعرف كيفية إجراء تقييم لأداء الطلاب في الفصول الدراسية.	10
11	I can adapt my teaching based-upon what students currently understand or do not understand.	✓					أستطيع تصميم طرق تدريسي وفق قدرات الطلاب على الفهم ووفق واحتياجاتهم.	11
12	I can adapt my teaching style to different learners.	✓					أستطيع تصميم طرق التدريس وفق الفروق الفردية للمتعلمين.	12

		Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree		
		أوافق بشدة	أوافق	لا أوافق ولا أعارض	لا أوافق	لا أوافق بشدة		
13	I can use a wide range of teaching approaches in a classroom setting.		✓				استطيع استخدام مجموعة واسعة من أساليب التدريس في الفصول الدراسية.	13
14	I am familiar with common student understandings and misconceptions.		✓				لدي دراية بمفاهيم الطلاب الصحيحة منها الخاطئة.	14
15	I know how to organize and maintain classroom management.	✓					أنا أعرف كيف أنظم و أدير صفي.	15
16	I can select effective teaching approaches to guide student thinking and learning in my subject area.		✓				يمكنني تحديد أساليب التدريس الفعالة لتوجيه تفكير الطلاب وتعلمهم في مجال مادة تخصصي.	16
17	I can produce lesson plans with a good understanding of the topic in my subject area.	✓					يمكنني وضع خطط دراسية مع الفهم الجيد لمادتي العلمية.	17
18	I know about technologies that I can use for "understanding and doing" in my subject area.		✓				أعرف عن التكنولوجيا التي يمكن استخدامها تماشيا مع مبدأ "المعرفة والتطبيق" في مجال مادة تخصصي.	18
19	I know how my subject area can be presented by the application of technology.		✓				أعرف التطبيقات التكنولوجية التي يمكن توظيفها واستخدامها في مجال مادة تخصصي.	19
20	I can choose technologies that enhance the teaching approaches for a lesson.	✓					أستطيع اختيار التكنولوجيا التي تعزز أساليب التدريس في حصتي الدراسية.	20
21	I can choose technologies that enhance students' learning for a lesson.	✓					أستطيع اختيار وسيلة التكنولوجيا التي تعزز طرق تعلم الطلبة في حصتي الدراسية.	21
22	My teacher education program has caused me to think more deeply about how technology could influence the teaching approaches I use in my classroom.		✓				برنامج التربية في الجامعة دفعني للتفكير بعمق حول كيفية تأثير التكنولوجيا على أساليب التدريس التي يمكن استخدامها في فصولي الدراسية.	22
23	I am thinking critically about how to use technology in my classroom.	✓					أنا أفكر بشكل نقدي حول كيفية استخدام التكنولوجيا في الفصول الدراسية.	23
24	I can adapt the use of the technologies that I am learning about to different teaching activities.		✓				يمكنني تطويع تكنولوجيا المعلومات و التواصل التي أتعلمها مع أنشطة تعليمية متنوعة.	24
25	I can select technologies to use in my classroom that enhance what I teach, how I teach and what students learn.	✓					يمكنني اختيار التكنولوجيا التي سأستخدمها في فصولي التي لدعم ما أريد تدريسة وكيفية تدريسة و دعم ما سيتعلمة الطلاب.	25

		Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree		
		أوافق بشدة	أوافق	لا أوافق ولا أعارض	لا أوافق	لا أوافق بشدة		
26	I can use strategies that combine content, technologies and teaching approaches that I learned about in my coursework in my classroom.		✓				يمكنني توظيف الاستراتيجيات التي تعلمتها في فصولي الجامعية و التي تدمج بين المجالات المتعلقة بمحتوى المادة الدراسية و التكنولوجيا و طرائق التدريس.	26
27	I can provide leadership in helping others to coordinate the use of content, technologies and teaching approaches at my school and/or district.		✓				يمكنني القيام بدور قيادي في تمكين الآخرين من التنسيق بين محتوى المادة الدراسية و التكنولوجيا و طرائق التدريس ذلك في نطاق مدرستي والمنطقة التعليمية.	27
28	I can choose technologies that enhance the content for a lesson.	✓					يمكنني اختيار التكنولوجيا التي تعزز محتوى الدرس.	28
29	I can teach lessons that appropriately combine mathematics, technologies and teaching approaches.	✓					يمكنني تدريس الدروس التي تجمع بشكل مناسب بين مادة الرياضيات و التكنولوجيا و الأساليب التدريسية.	29
30	I can teach lessons that appropriately combine literacy, technologies and teaching approaches.		✓				يمكنني تدريس الدروس التي تجمع بشكل مناسب بين مهارات القراءة والكتابة و التكنولوجيا و الأساليب التدريسية.	30
31	I can teach lessons that appropriately combine science, technologies and teaching approaches.			✓			يمكنني تدريس الدروس التي تجمع بشكل مناسب بين مادة العلوم و التكنولوجيا و الأساليب التدريسية.	31
32	I can teach lessons that appropriately combine social studies, technologies and teaching approaches.			✓			يمكنني تدريس الدروس التي تجمع بشكل مناسب بين مادة الدراسات الإجتماعية و التكنولوجيا و أساليب التدريس.	32

C- Models of TPACK

ت- نماذج من TPACK

		Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree		
		أوافق بشدة	أوافق	لا أوافق ولا أعارض	لا أوافق	لا أوافق بشدة		
1	My mathematics education professors appropriately model combining content, technologies and teaching approaches in their teaching.	✓					استطاع أساتذتي لمادة تدريس الرياضيات الجمع بين المحتوى والتكنولوجيا وطرق التدريس في تدريسهم.	1
2	My literacy education professors appropriately model combining content, technologies and teaching approaches in their teaching.	✓					استطاع أساتذتي لمادة تدريس مهارات القراءة والكتابة الجمع بين المحتوى والتكنولوجيا وطرق التدريس في تدريسهم.	2
3	My science education professors appropriately model combining content, technologies and teaching approaches in their teaching.	✓	✓				استطاع أساتذتي لمادة تدريس العلوم الجمع بين المحتوى والتكنولوجيا وطرق التدريس في تدريسهم.	3
4	My social studies education professors appropriately model combining content, technologies and teaching approaches in their teaching.		✓				استطاع أساتذتي لمادة تدريس الدراسات الإجتماعية الجمع بين المحتوى والتكنولوجيا وطرق التدريس في تدريسهم.	4
5	My instructional technology professors appropriately model combining content, technologies and teaching approaches in their teaching.	✓					استطاع أساتذتي لمادة تكنولوجيا التعليم الجمع بين المحتوى والتكنولوجيا وطرق التدريس في تدريسهم.	5
6	My educational foundation professors appropriately model combining content, technologies and teaching approaches in their teaching.		✓				استطاع أساتذتي في المرحلة التأسيسية الجمع بين المحتوى والتكنولوجيا وطرق التدريس في تدريسهم.	6
7	My professors outside of education appropriately model combining content, technologies and teaching approaches in their teaching.		✓				استطاع أساتذتي في المواد الغير تربوية الجمع بين المحتوى والتكنولوجيا وطرق التدريس في تدريسهم.	7
8	My school cooperating teachers appropriately model combining content, technologies and teaching approaches in their teaching.		✓				استطاع المدرسون في المدرسة التي أتدرب فيها الجمع بين المحتوى والتكنولوجيا وطرق التدريس في العملية التدريسية.	8

Feel free to answer in Arabic or English.

لا تتردد في الإجابة باللغة العربية أو الإنجليزية.

1. Give an example of a lesson where you integrated or will efficiently integrate technology into your classroom?

* use videos while teaching letters. For example, tell a story, discovering.

1. أعط مثالاً لدرس في فصلك تمكنت من خلاله أو ستكون لديك القدرة على دمج تكنولوجيا بكفاءة فيه؟

2. What is the strongest point in your program, where you believe it prepared you to integrate technology into your classroom practices?

* the Uni did not teach us how to teach and integrate it. They only tought us about what is I.T.

2. ما هي أقوى نقطة في برنامج التعليم الذي تدرسه، و التي تعتقد أنها أعانتك على دمج تكنولوجيا مع الممارسات الصفية ؟

3. What are the areas in which you like to be developed by the college in order to prepare you for your future classroom practices?

* teach us how to us tecnoligical tools in our teaching.
* gives us lists of great programs to support our teaching and how to diliver it.
* provides full program so we can keep it.

3. ما هي المجالات التي تُريد من الكلية تطويرها لتساعدك لاحقاً في الممارسات الصفية ؟

4. In the future, what do you plan to do to integrate technologies into your classroom practices?

* I can use them in my lessons. teach it to the students and how to use it.

4. ما الذي تنوي القيام به مستقبلاً لدمج تكنولوجيا مع الممارسات الصفية ؟

5. Please describe the most memorable and interesting situation where your professor used technology in teaching and learning?

* I like aprogram my mentor teachar used calleal "activinspire". it was useful and intresting.

5. يرجى وصف حصة دراسية كانت الأكثر تميزاً وإثارةً للاهتمام حيث استخدم أستاذك فيها تكنولوجيا في التعليم والتعلم؟

6. What are the best practices on technology integration in teaching and learning that you are aware of outside your own current classroom environment?

* I think using youtube and power point were the best tools I did in my practice.

6. ما هي أفضل الممارسات في مجال دمج تكنولوجيا مع التعليم والتعلم التي أنت على دراية بها من خارج بيئتك الصفية الحالية؟

7. How would you like to integrate technology in your teaching in the future when you will become a teacher?

* will try let my students have iPads, computers to improve/ buid their skills.

7. كيف تريد أن تدمج تكنولوجيا في تدريسك مستقبلاًعندما تصبح معلما؟

Are you willing to participate in a 20 to 30 minutes interview or focus groups regarding the same topic?

Yes | No

If **yes**, can you provide me with your contact information please?

Thank you very much for filling the survey. I truly appreciate your participation.

If you wish to contact me for any enquiries or clarifications, please feel free.

My email address is lailamohebi@gmail.com

هل أنت على استعداد للمشاركة في لقاء يستغرق من 20 إلى 30 دقيقة حول نفس الموضوع؟

نعم | لا

إذا كان الجواب بنعم ، فهل يمكننا الحصول على بيانات وآليات التواصل معك ؟

شكرا جزيلا لمشاركتك في الاستبيان . وأنا أقدر حقاً مشاركتكم المثمرة.

إذا كنت ترغب في الاتصال بي لأية استفسارات أو توضيحات، فلا تتردد في ذلك على عنوان البريد الإلكتروني التالي :.

lailamohebi@gmail.com

Appendix G: Interview guide for student interviews

Interview Guide - Students			
Research Title:	Investigating Perceptions of Pre-Service Teachers and Instructors in UAE Universities about TPACK Capabilities of Pre-Service Teachers: An Explanatory Study		
Institute:			
Major:			
Year:			
Practicum:			
Date:		**Duration:**	
Introduction:	The purpose of this study is to investigate UAE Universities pre-service teachers' and their instructors' perception about technology use in education context. The study adopts Technological Pedagogical and Content Knowledge (TPACK) model to capture the perceptions of pre-service teachers and their instructors on TPACK readiness in order to understand the current status and the way forward.		

Questions Guide/Prompts	
1	Tell me about yourself and your major? Are you planning to teach after you graduate? Why?
2	How do you define educational technologies? And what is your understanding of the types of technologies that can be used in classrooms? (Prompt= name few?)
3	Is it important to integrate ICT in the classroom? Why or why not? Are you using them in your current classrooms at the college?
4	How would you describe your Technology Knowledge, Pedagogy knowledge and Content Knowledge? How about TPACK?
5	How do you think your education program equipped you with pedagogy, technology and content knowledge to prepare you for teaching? How?
6	What is the strongest point in your program, where you believe it prepared you to integrate technology into your classroom practices?
7	Give an example of a lesson during your school practice where you integrated or **will** efficiently integrate technology into your classroom?

8	Please describe the most memorable and interesting situation where your professor used technology in teaching and learning?
9	What are the areas in which you like to be developed by the college in order to prepare you for your future classroom practices?
10	Do you have anything to add? Your thoughts about the study?

Appendix I: Interview guide for instructor interviews

Interview Guide - Instructors	
Research Title:	Investigating Perceptions of Pre-Service Teachers and Instructors in UAE Universities about TPACK Capabilities of Pre-Service Teachers: An Explanatory Study
Institute:	
Module Taught:	
Date:	
Duration:	
Introduction:	The purpose of this study is to investigate UAE Universities pre-service teachers' and their instructors' perception about technology use in education context. The study adopts Technological Pedagogical and Content Knowledge (TPACK) model to capture the perceptions of pre-service teachers and their instructors on TPACK readiness in order to understand the current status and the way forward.
Questions Guide/Prompts	
1	Tell me about yourself and your role in this institute? What modules you teach?
2	How do you define educational technologies? And what is your understanding of the types of technologies that can be used in classrooms? (Prompt= name few?)
3	Is it important to integrate ICT in the classroom? Why or why not? Do you integrate ICT into your teaching? Give an example.
4	How would you describe your students Technology Knowledge, Pedagogy knowledge and Content Knowledge? How about TPACK?
5	How do you think the modules you are teaching are equipping your students with pedagogy, technology and content knowledge to prepare them for integrating ICT into their future classroom practices? How?
6	What is the strongest point in the pre-service teachers program at your institute where you believe it is preparing the students to integrate technology into their future classroom practices?

7	Do you anticipate any challenges that your students might experience in the process of integrating ICT in their classrooms later on? Like what?
8	What are the areas in which you like to be developed by the college in order to prepare the students for future classroom practices?
9	How ICT integration is articulated in the national institutional policy and practices?
10	Do you have anything to add? Your thoughts about the study?

Appendix K: Participant's information sheet

TITLE:

Investigating Perceptions of Pre-Service Teachers and Instructors in UAE National Universities about TPACK Capabilities of Pre-Service Teachers: An Explanatory Study

PURPOSE OF THE RESEARCH:

The purpose of this study is to investigate UAE Federal Universities pre-service teachers' and their instructors' perception about technology use in education context in order to provide implications for researchers, teacher educators, policy makers, and administrators. The study adopts Technological Pedagogical and Content Knowledge (TPACK) model to capture the perceptions of pre-service teachers and their instructors on TPACK readiness in order to understand the current status and the way forward.

INVESTIGATORS:

Mrs. Laila Mohebi
PhD candidate, Faculty of Education
The British University in Dubai
00971506541429
120074@student.buid.ac.ae

METHOD AND DEMANDS ON PARTICIPANTS:

If you choose to be included, you will be asked to participate in completing a survey that will be given to you by hand. You might also participate in an interview conducted at your institute. The purpose of this survey is to investigate your perception about technology use in education context. The survey is looking at your perception on your understanding of technological, content and pedagogical knowledge as one domain of knowledge and also the combination of these three domains of knowledge. Please be

noted that the research is looking at your perception in general and not measuring these elements. This survey should only take 35 minutes to complete. Please note that your participation is voluntary and you can withdraw at any time. This study ensures your right to privacy, your confidences will be protected and anonymity will be preserved. Based on the information provided by you through the survey, you may be asked for an interview. The purpose of the interview is to emphasize your perception about TPACK and your understanding of ICT integration into classroom practices. This interview should only take 30 minutes. Please note that your participation in the interview is voluntary and you can withdraw at any time. This study ensures your right to privacy, your confidences will be protected and anonymity will be preserved.

For confidentiality and anonymity, there will be no identifiers on the survey or interview transcription and it will receive a code name or number and will be stored in a locked place to which only I have access. And once the survey data is entered into a software called SPSS the hard copies of data gathered will be shredded upon completion of the study and the electronic recording will be stored with other online collected data in an electronic format and will be password-protected to which only the researcher has access. The researcher will also guarantee that all your responses, respondent information and university name will be anonymized through the use of codes.

POSSIBLE RISKS, INCONVENIENCES AND DISCOMFORTS:

Apart from the 35 minutes of your time for the survey and the possible 30 minutes for the interview, you may consider discussing your perception of ICT integration in education and your understanding of your own TPACK capabilities.
Your involvement in the study is voluntary and you may withdraw your participation at any time and withdraw any data that you have provided to that point. Refusal to participate in the study will not affect your relationship with your university or the British University in Dubai.

BENEFITS OF THE RESEARCH:

This thesis will examine the perceptions of pre-service teachers and their instructors of TPACK capabilities, and will provide suggestions and recommendations based on students input from each university. The analysis of pre-service teachers' response to the interviews or focus groups will be used to help draw a number of suggestions and recommendations based on the input. The researcher hopes that the findings would help in understanding the ICT integration in education in pre-service teachers' preparation efforts in the federal universities of the UAE. Confidentiality is assured, and your university and you will not be identified in any part of the research.

ETHICS REVIEW AND COMPLAINTS:

This study has been reviewed by the Human Research Ethics Committee of your University. If you have any concerns or complaints regarding the way this research has been conducted, you can contact the Ethics Officer on 000000000 or email 000000000000.

Thank you for your interest in this study.

Appendix L: Consent form for participants

RESEARCH TITLE: Investigating Perceptions of Pre-Service Teachers and Instructors in UAE Universities about TPACK Capabilities of Pre-Service Teachers: An Explanatory Study

RESEARCHER: Laila Mohebi

I have been given information about the research "Investigating Perceptions of Pre-Service Teachers and Instructors in UAE Universities about TPACK Capabilities of Pre-Service Teachers: An Explanatory Study" and discussed the research project with Laila Mohebi who is conducting this research as part of a PhD of Education: Management degree supervised by Dr. Solomon David in the British University in Dubai.

I have been advised of the objective of this research, which includes investigating my perception about technology use in education context. This study is looking at my perception on my understanding of technological, content and pedagogical knowledge as one domain of knowledge and also the combination of these three domains of knowledge as part of teacher preparation. Moreover, I have been advised that the research is looking at my perception in general and not measuring these elements. Also, I have had an opportunity to ask Laila Mohebi any questions I may have about the research and my participation.

I understand that my participation in this research is voluntary, I am free to refuse to participate and I am free to withdraw from the research at any time. My refusal to participate or withdrawal of consent will not affect my treatment in any way my relationship with my university or my relation with the British University in Dubai.

I also understand that for confidentiality and anonymity, there will be no identifiers on the survey and the interview transcription and when it is completed it will receive a code name or number and will be stored in a locked place to which only the researcher has access. And once the survey data is entered

into a data software called SPSS the hard copies of data gathered will be shredded upon completion of the study and the electronic recording will be stored with other online collected data in an electronic format and will be password-protected to which only the researcher has access. The researcher also guarantees that all my responses, respondent information and university name will be anonymized through the use of codes. This is also applicable for any documented answers of the survey and the interview.

If I have any enquiries about the research, I can contact Laila Mohebi on 00971506541429 or if I have any concerns or complaints regarding the way the research is or has been conducted, I can contact the Ethics Officer, Human Research Ethics Committee or Office of Research in my university.

By signing below I am indicating my consent to participate in the study discussed above through a survey and/or an interview.

I understand that the data collected from my participation will be used for the purpose of the PhD thesis of Laila Mohebi and I consent for it to be used in that manner.

Name

.....

Date

.....

Appendix M: University Consent Form

Dear Sir / Madam

I am currently registered in the British University in Dubai (BUID) in the Doctorate of Education program; my research interest is pre-service teacher capabilities in technology. Part of my research is to collect data via surveys and interviews in UAE federal universities. The purpose of the project is to understand the Technological, Pedagogical and Content Knowledge (TPACK) of pre-service teachers in order to devise recommendations that can inform policy and practice on both university and ministry levels.

I hope you can approve my request of conducting my study in your institute, while assuring you of complete confidentiality of any information conveyed and anonymity of university and participants' names, which is in line with the British University in Dubai (BUiD) ethical code of conduct. I am also attaching a letter from BUiD requesting your permission for conducting the research study in the university. Please see below the requirements of the study, the TPACK survey and the interview protocol. I look forward to hearing from you, meantime, please accept my best regards.

Laila Mohebi
Masters of Arts in Online Education Leadership and Management
Project Manager at Zayed University
Mob 0506541429
Email Laila.mohebi@zu.ac.ae

1. Requirements for the study:
    a. Survey for 100 pre-service teachers
    b. Interview with 10 pre-service teachers and 5 pre-service teachers' instructors
2. Survey Protocol
    a. Appointment will be requested ahead of time using email and confirmed by phone calls.

b. Participants will be briefed prior to distributing the survey with the study purpose and objectives.
c. The survey will take 30 minutes.

3. Interview Protocol
    a. Appointments will be requested ahead of time using email and confirmed by phone calls.
    b. Participants will be briefed prior to interaction with the study purpose and objectives explaining the following.
    c. Anonymity (names will be coded if there is a need to mention them).
    d. Privacy of answers (negative points will not be conveyed to administration).
    e. Right to refrain or withdraw without any negative consequences.
    f. Permission for recording the interview will be requested at the beginning of the interview.
    g. Notes will also be taken during the interviews.
    h. Interviewees will be given the chance to check the data collected for authentication.

All data collected throughout the study will be safely kept in a private locked cupboard until the end of the project and the dissemination of the results. Later hard copies will be disposed using a shredder and all electronic files and recordings will be deleted.

If accepted, please sign below

Name:

Position:

Date: