UNIVERSITY OF SOUTHAMPTON

FACULTY OF SOCIAL, HUMAN AND MATHMATICAL SCIENCES

Southampton Education School

An Investigation of Teachers' Beliefs and Attitudes Regarding the Use of Tablet Computers as a Pedagogical Tool in Teaching Practical Studies (Electricity and Electronics) in Kuwaiti Intermediate Schools

By

Ebrahim Ghazi Alenezi

Thesis for the degree of Doctor of Philosophy

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ABSTRACT

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Tablet computers facilitate and augment learning in and beyond the conventional classroom, which is considered as seamless learning, free from time and space boundaries. These portable devices are increasingly being integrated in Kuwaiti schools and consequently there is the need to ascertain how teachers' pedagogical and epistemological beliefs influence their decisions to integrate tablet computers for teaching in Kuwaiti schools. This inquiry is grounded in the theoretical frameworks of the Technology Acceptance Model (TAM) and Technological Pedagogical Content Knowledge (TPACK). The study establishes the factors influencing teachers' initial adoption of tablet computers, their impact on teachers' pedagogical approaches, and the challenges teachers' face. A mixed-methods exploratory-cum-explanatory research design was employed to acquire both qualitative and quantitative data. Research instruments used included questionnaires, interviews and observations. Questionnaires were administered to a sample of 150 intermediate school teachers from one school district. A sample of 15 teachers was selected for interviews. The 15 teachers were also observed in their classrooms. Quantitative data was analysed using the statistical package for social sciences (SPSS) version 21 software while qualitative data was thematically analysed. This study found that the teachers' perceptions of affordances and constraints of the technology may have developed over time and through the use of the devices in their classroom practices. Although the teachers had varied self-efficacy beliefs, they had positive attitudes towards the use of tablet computers. Findings also suggest that the teachers' TPACK fostered skills to use these devices and that they could support authentic assessment and promote student-centred learning. Furthermore, the study considers that policymakers lack clarity in pedagogical understanding and as result inadequate policies were hindering rather than enabling tablet computer integration in schools. Although most findings reinforce what is already known about the field, this study is unique as these results are new for Kuwait and possibly more widely for the Middle East. The study recommends that policymakers provide increased support for teachers and encourage schools to put in place mechanisms that improve teachers' attitudes towards emerging technologies. Additionally, it recommends that teachers should be provided relevant and targeted in-service training programmes to enhance their skills and knowledge in order to integrate tablet computers into their teaching practices to effectively support a student-centred learning paradigm.

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Academic Thesis: Declaration Of Authorship

I, ... [please print name]

declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

[title of thesis]

....

....

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
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3. Where I have consulted the published work of others, this is always clearly attributed;
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6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
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Date: ....

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Definitions and Abbreviations

CK	Content Knowledge
ICDL	International Computer Driving Licences
ICT	Information and Communication Technology
KMO	Kaiser-Meyer-Olkin test
MOOCs	Massive Open Online Courses
OECD	Organisation for Economic Cooperation and Development
PAAET	Public Authority for Applied Education and Training
PCK	Pedagogical Content Knowledge
PIAAC	Programme for the International Assessment of Adult Competencies
PK	Pedagogical Knowledge
SPSS	Statistical Program for Social Sciences
TAM	Technology Acceptance Model
TCK	Technological Content Knowledge
TK	Technological Knowledge
TPACK	Technological Pedagogical Content Knowledge
TPK	Technological Pedagogical Knowledge
UAE	United Arab Emirates
UTOP	UTeach Observation Protocol

Chapter 1 Introduction

1.1 Introduction

There are extensive changes in the way technologies, such as tablet computers and other mobile technologies, are being used for learning. The integration of tablet computers in classrooms is claimed to contribute to seamless learning or learning that is free from time and space boundaries (Clark & Luckin, 2013). Wong and Looi (2012) define seamless learning as learning that extends beyond the classroom and allows students to use their own initiatives to acquire knowledge in a variety of scenarios including formal and informal learning, and individual and social learning, by using mobile devices to leverage their learning initiatives. Wong and Looi (2012) claim that seamless learning is a novel educational practice that can ensure smooth learning experiences in formal and informal contexts. Consequently, the culture of educators has to change so that they can incorporate mobile learning into the curriculum. It can therefore be argued that with the development of mobile technologies and the emergence of new pedagogical concepts, such as seamless learning, the use of technologies to facilitate learning has become a universal phenomenon.

Under such circumstances, it is also suggested that there is the need to make a pedagogical shift from the traditional “instructionist and transmissionist views of learning” (Milrad et al., 2013, p. 106), where students are considered to be passive recipients of knowledge, to a technology enhanced environment that reinforces the active participation of learners (Montrieux et al. 2015). In order to effectively integrate and use tablet computers and create a seamless learning space (Clark & Luckin, 2013), teachers require knowledge and skills in using these technologies.

However, research from Belgium, Canada, Scotland, Ireland and Finland suggests that not all teachers have the required skills and knowledge to use tablet computers and that they have not necessarily transformed their pedagogical practices (Burden et al., 2012; Karsenti & Fievez, 2013; Rikala et al., 2013; Young, 2016). The results of these studies show that teachers lacked relevant technological skills, had poor didactic skills to master mobile devices and did not have the knowledge to use tablet computers in collaborative projects as well as providing support in developing students' problem-solving skills. Research from Kuwait also reveals that most teachers lack basic digital-media and technological skills and pedagogical skills for using technologies (Al-

Awidi & Aldhafeeri, 2017). Furthermore, Kuwaiti teachers were also found to fear change, were hesitant in embedding technology in their curriculum practices and preferred traditional methods of teaching and teacher-centred approaches (Alkhezzi & Abdelmajid, 2011; Alfelaij, 2016). This suggests that technology necessarily does not fit the pedagogical approaches of these teachers in Kuwait.

Although tablet computers have been incorporated into the school curriculum in many Western nations, the concept of mobile technology integration has a different meaning to teachers in different school systems. In the Kuwaiti context teachers have to not only rapidly change their beliefs and attitudes in order to embrace new methods of teaching and integrate student-centred mobile learning but also update their knowledge and skills to improve educational practices and enhance learning outcomes. This indicates that teachers' skills and knowledge have to be complemented by their beliefs and attitudes. Teachers' skills, knowledge, beliefs and attitudes and the relationship between these elements are discussed in section 2.5 of the literature review (Chapter Two). There is evidence to suggest that teachers' beliefs are influenced by their knowledge and skills. For instance, Ertmer et al. (2012) found that the key obstacles preventing teachers from using technology were their attitudes and beliefs towards technology, as well as their levels of knowledge and skills. There are several other studies that have provided such evidence, for example Clark (2000), Sa'ari et al. (2005), Gibbone et al. (2010), and Tamer (2011) which are all discussed in sections 2.5.4 and 2.5.5 of the literature review (Chapter Two). This suggests that teachers' pedagogical beliefs are relevant to their teaching abilities and technological skills. Teachers who have positive attitudes towards technology are likely to have the required technological skills and consider technology as an important tool for learning and instruction while those who have negative attitudes may not. While beliefs and attitudes are critical for teachers to be effective when integrating technology, teachers' skills and knowledge are also essential for using technology.

Quality teaching occurs when teachers have knowledge of technology, pedagogy, and content. This thesis examines teachers' beliefs about the nature of knowledge (epistemology) and beliefs about effective ways of teaching and learning (pedagogy) through the lens of the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006). However, TPACK does not take into consideration teachers' epistemic beliefs and values about teaching and learning (Angeli & Valanides, 2009). The level of technology acceptance among teachers determines the extent to which tablet computers could be integrated into classroom settings.

Therefore, the Technology Acceptance Model (TAM) which models the adoption of new technology by measuring teachers' beliefs (Davis, 1989; Venkatesh et al., 2007) is also used along with TPACK.

1.2 Research context

The chosen context, within which this exploration takes place, is the intermediate school system in Kuwait where technological tools and resources are currently being integrated to support learning. Education reforms in Kuwait (see Table 1) appear to be providing a fertile ground for the integration of mobile technologies (Safar & AlKhezzi, 2013).

Year	**Fundamental reforms and steps taken**
2003	The World Bank established an Education Monitoring and Information System (EMIS) to assist the MOE and Kuwait's National Center for Education Development (NCED) with reforms.
2002-2005	Ministry of Education made it mandatory for all teachers to obtain an International Computer Driving Licence (ICDL)
2008	The Ministry of **Education** in **Kuwait** began to **reform** the science curriculum
2013	Introduced tablet computers with the expectation that the technology may bring about changes
2012	Textbooks in Kuwait were digitised by 2012
2011-2015	The "Integrated Education Reform Program" ensured that the Kuwaiti curriculum was developed by 130 specialists, reflecting national values and concerns
2015	The Kuwait Ministry of Education and the National Center for Education Development (NCED) and the World Bank launches a five-year technical cooperation agreement focused on education reforms. This second phase, starting 2015, focuses on implementation and capacity building.

Table 1: Timeline of education reforms/policies in Kuwait (Source: Oxford Business Group, 2017; World Bank, 2015)

Moreover, the inclusion of practical studies such as vocational programme subjects, including electricity and electronics, and the attempts being made to prepare teachers for technology integration, pinpoint the need for setting up the research in the context of intermediate school education in Kuwait. The reason for focusing on electricity and electronics is that most teachers in intermediate schools teach these subjects as part of the practical studies curriculum.

Teachers in Kuwait are required to obtain an International Computer Driving Licence (ICDL), however, they are either reluctant or lack the confidence to use these technologies (Al Sharija & Watters, 2012). This may be attributed to their negative perception about embedding technologies in their teaching (Alhashem & Al-Jafar, 2015; Aldhafeeri et al., 2016).

A number of research studies have focused on pre-service or university teachers' perceptions, students' perceptions and integration of technology in general (e.g. Alfelaij, 2015, 2016; Sadeq et al., 2015; Aldhafeeri & Alajmi, 2015; Al Behairi, 2016; Alkhezzi, 2016). However, a review of the literature, related to the use of mobile devices in classrooms in Kuwaiti intermediate schools (11 to 14 years), suggests that there is very little research in these settings. This gap, coupled with the fact that the Ministry of Education has been implementing technologies in classrooms and handing out tablet computers to school children, has made this research particular timely and appropriate.

Moreover, the Ministry of Education introduced tablet computers with the expectation that the technology may bring about changes (opportunities as well as challenges) in the way teachers deliver their teaching and consequently in the way students experience learning. This scenario provided the researcher with the opportunity to observe how teachers are integrating tablet computers in classrooms and the challenges they are facing. The current study aimed to do this by investigating teachers' perceptions towards the use of tablet computers as a pedagogical tool for teaching. This study describes the perceptions of teachers who teach practical studies and their beliefs in and attitudes towards integrating tablet computers into their teaching. There is also a noticeable gap in the research literature in relation to teachers' perceptions on the use of mobile technologies for bridging formal and informal learning in contexts where traditional teaching practices are still prevalent. This study addresses this gap.

1.2.1 Technology integration in Kuwait's school system

Kuwait is an Islamic state, and Arabic is the official language. At the beginning of the twentieth century, schools taught only basic literacy related to religion to both boys and girls. These schools were referred to as Al-Katatib or Qur'anic schools. The education system in Kuwait developed quickly and three more regular schools were established by the government between 1937 and 1938, two for boys and one for girls. Today there are 800 public or government run schools (see Table 2) in Kuwait (Central Statistical Bureau, 2016).

Type	Schools	Teachers		Students
		Kuwaiti	Expatriate	
Kindergarten	194	6459	213	42866
Primary	259	16394	7275	151487
Intermediate	208	10797	9216	110417
Secondary	139	39620	24722	375685
Total	800	73270	41426	680455

Table 2: Schools and Students in Kuwait (Public or government run) Source: Central Statistical Bureau (2016)

The subjects which are taught at primary level are English, Arabic, Islamic studies, Mathematics, Computer Science, Social Studies, Physical Education, Arts and Music. The subjects which are taught in Intermediate level and Secondary/high school level, in addition to the subjects taught at the primary level are, French, Philosophy, Biology, Geology, Chemistry, Physics, Geography, History, Economics and Practical Studies. Practical studies (for example, electricity and electronics which also include computer science; interior decorating) were introduced to meet the practical needs of industry and science.

Technology was first implemented in secondary schools in Kuwait in 1985 but it is claimed there was a rapid increase in the use of information and communication technologies with the introduction of the Internet in the late 1990s (Al-Abed, 1986; Burkhart & Goodman, 1998). Al Sharija and Watters (2012) are of the view that the reason for this exponential growth was due to the initiatives taken by the Kuwaiti Ministry of Education after realising the potential and importance of computers for learning. The Ministry of Education established the Educational Technology Department in schools, which provides resources to improve teachers' teaching in the classroom, such as video projectors, computers, teaching programs, and interactive whiteboards. In 2002 the Ministry of Education made it mandatory for all teachers to obtain an International Computer Driving Licence (ICDL), to enhance the teaching and learning process in the classroom (AlKhezzi & Abdelmagid, 2011). As part of deploying e-learning in almost all schools, textbooks in Kuwait were digitised by 2012 (Adkins, 2012).

The educational cultural shift needed to use technology, in a meaningful manner, begins with teachers who play a key role in realising successful changes in education (Mundy & Kupczynski, 2013). Although the Ministry of Education introduced policies to provide all schools with technological infrastructure and provide teachers with training programmes to develop computer skills (Al Sharija & Watters, 2012), teachers hold negative perceptions about integrating technology (Alhashem & Al-Jafar, 2015). In a recent study, Al-Awidi and Aldhafeeri (2017) examined teachers' readiness to implement a digital curriculum and found that they lacked technical and pedagogical skills to integrate technology effectively. Teachers perceived that the factors that hindered their readiness were related to knowledge and skills.

1.2.2 Practical studies (electricity and electronics) in intermediate schools in Kuwait

Practical studies, or subjects related to vocational education, which are being taught in intermediate schools in Kuwait, are considered to be vital in the development of a student. These subjects are claimed to prepare the student for life beyond the classroom, or later on in their lives and especially in their professional careers (Hovland & Soderberg, 2005). In Sweden and Norway, practical subjects are very much part of the curriculum, as these courses are said to develop creative and problem-solving skills (Hovland & Soderberg, 2005). In the UK, practical and vocational education is meant to provide a path to success for young learners, who can become electricians, doctors, engineers, graphic designers, beauty therapists or landscape gardeners if they are allowed to tackle real, practical challenges at school (Lucas, Claxton & Webster, 2010). In other words, students can experience the benefits of real-world learning and learn by doing as well as by thinking, reading and writing (Lucas et al. 2010).

In the context of Kuwait, practical Studies are offered to students from 7th to 9th grades (Al-Khalidi, 2007). The rationale for including practical studies in schools is to improve students' skills, to prepare students to study in training colleges in the future, and to enable teachers to connect their knowledge as well as pedagogical and technological skills to teach practical subjects in schools (Alanati & Eubid, 1995). Whether, it is the UK, or Sweden or Kuwait, the emphasis on practical or vocational courses is to allow students to solve problems with technology. This is in line with OECD's Programme for the International Assessment of Adult Competencies (PIAAC) which is being implemented in several countries worldwide. PIAAC defines problem solving in technology-rich environments as the use of "digital technology, communication tools and networks to acquire and evaluate information, communicate with others and perform practical tasks' (OECD, 2012, p. 47)

Baderkhan (2006) asserts that practical studies are crucial for teachers and students, as the subjects help students achieve a deeper level of understanding by promoting self-regulation. Another claim is that in classrooms where these practical subjects are taught, teachers can engage students with the processes of scientific enquiry (Alhayla, 1998). Furthermore, practical studies play an important part in the education system because they are related to teachers' knowledge and skills (Farghali, 1996; Abu-Sal, 1998). In practical studies or subjects that involve the use of technology, students are expected to creatively apply technology to practical learning skills. Therefore, an investigation of the beliefs, attitudes, knowledge and skills of teachers who teach these subjects is essential.

1.3 The research gap

As the literature review in the following chapter shows (Chapter Two), research in Kuwait and other Arab states has focused on the challenges and benefits of implementing tablet computers in classrooms, measured the mental and performance skills of school students when using the technology, and why technology integration has not been successful (Alajmi & Al-Hadiah, 2016; Alfelaij, 2016). The literature review also exposed a gap in understanding why practical studies has not been the main focus for integrating tablet computers in an education system in which traditional teaching approaches are still in vogue and where there is systemic resistance to technology enhanced learning (Alkhezzi & Abdelmajid, 2011; Alshammari, 2014).

1.4 Research Problem

In Kuwait, as well as in the wider context of other Arab nations, while there is the need to modernise and use a more secular and westernised approach in schools, teaching methods are still very traditional, especially in public or government run schools (Findlow, 2008). Research suggests that religious resistance to education overhaul is a big challenge when integrating mobile learning (Al-Hunaiyyan, Alhajri, & Al-Sharhan, 2016). Rote learning or memorisation, a traditional model of teaching and learning which breeds passivity is still deeply entrenched in schools (Alshammari, 2014). Moreover, teachers do not have training or confidence, although it is mandatory that they have an ICDL (Al Sharija & Watters, 2012).

From 2013, as part of a national strategy, the Ministry of Education in Kuwaiti began distributing tablet computers to students with an app which includes interactive secondary-level curricula, Microsoft Office, and a programme that allows teachers and students to communicate with each other (Oxford Business Group, 2017). Although, over US$ 580 million was spent on this exercise (Oxford Business Group, 2017) it is claimed that this initiative was superficial (Al Nakib, 2015).

However, the teacher preparation programme has not kept pace with technology integration (Al-Hunaiyyan, Al-Sharhan & Alhajri, 2017). When new and mobile technologies are introduced in schools, teachers need to update their knowledge and skills to use appropriate teaching approaches to improve the educational process. However, research suggests that teachers in

Kuwait are using traditional teaching methods (Al-Ajmi & Reys, 2007) as they lack competence to use technology in the classroom (Al-Qallaf & Al-Mutairi, 2016).

Research from the U.S. has also revealed that teachers' beliefs, attitudes and skills play an important role in integration of technology into classroom teaching. For instance, Ertmer et al. (2012) carried out a multiple case-study research, and results of the interviews with 12 teachers suggested that their own attitudes and beliefs facilitated technology integration. The teachers also reported that some of their colleagues were afraid, fearful and intimidated by technology and had negative attitudes, which could be changed if their knowledge and skills were increased through professional development programmes. In yet another study from the U.S., a survey that was administered to 2,462 teachers found that older teachers were not confident in using technology as compared to younger teachers (Purcell et al., 2013). This suggests that the older teachers had erroneous beliefs which could have influenced their negative attitude. Other studies from the West (Belgium and the U.S.) also indicate several reasons for studying teachers' beliefs (Hermans et al., 2008; Kim et al., 2013).

There is very little research from Kuwait that has ascertained how teachers' pedagogical and epistemological beliefs influence their decisions to integrate tablet computers for teaching in schools. Studies from Kuwait have examined the effectiveness of using tablet computers in learning and measured the mental and performance skills of school students in social studies (Alajmi & Al-Hadiah, 2016); investigated why integrating technology has been unsuccessful in Kuwait (Alfelaij, 2016), or were related to mobile learning implementation in higher education. This study also assumes that in the context of Kuwait, there is increasing pressure on teachers by policymakers to develop their own skills in using new learning technologies innovatively. This requires a significant paradigm shift in teachers' classroom practices. However, it is not certain how teachers' pedagogical and epistemological beliefs influence their decisions to integrate tablet computers. This is the focus of this study. This current research study was carried out in an intermediate school in Kuwait, which allowed the researcher to study teachers in their 'natural' environment.

1.5 Rationale, aims and research questions

Researchers have explored the integration of technology in classrooms from various perspectives, but there remains a need for research that explains the beliefs in and attitudes of teachers who teach practical studies (which are vocational courses and different from other academic subjects) towards the use of mobile technologies in Kuwaiti schools where traditional teaching approaches are still being used. This study is concerned with the interrelation of teachers' beliefs, understanding and attitudes as represented by the models of TPACK and TAM. Therefore, there is the need for an in-depth investigation to understand teachers' beliefs and knowledge about tablet computer integration in classrooms, and to identify capabilities and enablers as well as challenges facing teachers. Moreover, it is important to understand teachers' stated pedagogical beliefs about using tablet computers for teaching, and to identify the challenges faced by them and finding solutions to enable teachers to effectively adopt mobile technologies to support teaching and learning.

The main aim of this research is to find out more about teachers' knowledge, skills and attitudes towards using tablet computers in teaching in intermediate schools in Kuwait and bring a better understanding of it. The objectives of the study are to:

- Investigate Kuwaiti intermediate school teachers' beliefs regarding the use of tablet computer for teaching practical studies.
- Investigate Kuwaiti intermediate school teachers' knowledge towards the use of tablet computers for teaching practical studies.
- Investigate Kuwaiti intermediate school teachers' skills (practical knowledge) related to the use of tablet computers as a pedagogical tool for teaching practical studies.
- Investigate Kuwaiti intermediate school teachers' attitudes towards the use of tablet computers for teaching practical studies.
- Explore the challenges and difficulties which school teachers face when using tablet computers for teaching practical studies.
- To make recommendation to policy makers in the Ministry of Education so that they can formulate strategies to improve teaching methods, when tablet computers are used in schools for teaching practical studies.
-
- - The study attempts to address the following research questions, with regard to tablet computers in Kuwaiti intermediate schools:

1- What are teachers' beliefs and attitudes associated with the initial adoption of tablet computers for learning and instruction?

2- How has the deployment of tablet computers influenced or changed teachers' pedagogical approaches in intermediate schools?

3- What are the challenges facing teachers who use tablet computers for teaching in intermediate school classrooms?

The literature review was the starting point for narrowing down the broad research aims which were then used to formulate the research questions. The questions arose from issues raised in the literature, for example the factors associated with teachers' beliefs in and attitudes towards technology adoption and use (Venkatesh et al., 2003; Mueller et al., 2008; Tondeur et al., 2008; Teo, 2009a), and the challenges facing teachers (Karsenti & Fievez, 2013; Blackwell, 2014; Culen & Gasparini, 2012). Thus, the questions are linked with what is already known about the topic. What is not known is how teachers who teach practical studies are integrating tablet computers in Kuwaiti schools.

1.6 Research approach

As stated earlier the main aim of this study is to gain a deep understanding of teachers' perceptions of their attitudes, beliefs, knowledge and skills in using tablet computers. Therefore, an exploratory-cum-explanatory research paradigm was considered appropriate for finding answers to the research questions. Since the intention was to understand rather than test a theory, a pragmatic worldview or paradigm was adopted.

The pragmatist stance allowed the collection, mixing and analysing of both qualitative and quantitative data. By adopting a mixed methods research design, data were collected from teachers through the use of questionnaires, interviews and observations to investigate teachers' beliefs about the use of tablet computers as a pedagogical tool in teaching in Kuwaiti intermediate school classrooms. The integrated research design allowed the researcher to triangulate different perspectives obtained from multiple data sources and use the sources in a complementary fashion in order to produce a better understanding of the research problem and to generalise to a certain extent. The researcher's position was neither that of an insider nor outsider. The researcher experiences and shares the characteristics, roles, and experience of the participants but did not have a prior personal, social or professional relationship with the actual respondents.

The theoretical frameworks of TPACK and TAM provided a framework for the theoretical exploration of the pedagogical consequences and the mediating role teachers play in the technology integration process. The researcher assumes that TPACK and TAM would explain the connections between technology and pedagogy, and in understanding teachers' pedagogical and technological practices.

1.7 Potential contribution

The literature review was rigorous as the search involved electronic databases, peer-reviewed journals, and Google Scholar. In order to generate the data being sought, the keywords used were mobile technology, m-learning, schools, integration, seamless learning, tablet computers, teacher skills, knowledge, beliefs and attitudes, technology adoption, TPACK and TAM. The search focused on identifying only robust and valid research concerning the use of mobile devices in education. In other words, the review focused on the use of specific terms or keywords in the search to obtain more focused and productive results in the search. Only relevant studies, for example, peer reviewed and high impact journals were included and studies that were outdated or those that were associated with technology integration in higher education were summarily excluded because they were outside the sphere of interest. The study is expected to contribute to current theory, methodology and experience in terms of teachers' beliefs about the use of tablet computers as a pedagogical tool in teaching.

In order for decision makers to plan for the effective use of technology in schools, it is essential to consider both teachers' beliefs and their use of technology in the classroom. The findings of this study are expected to help policy makers in the Ministry of Education in Kuwait to understand teachers' beliefs regarding the use of tablet computer as a pedagogical tool. It is also hoped that such an understanding of teachers' beliefs will help the policy makers in their effort to improve the teaching methods.

Finally, this study contributes to methodology by adopting a holistic, mixed-methods approach to theory building (Creswell & Plano Clark 2011; Tashakkori & Teddlie, 2010). The study is unique due to the revealing and insightful perspectives collected from natural settings in an attempt to understand teachers' beliefs and attitudes through the eyes of the participants. Researchers in general who have examined teacher attitudes and beliefs have predominantly used self-reporting questionnaires. Similarly, current literature from Kuwait as well as the wider Gulf region, the majority of which adheres to strictly positivist or interpretivist studies, this thesis combines both qualitative and quantitative methods, which offer appealing insights into the phenomenon under investigation. Researchers who have examined teachers' attitudes and beliefs have predominantly used quantitative methods and have not focused on 'practical' or vocational subjects.

1.8 Overview of the study

Chapter One includes a description of the problem and context of the study, statement of the problem, purpose of the study, research questions, and research contributions.

Chapter Two delves deeper into current and past literature about teacher's beliefs, attitudes, knowledge and skills in using technology, and the significant barriers they face. It also provides a critical review of the key issues identified. The chapter also presents the theoretical framework drawing from TPACK and TAM and exploring the complex concepts this study investigates.

The methodology used to conduct this mixed methods research is presented in *Chapter Three*. The chapter elucidates the philosophical assumptions underpinning the research design and methodology, and includes description of the population sample, research methods and data collection methods used in the study.

Chapter Four presents the analysis of the data collected, and the findings of the study. The chapter also presents the quantitative findings, describes the key themes and major findings emerging from the research and elaborates how TPACK and TAM helped make sense of, and interpret the data.

Chapter Five provides a detailed discussion of the findings relating to teachers' beliefs and knowledge with supporting evidence from the research instruments used.

Chapter Six includes a summary key findings and conclusions, limitations of the study, implications for current practice, and recommendations for future research.

Chapter 2 Literature Review

2.1 Introduction

During the past few years mobile technologies, such as tablet computers, have been integrated in classrooms, for instance in teaching, learning, and assessment, with relatively great success (Ifenthaler & Schweinbenz, 2013; Montrieux et al., 2015; Denison, Bate & Thompson, 2016).

Teachers have to play a significant role in this integration process, since their beliefs are crucial for the effectiveness of using technology in the classrooms of today. A large number of studies have examined teachers' beliefs and attitudes towards technology integration, however, the focus of this research is on teachers' pedagogical and epistemological beliefs and the influence of these on teachers' integration of tablet computers in schools.

This research captures a matrix of elements, namely beliefs, attitudes, knowledge and skills, all of which influence teachers' adoption and use of mobile technologies such as tablet computers (See Figure 1). Although, this research is about teachers' beliefs, the researcher considers that all these elements relate to each other.

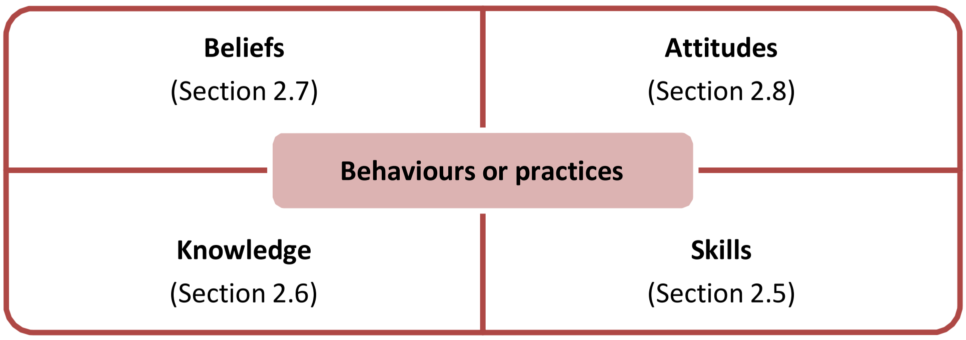


Figure 1: Elements that influence teachers' adoption and use of mobile technologies (and sections in the literature where these constructs are discussed)

Beliefs, attitudes, knowledge and skills are the internal qualities of teachers which, however, also serve as barriers to technology integration (Ertmer et al., 2012). For the purpose of this thesis, beliefs are thoughts, opinions or values that shape an individual's behaviour to use technology while attitudes are evaluative dispositions that make an individual to think, feel, or behave either positively or negatively toward a technology or an issue. Moreover, Eaton et al. (2008) and Ajzen (2005) have described or defined attitude as a disposition. Knowledge are things or information that a teacher has about technology or pedagogy. Skills are things teachers do but will use knowledge to perform a task. While beliefs and attitudes are critical for teachers to be effective, relevant skills and knowledge are also required to inform classroom practices. Moreover, beliefs typically overlap with terms such as knowledge and attitude (Pajares, 1992). This will the focus of this literature review.

The chapter also focuses on teachers' knowledge and skills in using technologies such as tablet computers, by drawing on theoretical concepts put forth in the TPACK framework (which describes teachers' knowledge for technology integration) and the TAM (which can be used to explain how teachers accept and use technology).

2.2 Mobile technologies: an overview of tablet computer integration in schools

A tablet computer is a multimedia platform with a finger-driven touch-sensitive screen which can be used to browse the internet and use diverse mobile applications or apps for accessing music, books, journals, movies, games, and web content (Romney, 2011; Clark & Luckin, 2013).

Research suggests that the use of tablet computers in educational settings has increased tremendously over the past decade (Clark & Luckin, 2013; Rikala et al., 2013; Blackwell, 2014; Hashim, 2014; Montrieux et al., 2015). These mobile devices support seamless learning by allowing students to use them for both formal and informal learning (Clark & Luckin, 2013; Wong & Loooi, 2011). When compared to desktop or laptop computers it is claimed that tablet computers encourage ubiquitous learning, to a greater extent, because of their multisensory capabilities. Furthermore, they are compact, convenient to carry, have a long battery life, in addition to having an endless variety of applications which can be instantaneously accessed anywhere at any time (Clark & Luckin, 2013; Hashim, 2014). Consequently, it is argued that these affordances can be leveraged to engage and motivate students and strengthen and broaden the learning environment (Hashim, 2014; Ifenthaler & Schweinbenz, 2013; Blackwell, 2014). Studies (e.g. Blackwell, 2014; Montrieux et al. 2016) have found that tablet computers have an impact on both teaching and learning practices, and that the devices can be used by teachers for scaffolding student learning.

Burden et al. (2012) carried out a case study of mobile technology adoption in schools in

Scotland to investigate how tablet computers were being used. Data was collected using interviews, surveys, focus group meetings and classroom observations involving students, teachers, policy makers and parents. While students, parents and local authorities welcomed the innovation, teachers reported that tablet computers redefined the teacher's role by increasing peer-to-peer learning and empowering students as co-learners. Montrieux et al. (2015) also reported that teachers believe that tablet computers have altered the dynamics of the classrooms. Teachers have reduced control over the devices or over the delivery of students' learning. The findings of Montrieux et al. (2015) appear to correspond to the claims of Burden et al. (2012) that technology can alter the classroom learning environment, however, Burden et al. reported that students were able to become better learners.

Stacy and Cain (2015), in their research paper, discussed the potential implications of mobile technologies on classroom note-taking in the U.S., and observed that students were actively directing their own learning by modifying the teachers' lectures and notes. In such circumstances, teachers feared that they were no longer the holders and transmitters of information. This shows that technology integration in classrooms where students are always 'connected' can be a challenging task for teachers. In contrast, Burden et al. (2012) and Hashim (2014) claim that it is teachers who facilitate student learning, support reflection and encourage collaboration and information sharing. This suggests that although technology can amplify great teaching, it cannot replace poor teaching (OECD, 2015). There are also claims that tablet computers and other mobile technologies enable more student-centred learning because many of the features such as cameras, apps and digital resources encourage creative ways of instruction (Rikala et al., 2013; Leinonen et al., 2014; McGuire, 2015). The findings of Leinonen et al. (2014) validate the findings of Burden et al. (2012) and Hashim (2014).

McGuire (2015) provides an overview of Massive Open Online Courses (MOOCs), which offer unlimited participation and open access via the web. McGuire discusses the use of mobile technologies and their use in instructional photography. McGuire reported that the mobile devices and built-in cameras not only empowered students but also enhanced their learning experiences. This suggests that mobile technologies support a more student-centred approach to learning. Falloon and Khoo (2014) observed the use of tablet computers by school children in New Zealand. They found that computational applications on these devices could engage learners in problem-solving activities and their results also indicated that students engaged in very high levels of collaborative on-task talk.

Karsenti and Fievez (2013) surveyed 6,057 elementary and high school students and 302 teachers in Quebec, Canada to investigate the integration and use of iPads in classrooms. The study claimed that the teachers found it difficult to make the transition from the physical book to tablet computers as they did not have the knowledge to use the devices appropriately in the classroom. The study found that 99% of the students spent most of their time using tablet computers for social purposes. This suggests that at the time of the Karsenti and Fievez's study teachers had not become fully engaged with these mobile devices, however, the later studies by Falloon and Khoo (2014) and McGuire (2016) point to the potential educational value of these devices. The results of a meta-analysis of literature by Sung et al. (2016) indicate that many researchers consider mobile technologies as a sort of reinforcement tool to encourage motivation and enhance engagement, and not essentially as a content-delivery tool. While, Falloon and Khoo accept that tablet computers have the potential to support collaborative learning, however they caution that teachers have to play a key role in helping students learn by raising talk quality.

A number of researchers (e.g. Karsenti and Fievez, 2013; Kordaki, 2013; McCoy, 2013; Montrieux et al., 2015) have reported the distraction factor as a barrier, as easy Internet access allows students to use Messenger, chat and networking functions. Research shows that such distractions can negatively affect the quality of work produced (Culen & Gasparnini, 2012) and recommendations have been made to monitor student interactions with technology, and to be critical of their selection of apps (Falloon, 2013a; Falloon, 2013b). Moreover, to carry out certain tasks a student has to rely on a computer, for example word processing or spreadsheets, to carry out tasks such as writing lengthy texts (Karsenti & Fievez, 2013). At the time of Karsenti and Fievez study, the iPad was not a suitable tool. Together with the distractions arising from the use of the technology there are other considerations that can be classed as disadvantages including language as most apps are in English and not designed for students from non-English speaking nations (Huber, 2012).

Kim et al. (2013) and Blackwell (2014) both investigated teachers’ attitudes towards tablet computers. Kim et al. (2013) used questionnaires, interviews and classroom observations in an exploratory mixed methods study to investigate the beliefs and technology integration practices of 22 teachers in the U.S. who had participated in a professional development programme.

Blackwell (2014) used interviews and classroom observations to examine the use of tablet computers by teachers in early childhood classrooms in the U.S. The study focused on the factors that influence teachers' attitudes towards tablet computers. Blackwell (2014) found that one of the difficulties teachers encountered was finding appropriate content. The results of the two studies suggest that teachers may need more support, such as in-service training in order to take advantage of the potential that the technology has to offer. Hassler, Major and Hennessy (2015) also support the findings of Blackwell (2014) and claim that adequate support has to be provided to teachers who have incorporated tablet computers, as teaching and learning will not change simply with the introduction of a new technology.

In Belgium, Montrieux et al. (2015) investigated secondary school teachers' and students' perceptions concerning the impact of using tablet devices for teaching and learning purposes. This explorative focus group study found that one of the significant limitations of the use of tablet computers for teaching is teachers' apprehension that they may lose control over the class, due to the presence of these mobile technologies. The results not only support the findings of Kim et al. (2013), Kordaki (2013) and Blackwell (2014) but also suggest that teachers need technical and pedagogical support in order to improve their practices. The advantages of using tablet computers for teaching also include fostering authentic assessment (Fabian & MacLean, 2014) as well as for providing timely feedback (Salem, 2013). Denison, Bate and Thompson (2016) investigated the use of tablet computers for assessment compared with a paper-based marking system and found that the devices improved quality and quantity of feedback provided by teachers. The current study argues that in spite of the benefits and limitations identified in the literature so far, the potential benefits arising from the use of tablet computers far outweigh the drawbacks.

To sum up, while mobile technologies can be used for formal and informal learning, it can also motivate and engage students in collaborative activities and to foster student centred learning.

2.3 Research on mobile technology integration in Kuwaiti schools

When investigating teachers' beliefs regarding the use of tablet computers, as a pedagogical tool for classroom teaching, there is the need to examine technology integration through the lens of teachers who are the agents of change (Ertmer & Ottenbreit-Leftwich, 2010). The current study seeks to understand teachers' beliefs and attitudes, their pedagogical approaches for using the technology, the factors that facilitate or inhibit them from using the technology, why they resist change, and the role of policy makers in motivating teachers and bringing about change in teaching strategies.

In Kuwait, and adjoining Gulf States, there is a paucity of literature on teachers' beliefs about the integration of mobile technologies in classrooms. Furthermore, research has not investigated teachers' beliefs and attitudes towards tablet computers in schools. This lack of research highlights the timeliness of this currents study about teachers' beliefs and attitudes, as well the barriers facing them. A few studies from Kuwait have examined the effectiveness of tablet computers use in learning. Alajmi and Al-Hadiah (2016) examined the effectiveness of using the iPad in learning to acquire the mental and performance skills in teaching. The researchers used an experimental design method and the results of the study revealed that the use of tablet computers (iPads) had a significant positive impact on students' learning. Alfelaij (2016) investigated technology integration in Kuwait and the qualitative study found that cultural, technical and contextual challenges contributed to the failure of technology in enhancing learning. For instance, the prevalence of traditional methods of teaching such as rote-learning and teacher-centred approaches. Alfelaij's study also demonstrated that teachers preferred only those applictions that they were familiar with, for example Blackboard or WebCT. This reflects the negative attitudes and behaviours of the teachers and corroborates the results of other studies from Kuwait, for example Alkhezzi and Abdelmajid (2011). Alkhezzi and Abdelmajid (2011) used surveys and interviews to investigate the use of technology by teachers in elementary schools in Kuwait and found that the teachers lacked the skills to use computers. Aldhafeeri et al. (2016), studied the integration of technology (iPads) into play-based pedagogy by administering questionnaires to 195 teachers in Kuwait. They found that the teachers were hesitant about embedding technologies into their curriculum practices.

Another barrier, of significant concern is the development of pre-service teachers' technological, pedagogical and content knowledge (Alayyar et al. 2012). Teachers in Kuwait are trained by the government-run Public Authority for Applied Education and Training (PAAET) and it is within the preparation programme offered by this vocational training institution that pre-service teachers acquire technical, pedagogical and content knowledge (Alayyar et al., 2012). In the Kuwaiti context, Mohammad (2014) explored the relationship between in-service teachers' beliefs, knowledge and skills in using ICT in practice. The teachers in the study reflected on their experiences in integrating ICT and the quantitative and qualitative results demonstrated that quality continuous professional development programmes were needed to improve teachers' pedagogic practice. The study also revealed that the teachers were not empowered as they lacked training and support, which negatively influenced their attitudes to successfully integrate ICT. The main challenges that the teachers faced were lack of TPACK and inadequate skills. This suggests, that although the teachers had pre-service education, that taught them how to use emerging technologies to support student learning in transformative ways, teachers in service still needed continuous learning. It can therefore be surmised that the lack of continuous professional development programmes may have affected their attitudes towards technology integration. The findings from the exploratory case study uphold the claims of Alayyar et al. (2012) that the teachers, in their study, lacked technological, pedagogical and content knowledge. This could have an impact on their capacity to improve their pedagogic practice.

Alhashem and Al-jafar's study (2015), which investigated technology integration for teaching science in elementary schools in Kuwait, corroborates the results of the Mohammed (2014) study. A concept map and rubric based on the TPACK model was used by the researchers to collect, from female teachers, quantitative data while in-depth interviews were used to gather qualitative data. The results suggested that the centrally mandated curriculum was not compatible with technology and therefore not useful for teaching science. Moreover, teachers lacked the skills to connect pedagogical knowledge while using technology in teaching science. Most importantly, it did not empower teachers to teach what is relevant and meet the needs of the students.

In Kuwait, the implementation phase of the extensive curriculum reform began in 2005 but the reforms had not built on the respect of teachers’ professionalism or empowered them with high-quality professional development. According to Alshammari (2013) the Ministry of Education, responsible for the management and administration of public education in Kuwait, makes all decisions related to curriculum development or what technology has to be integrated. Although the education reform initiatives tend to hold high expectations of teachers, teachers’ voices are not heard. These findings are supported by Troudi and Alwan (2010), who examined female teachers’ perceptions of curriculum reforms in the United Arab Emirates (UAE). These authors emphasised that the teachers lacked pedagogical knowledge, as they did not have any control in matters of teaching and learning and added that they were almost completely disempowered to reflect on their current practices. All this suggests that despite the initiatives taken to reform education, the problem of technology integration continues. Thus, it is important to understand how tablet computers are embraced by teachers in Kuwait where educational reforms have been implemented.

In Kuwait, education reforms are compelling teachers to integrate technology into instruction focussing on student-centred beliefs, but there is a lack of sufficient research on teachers' beliefs and practices and if the two differ. In a recent study, Alsahou (2015) explored science teachers’ pedagogical beliefs and practices in fostering creativity and the socio-cultural factors that influence these beliefs and practices. Thematic analysis of the semi-structured interviews, student focus groups and observations indicated that although teacher-centred practices were evident, student-centred practices were moderate. The case study findings suggested that teachers wanted to strive for a balance between the two approaches in order to avoid socio-cultural conflict and at the same time achieve their goal, which was to meet student needs and pacify the policy makers. The findings of Alsahou’s study appears to mirror the claims of Jackson (2014) that in the UAE and in the member states of the Gulf Cooperation Council, the concept of student-centred learning is different from what it means in the Western hemisphere and in most Asian nations. Jackson, who not only lived in Kuwait for three decades but also wrote about student-centred learning in the UAE and the wider Arab world, is of the view that in the UAE there is the culture of radical student empowerment and teacher fear. Since the UAE has richer students than teachers, they are more empowered than teachers. Emirati students exert influence and therefore teachers actually fear the students who can deprive them of their livelihood. Jackson concludes that "student-centeredness has run amok" (p.11) as it disempowers teachers and "delegitimizes their professionalism" (p.13). It can therefore be argued that teachers are faced with the challenge of how to accommodate their students' social and cultural needs than finding ways to integrate technology.

2.4 New technologies and didactic approaches

There is a rapid growth in new and emerging technologies to support education, consequently delivery methods are also undergoing change - from didactic approaches to student-centred tablet computer-based teaching (Montrieux et al. 2015). Didactic teaching is a traditional classroom-based teaching model which is also referred to as a teacher-centered teaching strategy (Johnson & Hayes, 2016). Teachers who adopt this model are considered authoritative figures and prefer lectures or one-way presentations.

While face-to-face traditional lectures are slowly giving way to technology enhanced teaching, teachers are finding it difficult to acclimatise to new digital environments because they have to re- imagine the teaching process (Guo et al., 2014). Teachers with negative attitudes fear change and uncertainty and resist technology (Stacy & Cain, 2015). These teachers, therefore, fit content into traditional lectures which continue to be their primary mode of instruction (Gorissen, 2013).

Although, didactic teaching can be appropriate in small classes, research suggests that students prefer teachers who facilitate learning using technology over traditional lecture-based instruction (Potts, Rodriguez, Livingston & Brown, 2017). The drawbacks of a didactic approach are that it is passive, teacher-led, and involves rote learning or memorisation and note-taking (Donnelly et al., 2011). Moreover, this approach does not give importance to team work (Conneely, Lawlor & Tangney, 2013). In spite of its constraints, this teaching strategy is still prevalent today (Johnson & Hayes, 2016).

From the literature reviewed in this section, it can be understood that the hesitation surrounding the use of tablet computers by teachers in Kuwaiti schools arises from a number of sources. These include negative pedagogical beliefs and attitudes, the prevalence of traditional didactic teaching approaches, the lack of knowledge or skills or the inability to alter instructional strategies, for example, student-centred approaches that involve a parallel change in the teacher's role and accommodate new technologies, as well as socio-cultural factors that shape technology usage. In-service teachers' technological, pedagogical and content knowledge and their reluctance to use technology in teaching can be addressed through professional development or training.

While teachers' skills and knowledge are essential for using technology, beliefs and attitudes are critical for teachers to be effective when integrating technology. The following sections discuss these constructs and the relationships among them in order to determine how teachers' skills, knowledge, beliefs and attitudes relate to teaching with technology.

2.5 Teachers' skills

The Survey of Adult Skills conducted by the Organisation for Economic Cooperation and Development (OECD) and referred to as the Programme for the International Assessment of Adult Competencies (PIAAC), provides a rich source of data on adults' ability to read and write; both are essential for communication, co-ordination, and organising one's time. The OECD considers these information-processing skills necessary for resolving problems in technology-enhanced environments and eventually for withstanding "the uncertainties of a rapidly changing labour market" (OECD 2013, p.46). Teachers are expected to have these skills, as they are under pressure to prepare students for the future. However, if teachers are to teach students with ever-more diverse needs to raise overall achievement levels and reduce disparity, it is essential that successful teacher preparation programmes embed 21st century knowledge and skills, for example critical thinking, independent and creative thinking, communication, collaboration, creativity and technology literacy (Bernhardt, 2015).

The PIAAC recommends that institutions and policy makers may have to facilitate and encourage teachers to undertake continued education and training. In other words, the findings suggest that if teachers are to acquire skills for teaching 21st century skills, these may have to entail the professional development of teachers through training so that educators of the future will focus on concepts such as project-based learning (engaging students in classroom activities which require learners to apply the knowledge and skills they learn), personalised learning (tailor education to the needs of learners through effective use of digital technologies), and authentic learning (supporting learners to engage in knowledge-generating activities in authentic contexts).

Chapter 2

Teachers' skills are directly related to the ability to impart knowledge to students. The term 'skill' can be referred to as the ability, knowledge, and experience of an individual to do something well (Boyatzis & Kolb, 1995). Teachers' skills are related to teaching skills, which can be defined as clear, individually separate and distinct activities that are used to support student learning (Kyriacou, 2007). Teachers' skills are also defined as the strategies that teachers repeatedly use to enable students to learn (Wragg, 2005). Kyriacou (2007) claims that these skills allow teachers to develop lesson plans and support learning in classrooms. In addition, teachers' skills are related directly to teachers' knowledge about effective teaching and learning (Campbell et al., 2004; Muijs & Reynolds, 2005).

Kivunja (2015) identifies four sets of skills that teachers ought to have: traditional core skills (for example reading and writing), learning and innovation skills which help teachers to improve and develop their own skills, life and career skills or 21st century skills (for example to adapt to change, or learn independently), and digital literacy skills (for example to use technologies).

Additionally, Low et al. (2014) define teachers' skills as communication skills that are required to establish relationships with students in the classroom which also contribute to an effective and worthwhile learning and teaching environment. According to Baylor and Ritchie (2002) teachers' skills are not just related to level of knowledge, but also related to the level of technology competency and technology integration in the teaching and learning process. Most importantly, teachers' skills are highly dependent on teachers' knowledge (Billing, 2007). Teachers are also required to have analytical skills and critical abilities to integrate content knowledge for teaching a particular subject, besides skills in classroom management and organisation (Shulman, 1987). This is referred to as pedagogical content knowledge (PCK). Shulman's PCK is considered the best theoretical framework to examine and understand the skills of teachers (Fernandez, 2014).

To sum up, teachers' skills refer to the ability of teachers to not only improve student outcomes but also to succeed in life and in their career (Mmasa, 2016). However, teachers can develop these skills only if their teacher training and professional development is a continuous, lifelong process. Teachers' continuing professional development can be considered as a means of enhancing knowledge, skills and attitudes. Therefore, teachers' models of continuing professional development especially those outlined by Kennedy (2005) are central to this thesis to some extent. Kennedy (2005) outlined nine models of teachers' continuing professional development which can be broadly organised into three categories: transmissional, transitional ad transformative. The transmission models include training, award bearing, deficit and cascade. The training model focuses on teachers' academic skills, does not give importance to classroom practice or practical skills and supports a high degree of central control. The award bearing model stresses external validation but at the expense of issues of teachers' values and beliefs, while the deficit model looks at addressing perceived deficits in the expertise or skills of teachers. The cascade model focuses on providing training to individual teachers who pass on the information to fellow colleagues.

Model such as standards based, coaching or mentoring, and community of practice are categorised as transitional models. Standards based model lays emphasis on teacher competence and effective teaching. Coaching or mentoring model gives importance to relationships between two teachers, and communication to support continuing professional development. The community of practice is different from the coaching model in that the communication and relationships are not just between two people but among members of a group and involves prolonged discourses.

Action research and transformative are transformative models. The action research model enables teachers to experiment with different practices while the transformative model integrates the different models discussed here. The transformative model supports teachers' professional autonomy and transformative practices.

2.5.1 Teachers' professional skills

Teachers' teaching skills, which were discussed previously, can be referred to as a set of actions or behaviours intended to facilitate student learning. On the other hand, teachers' professional skills include facilitating student learning, content knowledge, lesson planning, classroom management to minimise the likelihood of student misbehaviour, understanding students` needs as well as their learning strategies, communication skills, motivating students and using fair student assessment practices (Moreno, 2010). Professional skills also include technological skills.

Literature suggests that teachers who prefer to use technology as an instructional tool are required to have the professional skills to evaluate and apply these tools in teaching and learning (McCain, 2005; Voogt et al., 2009; Eady & Lockyer, 2013). Teachers' professional skills play an important and decisive role in the successful use of technology, so that students learn effectively (Karolcik et al., 2016). However, teachers who integrate technology as a pedagogical tool for improving teaching and learning have to be well prepared (Thieman, 2008). This claim supports the assertion made by Henderson et al. (2005) that ongoing training and professional development programmes can help develop and enhance teachers' skills.

Karolcik et al.'s (2015) study set in Slovakia, examined the opinions and attitudes of 342 biology teachers about the development of skills when integrating digital technologies. The research was carried out over a three-year period and involved executing a course consisting of three modules. Data were obtained by administering questionnaires. The study found that if school teachers are to integrate technology successfully there is the need to develop teachers' professional skills (Karolcik et al., 2015). The findings uphold the views of Shulman (1987) who pointed out that teachers should have the skills to manage students in the classroom and also have the ability to manage ideas in the classroom. This suggests that to be an effective teacher it is not enough to have deep content knowledge, but also skills in classroom organisation and management. To conclude, professional skills are the core skills that teachers need to fulfil their professional role in schools. Professional skills are different from teachers' pedagogical skills which refer to the skills teachers use to enable students to attain the knowledge and skills related to a subject or a course. Professional skills include planning the courses by matching them to the needs and abilities of students. They also involve communicating with learners, employing a wide range of teaching strategies and resources, and by creating a purposeful learning environment.

2.5.2 Teachers' inter-personal skills

Teachers also require communication or interpersonal skills to interact with students. Ihmeideh et al. (2010) who examined student-teachers' attitudes towards communication skills in Jordan defined interpersonal skills as the ability to listen, speak, read and write, as well as negotiate with students. The results of the Jordanian study corroborate a study from the U.S. which identified teachers' interpersonal skills as competencies (North & Worth, 2004). Puhakka et al. (2010) who examined the employability of Finnish graduates claimed that interpersonal skills also include teamwork and social skills, negotiation skills, communication skills, as well as organisation and coordination skills. Ihmeideh et al. (2010) elaborated on what Puhakka et al. (2010) had identified by stating that teachers need to develop strong interpersonal skills, such as social awareness, speaking, active listening, and oral communication skills, in order to succeed in their profession.

Interpersonal skills help teachers to continually collect, categorise, analyse and explain information to learners in classrooms, as well as communicate capably and effectually with stakeholders within schools (for example co-workers, principals and administrative staff) and external customers, such as students, parents and policy makers. The findings of Ihmeideh and colleagues validated the results of Chong and Cheah (2009) who studied the values, skills and knowledge of student teachers at a higher education institution in Singapore. Chong and Cheah (2009) reported that teachers need to possess proficient interpersonal skills such as communication and relationship-building capabilities, which are essential competencies necessary for developing and maintaining conducive learning environments so that real learning can take place. The results of the Singapore study also support the findings of an empirical study from India, which demonstrated that the interpersonal skills of teachers can help to create an encouraging learning environment in which students learn better, and schools function smoothly, eventually leading to the overall success of the institutions (Rani & Tyagi, 2013). Based on the findings of the studies reviewed, it can be argued that the development of teachers' interpersonal skills not only helps improve their potential to become successful professionals, but also increases the quality of the teaching products, that is the students.

Other studies have also shown that interpersonal skills are one of the qualities of teachers which have a positive effect on students' learning outcomes. For example, Njogu (2012) who examined teacher-based factors on student outcomes found interpersonal skills to be a crucial factor that influences learner achievement. The study also claimed that interpersonal skills are critical skills that enable teachers to relate with students, to listen to the learners and provide prompt feedback. The study concluded that it is therefore essential that teachers refine and cultivate these skills to guide and motivate students.

To sum up, interpersonal skills are central to education because of the dialogic nature of teaching, for example group work or presentations and especially in experientially-based small-group learning (Skinner et al., 2016). When integrating technology, teachers still need to spend time developing appropriate interpersonal skills so that they can feel confident in replying to students' queries and discussing lessons.

2.5.3 Teachers' technology skills

The technology and computer skills of teachers are important factors for the teaching and learning process (Ertmer & Ottenbreit-Leftwich, 2010). However, studies have found that one of the biggest barriers to using technology in education is teachers' lack of technology skills (Ertmer et al., 2012; Fenty & Anderson, 2014; Ihmeideh et al., 2010).

Teachers' technology skills are key for using technology as a pedagogical tool in teaching and learning (Ertmer & Ottenbreit-Leftwich, 2010). Ertmer and Ottenbreit-Leftwich (2010) claim that technology integration requires teachers to have advanced knowledge in using technology tools and applications, such as their affordances, and when the tools have to be used to teach content, so that the teaching will result in the attainment of meaningful learner outcomes. However, teachers' lack of knowledge and skills can result in the failure of technology integration programmes in educational institutions.

Teachers' technology skills not only depend on knowledge but also on the quality and quantity of their training programmes (Husa, 2008). The European Commission (2013) suggests that teacher training should be preceded by an assessment of teachers' learning needs, following which, in-service training should take into account specific needs in order for relevant individualised training to be provided. According to Ertmer and Ottenbreit-Leftwich (2010) teachers who lack technology skills and knowledge may feel extremely uncomfortable in front of students in the classroom. This suggests that teachers require more time for preparing teaching materials and resources which could increase their confidence to use technology.

Teachers' confidence is critical for gaining the skills required to use technology in their classrooms, however, teachers need more exposure to the tools, have experience of how technology facilitates students' learning and they access to professional development programmes related to their work (Ertmer & Ottenbreit-Leftwich, 2010). In addition, Sa'ari et al. (2005) indicate that if teachers have confidence in integrating and using technology in their classrooms, they will possess a positive attitude which could positively influence their teaching and students' learning. Sa'ari et al. also point out that the majority of teachers perform tasks by seeking assistance and complete them, by using the computer as a technology tool. Furthermore, research shows that it is not sufficient if teachers only have strong technology skills and knowledge, but they also should have the right attitude towards integrating technology in teaching and learning (Wong, 2009).

As technologies continue to change and evolve, teachers need to stay up-to-date with the developments and use the technologies to support good teaching practices. In other words, teachers have to create learning activities appropriate to the abilities of their students. However, good teaching practices that drive technology use are not only affected by teachers' skills but also other factors, which are discussed in the following section.

2.5.4 Factors affecting teachers' skills

The factors that influence teachers' skills are knowledge, beliefs, and attitudes. Besides technology skills and knowledge, teachers' attitudes also play an important part in the education system, especially when integrating technology in the teaching and learning process (Hew & Brush, 2007). According to Sa'ari et al. (2005) teachers' attitudes towards technology are influenced by factors such as teachers' skills, and teachers' readiness. There is a relationship between teachers' attitudes and teachers' skills in the education system, and teachers' attitudes towards technology depend on teachers' skills and ability to use technology as a pedagogical tool in teaching (Clark, 2000). Clark (2000) claims that because teachers' attitudes affect teachers' skills, educators should design training programmes not only to improve teachers' skills but also to change their attitudes towards the use of technology in classrooms. Furthermore, teachers' experience about using technology as a pedagogical tool could increase teachers' positive attitudes towards technology, which also could increase teachers' technology skills (Sa'ari et al., 2005; Tamer, 2011).

Yuen and Ma (2008) explored teachers' attitudes and acceptance of e-learning technology by developing and administering a self-reporting questionnaire to in-service teachers in Hong Kong. The authors used the TAM (Davis, 1989) as the core framework for understanding teachers' acceptance of e-learning technology. The results of their quantitative study showed that the lack of teachers' knowledge and experience, as well as technology skills were the reasons for teachers to have negative attitudes towards the use of technology. This also suggests that there is a relationship between knowledge, experience, teachers' skills and attitudes.

Gibbone et al. (2010) developed an online questionnaire to investigate the technology usage of secondary level physical education teachers from many states across the U.S. The study found that there were several factors that influenced teachers' attitudes to adopt and use technology in the teaching and learning process, such as teachers' teaching strategies, contextual factors and teachers' skills. The results showed that teachers with more access to technology, and beliefs in student-centred philosophy, had an overall positive attitude towards using it. However, the teachers in the study also reported that they lacked training which may have affected their attitude towards technology. To sum up, if teachers are to infuse technology into the curriculum and integrate it into the school system, they have to not only possess the skills but also demonstrate positive attitudes towards the technology (Baylor & Ritchie, 2002).

Skills are essential for success in most work places (Teichler, 2007) and this applies to education as well. Teachers' skills, beliefs and motivation are all interrelated, as they influence the way teachers practice in the classroom (Darling-Hammond, 2000). According to Almonkari and Kokkonen (2015) skills are one of the most important factors that influence the quality of work in any institution. A study by Sa'ari et al. (2005) indicated that technology training courses can improve teachers' skills. Sa'ari et al. also found that the majority of teachers had strong levels of technology skills. This suggests that teachers' technology skills and the way they use the tools can enhance teaching and improve student learning (Rienties, Brouwer, Lygo-Baker & Dekker, 2015).

search suggests that teachers' technology skills are affected by teachers' technology beliefs and both have an influence on integration of technology into teaching and learning process in classrooms (Hew & Brush, 2007). Lack of knowledge and skills are both common reasons for teachers to not have strong beliefs in using technology for teaching and learning (Snoeyink & Ertmer, 2002; Williams et al., 2012). According to Ertmer (2005) the decision to adopt and use the technology depends on teachers' beliefs and skills. Furthermore, there is a strong relationship between teachers' skills and beliefs, as teachers' skills and beliefs have a direct influence on integrating technology in the classroom (Hew & Brush, 2007).

There is research-based evidence that teachers' skills also play an important part in integration and use of technology in the teaching and learning process (Ertmer, 2005; Tamer, 2011). In addition, researchers (e.g. Beauchamp, 2011; Webb and Cox, 2004) claim that teacher' skills in using specific technology could effect and change teachers' belief, while a lack of teachers' skills or experience could influence their beliefs (Lim & Chan, 2007). The results of the study by Hew and Brush (2007) show that teachers' skills and knowledge, institutional practices and expectations, and institution support are factors that directly affect teachers' beliefs. The study suggests that institutions should support teachers by providing resources and ongoing professional development, in order to change their beliefs about not using technology for teaching. These findings are further substantiated by a study by Blackwell, Lauricella and Wartella (2014, p.87) set in the U.S. which claims that "support and technology policy influence teacher confidence, which in turn influences attitude".

To sum up, the key factors that affect teachers' skills are their attitudes, beliefs, and knowledge. These factors are crucial for understanding and improving educational processes, for developing strategies for coping with challenges that teachers face in their daily professional lives, and in shaping students' learning especially in practical studies. This current study suggests that in order to use tablet computers effectively in the classroom teachers also need knowledge of the technology besides the skills to use the devices. The next section discusses teachers' knowledge or more specifically TPACK.

2.5.5 Nature of teachers' knowledge

Teachers' knowledge is defined as consisting of pedagogical knowledge, content knowledge, and pedagogical content knowledge (Shulaman, 1987). Pajares (1992, p.313) describes teachers' knowledge as that which is "based on objective fact" Sherin et al. (2000) who explored different accounts of teachers' knowledge categorises the interpretations as 'form' of teacher knowledge and ‘content’ of teacher knowledge. The ‘content’ of teachers' knowledge focuses on what knowledge is all about or what it is used for, whereas the ‘form’ of teachers' knowledge focuses on how teachers mentally organise and represent that knowledge. Although content knowledge is important, it is claimed that teachers’ knowledge has to include how to enable students to make sense of the world in the early 21st century (Holden & Hicks, 2007). Ben-Pertez (2011) reviewed literature from 1988 to 2009 and argues that teachers' knowledge should encompass both pedagogical knowledge and content knowledge and also include awareness of societal and global issues, such as multiculturalism. The different categories of teachers’ knowledge are discussed in the following section.

2.6 Teachers’ knowledge

Teaching is a dynamic field of activity, and new learning environments, enhanced by the increasing availability of and access to new technologies as well as digital networks, requires innovative approaches to teaching and assessment. Although teachers may have expert content knowledge of various concepts related to a particular subject, they also have to acquire the knowledge to represent content in pedagogically appropriate ways to students in diverse educational and cultural contexts (Ball et al., 2008; König et al., 2011; Clara, 2012). This suggests that although content delivery and teaching discrete skills are appropriate, students have to be equipped with 21st century skills which call for new approaches to teaching and learning that reflect the modern economy (Kereluik et al., 2013). Thus, teachers, as knowledge creators, should have technological, pedagogical, and content knowledge.

The following sections in this chapter will provide an overview of the nature of teachers’ knowledge, the classification of teachers’ knowledge, discusses teachers’ knowledge and skills, the association between teachers’ knowledge and technology, teachers’ knowledge and practice as well as the sources of the knowledge base for teaching.

2.6.1 Classifying teachers’ knowledge

Shulman (1987) classifies teachers’ knowledge into seven categories which include: content knowledge; general pedagogical knowledge; curriculum knowledge; pedagogical content knowledge; knowledge of the learners and their characteristics; knowledge of the educational context and knowledge of educational ends. For the purpose of this study, teachers' knowledge is classified as knowledge of learners, content knowledge (CK), general pedagogical knowledge (PK), pedagogical content knowledge (PCK), and technology, pedagogy and content knowledge (TPACK).

Teachers need a knowledge base to teach students, which can be referred to as professional knowledge or knowledge for practice (van Tartwijk et al., 2009). Literature suggests that researchers use various labels for teachers' knowledge for instance, 'teachers' knowledge' or 'teachers' practical knowledge' to indicate all the knowledge that is required for classroom teaching (Verloop et al., 2001; van Tartwijk et al., 2009). Hill et al. (2008) who conceptualised and measured teachers' topic-specific knowledge of learners, claim that teachers' knowledge, which is commonly associated with quality teaching, has a positive effect on students' learning. However, it can be argued that quality of teaching alone is not sufficient to gain the attention of students. In a Dutch study, van Tartwijk et al. (2009) used video-stimulated interviews to investigate teachers' practical knowledge about classroom management in multicultural classrooms. They found that the teachers built rapport with students and modified their teaching approaches to create a positive atmosphere. The teachers in the Dutch study wanted to avoid anything confrontational and did not impose themselves upon the students in order to better understand the learners. This suggests that besides imparting quality knowledge to learners, teachers have to also understand how to develop positive inter-personal relationships with the students.

Students also have misconceptions about concepts or theories or about certain topics and researchers recommend that teachers be aware of their students' ideas or thinking (Barket et al., 2009). These misconceptions undermine students' efforts to learn. Sadler et al. (2013) administered a questionnaire to experienced middle school science teachers in the U.S. to examine the relationship between teachers' knowledge and students' learning, as well as to measure teachers' knowledge of student misconceptions. The study found that better knowledge (a form of pedagogical content knowledge) of such misconceptions was linked to improved students' outcomes. By presenting these findings, Sadler et al. (2013) upheld the results of previous studies that had examined teachers' knowledge of students' thinking or students' misconceptions (Ball et al., 2008; An & Wu, 2012). This suggests that understanding how students reflect or deliberate (accurately or inaccurately) about particular concepts is important for teachers to provide better opportunities for students to learn.

Content knowledge refers to the knowledge of subject matter, such as facts, theories or concepts (Tsui, 2003). Furthermore, content knowledge is the amount of knowledge about a subject gathered and organised in the minds of teachers (Shulman, 1987). As discussed in the previous section, if teachers are to acquire content knowledge they must not only have in-depth understanding of the particular subject being taught, but also have extensive previous education that helps convey what is essential to learners (Shulman, 1987). Moreover, content knowledge is important as it is crucial for the improvement of teaching and learning (Sharkey, 2004). In other words, teachers' subject or content knowledge can influence their instructional practice and in turn students' achievements.

General pedagogical knowledge is important for teachers because awareness of general principles of teaching and learning, as well as classroom management, is essential for developing quality teachers (König & Blömeke, 2011; Shulman, 2004). General pedagogical knowledge comprises several elements, which include classroom management; classroom communication; the curriculum and instructional methods (Sothayapetch et al., 2013). According to Sothayapetch et al. (2013), who investigated the general pedagogical knowledge and pedagogical content knowledge of experienced primary school teachers teaching science in Finland and in Thailand, identified that teachers' knowledge about learners is important, as it helps motivate learners and build better relationships between teachers and students. To sum up, general pedagogical knowledge is an essential type of knowledge that is required for teachers to plan, teach, and evaluate students' learning outcomes (Sothayapetch et al., 2013).

Pedagogical content knowledge (PCK) is important for teachers because it not only enables teachers to transfer ideas into concepts and improve their teaching practices, but also enhances students' learning (Shulman, 1987). PCK is defined as the fusion of content and pedagogical knowledge that is required for teaching and learning particular topics, and organise, represent and adapt them to meet the diverse interests, needs and abilities of learners (Shulman, 1987; Sothayapetch et al., 2013). There are two central components in PCK: (1) knowledge of strategies and representations; (2) knowledge of students' misconceptions (Shulman, 1986). Teachers' PCK is related to student learning, and consequently it is an important part of the knowledge base of a teacher (Sothayapetch et al., 2013). The essential elements of PCK are that they stress the importance of understanding students' thinking and teachers' knowledge of resources (Chick, et al., 2006). (See Figure 2)

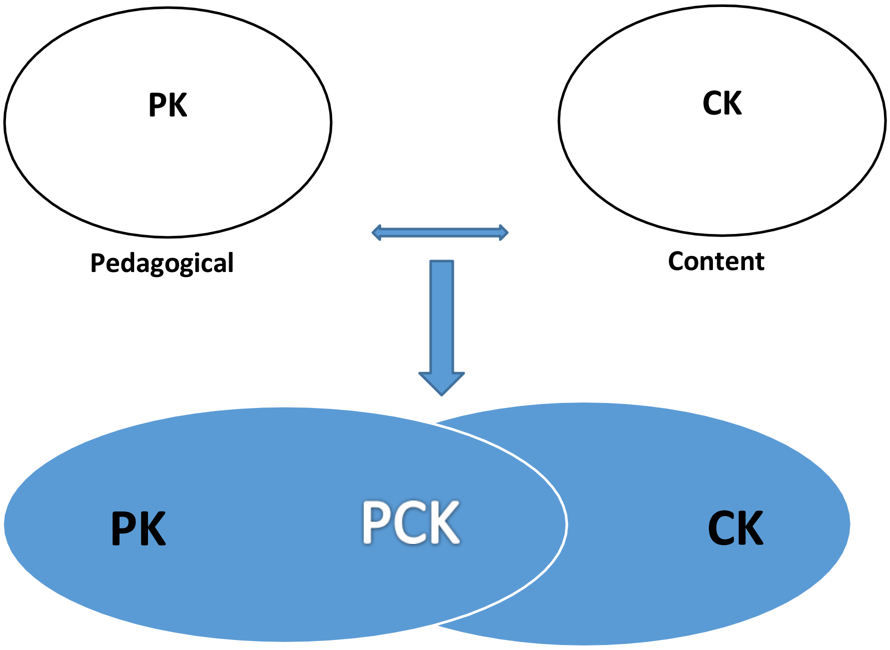


Figure 2: Pedagogical Content Knowledge: A blend of PK and CK (Originally proposed by Lee Shulman, 1986; 1987)

Turner-Bisset (1999) further developed Shulman's concept of pedagogical content knowledge by including elements such as teachers’ beliefs about the topic; knowledge of the curriculum; knowledge of self, learners and contexts and learning outcomes. Turner-Bisset (2001), therefore, proposes continuous professional development as teachers need a comprehensive understanding of different knowledge bases to develop advanced professional capabilities.

Baumert et al. (2010) investigated the relationship between teachers’ content knowledge and students' learning and found that PCK is the stronger predictor of students' learning. Research also suggests that the concept of PCK is important for teachers and can enhance teachers' performance (Hume & Berry, 2011; Williams, 2012). However, critics argue that PCK focuses mainly on individual teachers and that it reifies knowledge, making it fixed and constant and as a result does not give importance to the teachers’ thinking and learning processes (Hashweh, 2005).

The categories of knowledge discussed previously concern the different types of knowledge development as they relate to teachers. As the focus of the current study is to investigate teachers’ beliefs and attitudes towards tablet computers, the next section discusses the relationship between knowledge and technology.

2.6.2 Relationship between knowledge and technology

With the increasing dependence on technology in the early 21st century, it is essential that teachers should be able to add another dimension to their teaching practices. For teachers to maximise their teaching and students' learning, Mishra and Koehler, the educational theorists who developed the TPACK model, describe TPACK as the "basis of good teaching with technology" (Mishra & Koehler, 2006, p.1029). At the core of TPACK is the vigorous, transactional relationship between the three elements - content, pedagogy and technology - and an understanding of the link between them is essential for technology enhanced quality teaching. These three elements together are necessary to formulate suitable, context-specific approaches and representations (Koehler et al., 2007).

The main components of teachers' knowledge identified by Harris et al. (2009) and McCormick and Scrimshaw (2001) are content knowledge, pedagogic knowledge and technological knowledge. A significant reason why technology is not being integrated, or used, in both teaching and learning environments, at all educational levels, arises from the lack of teachers' technological knowledge (Shih & Chuang, 2013).

In their theoretical paper, Harris et al. (2009) analysed the approaches to technology integration and claim that content, pedagogy and technology are viewed as interrelated aspects of teacher

knowledge. The authors proposed a mix of constructivist and traditional pedagogical approaches in different subject domains as well as multiple ICT tools. The authors claimed that as there is an increase in the use of emerging technologies in education, teachers are expected to possess adequate knowledge of technology. Teachers need to work with technology and know not only what technology affords them, but also how technology can be used to teach content in multifaceted ways (Harris at al., 2009). However, in the case of Kuwait it remains to be seen if teachers who teach practical studies are skilful in integrating tablet computers or other mobile technologies and if they are capable of handling the complex relationships among knowledge, technology, content, and pedagogy. Teachers' knowledge and skills in using technology are key for teaching practical subjects as they feature hands-on projects. The current thesis suggests that if the teachers lack the knowledge and/or the skills, they may require training. Harris et al. (2009) are of the view that activity type based training, or professional development programmes, which teach appropriate context-specific uses of instructional technology, could help increase teachers'

TPACK.

Borko et al. (2009), in their editorial of the Journal of Teacher Education discuss the importance of teacher education programmes to increase teachers' knowledge about technology. The authors state that the possibilities of teaching and learning with technology is a complex issue. Borko and colleagues claim that technology can have an effect on developing teachers' knowledge, but in order to use technology effectively in teaching, teachers must have the knowledge and skills to use the technology. Furthermore, the authors argue that if teachers are to successfully integrate and use technology for pedagogical purposes, the development of teachers' TPACK is critical to implement effective technology enhanced teaching.

Kim and Hannafin (2011) examined how pre-service teachers acquire knowledge about teaching with technology by collaborating with experienced in-service teachers. The findings of the qualitative case study showed that most pre-service teachers were not only able to understand appropriate uses of technology but also refine their knowledge of classroom practices such as a constructivist pedagogy, student-centred learning and authentic teaching-learning situations.

Although many researchers have examined why teachers use technology in classroom settings, few of them have focused on how teachers refine their knowledge and understanding of classroom technology integration.

In the studies reviewed here, there is agreement among researchers that if teachers are to integrate technology into their teaching practices, they have to develop or refine their knowledge (Mishra & Koehler, 2006; Borko et al., 2009; Kim & Hannafin, 2011). However, Harris et al. (2009) and Borko et al. (2009) concur that teachers need professional development aimed at technology integration. They also agree that there is a need to reframe teacher education and prepare pre-service teachers by placing a heavy focus on training related to the acquisition of technological knowledge and skills.

2.6.3 Relationship between teachers' knowledge and skills

Teachers' knowledge refers to what teachers must know about the subject and their awareness of how to organise the curriculum to meet the needs of learners (Darling-Hammond, 2000). The teaching process in classrooms requires a significant amount of teacher knowledge and skills, at all levels of education (Serow et al., 2002). Research has established the relationship between teacher knowledge and skills and that a lack of both can present conceptual and implementation barriers to change (Hutchins & Friedrichsen, 2012), especially when integrating technology. In other words, teachers should also have the skills to use the knowledge effectively. This suggests that there is a relationship between skills and knowledge (Redecker & Johannessen, 2013).

Furthermore, Husa (2008) indicates that teachers’ skills influence their knowledge to solve educational problems and also to find the suitable instructional methods to teach in the classroom. A study by Blomeke et al. (2015), found that teachers’ knowledge and experience could have an influence on developing teachers’ skills to improve the teaching and learning process in the classroom. Moreover, teachers’ skills can have an effect on teaching, such as teachers’ knowledge and beliefs because strong skills can improve with knowledge and also could change teachers’ beliefs (Farisi, 2016). Farisi also found that there is a relationship between teachers’ skills and knowledge, and teachers’ must have sufficient skills and knowledge to use educational tools in teaching and learning in the classroom. According to Serow et al. (2002), teachers should have higher levels of skills and knowledge to use technology and impart knowledge to students.

Educational researchers provide a broader understanding of teachers' knowledge and skills which are key for successful classroom teaching (Blömeke et al., 2015; Kaiser et al., 2013; Shavelson, 2010). A combination of skills and knowledge contribute to teachers’ professional performance in classroom teaching (Bromme, 2001). In other words, teachers’ experience and expertise play an important part and influences their knowledge and skills (Konig et al., 2015). However, there are claims that teachers’ knowledge and skills cannot be easily and quickly achieved (Angeli & Valanides, 2009). This suggests that teacher education programmes are required, if teachers are to acquire professional pedagogical knowledge and skills (Tatto et al., 2008) and equip students with 21st century skills (Chan, 2010). Other studies have voiced similar views, for instance Angeli and Valanids (2008) claim that it is important to prepare teachers to use technology for teaching. Although, research evidence, over the years, shows that efforts are being made for preparing teachers to use technology for classroom teaching, teachers lack the knowledge and skills needed to teach with technology successfully (Koehler et al., 2007; Rodrigues, 2003).

2.6.4 Teachers’ knowledge and classroom practice

Teachers’ classroom practice is based on their professional knowledge and in order to understand this it is important to understand the sources that influence, contribute and shape teachers’ knowledge (Tsui, 2003). Teachers have to create a knowledge base for teaching and there are numerous sources which influence, contribute and develop their professional knowledge, such as experiences, formal education and their reading of research (Shulman, 1986; Verloop et al., 2001). According to Hegarty (2000) the experience and interaction with school students are possible reasons for developing a knowledge base. Johnston and Goettsch (2002) identify teachers' experience and their education as the most important sources of knowledge and Hofer (2000) identifies beliefs. In addition, teachers' knowledge could be acquired from different sources, such as personal experience (Buhel & Fives, 2009). In their study, Buhel and Fives (2009) found that teachers' knowledge of teaching comes from formal preparation, for instance college courses, training and professional development, as well as observational experiences such as observing how others teach. Another study conducted in Australia by Ohi (2007) found that the sources of a knowledge base for teaching included teachers' professional experience, sharing resources, networking with and observing other teaching professionals. Brophy (2008) added motivation as being a source of a teacher's knowledge base.

Meneses et al. (2012) point out that the use of technology in classroom teaching depend on factors such as teachers' knowledge, practice, skills and attitudes towards technology. There are also other factors that help teachers to successfully manage classroom learning environments, such as the use of technology to plan, organise, and practice high quality teaching (Moyer et al., 2011).

Teachers' knowledge is key to teaching effectiveness, while classroom practice depends on teachers' knowledge (Hao, 2016). Classroom practice refers to teaching methods, assessment, and classroom management. Classroom practice is related to students' learning and performance (Hill et al., 2005), however research also suggests that there is a relationship among teachers' knowledge, instructional practices, and student learning (Hiebert et al., 2002; Mewborn, 2003; Hill et al., 2005; Hill et al., 2007). Teachers' expert knowledge is useful for classroom practice, specifically because it develops in response to specific problems of practice (Hiebert et al., 2002). Furthermore, teachers create and articulate new knowledge as they are motivated by problems of practice and because all that knowledge is associated with the teaching and learning activities in the classrooms (Hiebert et al., 2002). Teachers play an essential role in classrooms by using their knowledge (content, technological, pedagogical) to help students understand key concepts, and therefore it is important to study the relationship between knowledge, beliefs and classroom practice (Kordaki, 2013).

As professionals in their field, teachers are expected to process, evaluate and update their knowledge base to improve their practice in order to integrate technology. Teachers' knowledge supports their classroom practices and that the use of technology could improve teachers' teaching and students' learning in their classrooms (Mama & Hennessy, 2013; Hao, 2016). Gilbert and Gilbert (2013) carried out a comparative case study to further their understanding of the way teachers' content knowledge influences their teaching practices. The study found that teachers need to possess a deep, broad, and thorough understanding of the content they are to teach.

Wasserman and Walkington (2014) explored how the instructional approaches of beginning teachers were related to observed classroom practices. The results of the mixed methods study, which involved surveys, interviews and classroom observation revealed that although teachers reported valuing their content knowledge, they had difficulty effectively translating their content expertise into teaching context. The results of these two small scale studies (Gilbert & Gilbert, 2013; Wasserman & Walkington, 2014) were similar. While there has been plenty of discussion and debate around the relationship between teachers' knowledge and classroom practices or quality instruction, there is a lack of empirical research connecting knowledge to classroom practices (Guerriero, 2009).

The question, however, is whether teachers are adequately incorporating this new knowledge into their classroom practices. It is therefore suggested that the relationship between teachers' knowledge and practice is complex and that teachers' beliefs can play a facilitating role in the relationship (Hill et al., 2005; Hill et al., 2007). Classroom practice is related to students' learning and performance (Hill et al., 2005), however, research also suggests that there is a relationship among teachers' knowledge, instructional practices and student learning (Hiebert et al., 2002; Mewborn, 2003; Hill et al., 2005; Hill et al., 2007). Teachers' expert knowledge is useful for classroom practice, specifically because it develops in response to specific problems of practice (Hiebert et al., 2002). Furthermore, teachers create and articulate new knowledge as they are motivated by problems of practice and because all that knowledge is associated with the teaching and learning activities in the classroom (Hiebert et al., 2002).

To sum up, the review of literature on teachers' knowledge shows that teachers have to combine their knowledge of learners with content knowledge (CK); general pedagogical knowledge (GPK); pedagogical content knowledge (PCK) and technology, pedagogy and content knowledge (TPCK) to more effectively prepare and develop into professional teachers. It is also evident that there are relationships between teachers' beliefs and knowledge (Pehkonen & Pietila, 2003); between knowledge and technology (Harris et al., 2009); between teachers' knowledge and skills (Hutehins & Friederichsen, 2012; Blömeke et al., 2015) and teachers' knowledge and classroom practice (Kordaki, 2013). It was also found that there are a range of sources from which teachers develop their professional knowledge. The following sections will discuss teachers' beliefs and attitudes towards technology adoption and integration.

2.7 Teachers' beliefs

'Beliefs' have been defined by various researchers in different ways and as such there is no unanimous definition of what it means. However, it is necessary to understand the difference between beliefs and knowledge before looking at the various definitions of 'beliefs'. The difference between these two concepts has led to a debate amongst researchers (Turner et al., 2009). 'Beliefs' represent an individual's subjective knowledge about their attitudes and behaviours, whereas knowledge can be subjective or objective (Pajares, 1992; Pehkonen & Pietila, 2003). In this sense 'beliefs' can be referred to as the subjective knowledge of an individual, made up of assumptions or ideas or personal thoughts or commitments. Beliefs that are subjective in nature are prone to disputes. On the other hand, objective knowledge cannot be referred to as 'beliefs' as they are factual propositions (Turner et al., 2009).

Teacher's beliefs are beliefs relevant to their teaching abilities, the role they play in facilitating learning and are also made up of a combination of their previous experiences, such as life and school experiences (Raths, 2001). It is also claimed that beliefs are "based on evaluation and judgment" (Pajares, 1992, p. 313). According to Pajares (1992, p.307) teachers' beliefs are "a messy construct" as they are made up of rational ideas developed over a period of time, through experiences gained while trying to understand a students' mind, and monitoring classroom behaviour, for instance, how students react to lectures.

There is no consensus in education literature, as there are many definitions of teachers' beliefs. While the aforementioned definitions are useful, it is important to focus on one definition which includes all those expedient convictions which teachers have about technology integration in classrooms. Therefore, in this study, teachers' beliefs are defined as the subjective knowledge gained from past experiences which shape an individual' behaviour and personality. This working definition has been developed after considering the interpretations of the concept of 'beliefs' by both Pajares (1992) and Raths (2001).

The current study may help in identifying the gap that exists between teachers' beliefs and practices and the factors that influence teachers to integrate tablet computers in classrooms. Understanding teachers' beliefs will not only help in expanding existing literature but it would also be useful for educators and policy-makers to help shape or re-orient teachers' beliefs, support technology integration, and improve teaching methods. This section also sheds light on the relationship between beliefs and knowledge; the importance of teachers' beliefs in their teaching practice; teachers' beliefs with regard to the use of tablet computers and the factors affecting change in teachers' beliefs.

2.7.1 Relationship between beliefs and knowledge

A number of studies have focused on understanding the relationship between beliefs and knowledge, and as Pajares (1992) points out beliefs are based on perspectives (or assessment and judgement) while knowledge is based on objective facts. Pajares (1992) also claims that beliefs play an important role in defining behaviour and organising knowledge. Beliefs are considered to be part of knowledge, though researchers see beliefs as part of attitudes or as part of conceptions (Pehkonen & Pietila, 2003). Nespor (1987, p.321), who examined the relationship between beliefs and knowledge, found that belief systems are totally different from knowledge systems claiming that "beliefs are basically unchanging, and when they change it is not argument or reason that alters them but rather a "conversion or gestalt shift". This suggests that beliefs change when an individual's interpretation of his/her experience changes from one thing to another. Besides, knowledge systems, unlike belief systems, are "open to evaluation and critical examination, beliefs are not" (cited in Pejares, 1992, p.311). Borg (2003) claims that beliefs, knowledge and attitudes have similar meaning, and suggest that all three have a motivational component which encourages and drives a teacher's behaviour in the classroom.

Woods and Cakir (2011) assert that there exists a significant relationship between teachers' knowledge and teachers' beliefs. Woods and Cakir (2011) cite Abelson (1979) who identified seven features that characterise differences between belief systems and knowledge systems, which are: not involving consensus; symbolising existence of entities such as ghost, black magic etc.; recognising "alternative worlds"; depending on the significant value of things and real mechanisms; including loosely connected events or materials such as traditional stories and cultural experiences; having open boundaries (including self-construction, self-identity, self-perspective) and lastly, having the flexibility to believe in or accept something as true with varying degrees of conviction (cited in Woods & Cakir, 2011, p.383). Griffin and Ohlsson (2001) suggest that the main distinction between teachers' beliefs and their knowledge is that knowledge is understood as a representation of a proposition, and beliefs are understood as representing the truth-value related to a proposition. It can be argued, that regardless of whether beliefs inform knowledge or vice-versa, it is the relationship between teachers' beliefs and practices that is more important (Rapoport, Rubinsten & Katzir, 2016).

2.7.2 Importance of teachers’ beliefs in teaching practice

Research has highlighted the importance of teachers' beliefs, which are considered to be crucial for understanding and improving educational processes (Turner et al., 2009). Educational researchers, who have examined and investigated teachers’ beliefs, point out that the concept plays an important role in influencing teachers’ instructional decisions and classroom teaching (Pajares 1992; Cohen 1990; Ertmer 1999; Kuzborska, 2011). It is argued that it is not easy to investigate teachers’ beliefs, for the reason that the concept is a global construct and therefore cannot be empirically investigated (Pajares, 1992). According to Farrell (2013, p. 14):

> *the systematic reflection of the alignment between beliefs and practices can help teachers develop an understanding of both what they want to do in their classrooms and the changes they want to implement to their approaches to teaching and learning.*

Researchers have pointed out that, prospective teachers “have deeply grounded beliefs and attitudes about teaching and learning and expectations about the role of the teacher formed on the basis of their extensive experience as learners” (Karavas & Drossou, 2010, p.262). This view is supported by Hutchins and Friedrichsen (2012) who put forward the idea that an individual’s beliefs about teaching are already formed about teaching before they enter the teaching arena. This is referred to as the "apprenticeship of observation" (Lortie, 1975, p.62). This concept posits that the beliefs of teachers are influenced by what they had observed at an early age. According to Chong et al. (2010, p. 1) “the unsubstantiated beliefs that pre-service teachers bring with them have been shown to affect what they learn from teacher education and how they learn from it.” In other words, a teacher's beliefs depend on past experiences and are formed on the basis of their observations of how they were taught as young students. These beliefs influence the teacher’s classroom practices. However, not all may find it difficult to change these firmly held beliefs. This suggests that there is a clear relationship between a teacher's beliefs and their teaching practice (Altstaedter & Falasca, 2015). Therefore, the key to understanding teachers' abilities in their classrooms is to understand their beliefs (Garton, 2008), meaning that any change in their teaching practice is due to changes in their beliefs. There is a wealth of research evidence that has shown that teachers’ beliefs influence their teaching practices (Farrell & Lim, 2005; Ertmer et al., 2012; Deng et al., 2013; Farrell & Ives, 2015; Altstaedter & Falasca, 2015).

Farrell and Lim (2005) investigated and compared the beliefs and actual classroom practices of two experienced English language teachers in a school in Singapore. Their case study examined factors influencing teachers' actual classroom practices and found that teachers do indeed have a set of complex belief systems that are sometimes not reflected in their classroom practices, for instance time and preference for traditional teaching approaches. When Farrell and Ives (2015) replicated the study, the findings correlated with the previous study. However, the later study also found that when teachers articulate and reflect on their beliefs, they become more aware of the meaning and impact of these on their classroom practices.

Ertmer et al. (2012) claim that teachers' espoused beliefs are aligned with their teaching practices, especially when they integrate technology in their classrooms. Teachers' beliefs help teachers not only in implementing change but also play a major role in their decision making, especially when they have to plan instructional activities. The results of previous studies, for example Ertmer et al. (2012) and Farrell and Lim (2005), seemed to have added incremental value to Deng et al's (2013) study, who found that teachers' practices depend not only on knowledge, skills or what they bring to the classroom but also on beliefs. Deng et al. (2013) also found that teachers' beliefs, teaching practices and the use of ICT play important roles in the classroom, and that teachers' beliefs about knowing, knowledge and teaching are associated with their preferred technology-based instructional strategies and practices.

Altstaedter and Falasca (2015) explored the beliefs of two groups of pre-service foreign language teachers from Argentina and the U.S. At the outset, the researchers assumed that beliefs were deeply personal and rooted in the culture and norms of the teachers and of the societies to which they belonged. The findings of the study proved otherwise, as the pre-service teachers did not hold beliefs that were inconsistent or in conflict with one another. In other words, the study found that the beliefs of the teachers did not vary although they belonged to different cultures and spoke different languages. However, this may not be the case in the context of the current study which examines Kuwaiti teachers' beliefs and attitudes. The researcher assumes that the cultures of Argentina and the U.S. are more similar to each other, than they are to that of Kuwait, which is a very conservative society. It is idealistic to attempt to explore teachers' beliefs without referring to the environment in which the beliefs are located as according to Mansour (2009, p.33) "teachers' beliefs are influenced by the interaction within the nested social contexts within which teachers' beliefs and practices are situated".

Researchers (e.g. van der Schaff et al., 2008; Basturkmen, 2012; Hallett, 2010) argue that teaching beliefs are not always aligned with teachers' pedagogical practices and therefore any connection between the two is questionable van der Schaff et al. (2008) examined the relationship between teachers' stated beliefs about research skills and their actual research classroom practices and found there was no clear relationship between stated beliefs and practices. The findings of van der Schaff and colleagues were upheld by Basturkmen (2012), who reviewed literature concerning the relationship between teachers' stated beliefs and practices and claimed the connection between the two to be complex. Another study from the UK (Hallett, 2010) also seems to concur with the findings of van der Schaff et al. (2008) and Basturkmen (2012). The UK study, which was situated within higher education, found that there was a perceived lack of congruence between teachers' beliefs and the expectations of general classroom practice in the field of teacher education. It can therefore be concluded that the practices of teachers can at times be affected by "classroom realities" (Ertmer et al., 2012). Although teachers' beliefs are still the most crucial factor in classroom practice, it has been put forward that a change in practice can be achieved only if teachers' attitudes and beliefs are addressed (Ertmer et al., 2012).

2.7.3 Teachers' beliefs with regard to the use of technologies/tablet computers

Studies that have focused on the adoption and use of technology in schools have revealed that technology learning can be transformed (Montrieux et al., 2015). However, studies (e.g. Gorder, 2008; Blackwell, 2014) have also found that not all teachers successfully integrate technology in their teaching. The reasons for not integrating, or using technology, extend from a lack of resources, infrastructure, lack of training, and negative attitudes and beliefs of teachers (Ertmer, 2005; Park & Son, 2009). Although, teachers may use technology they either do not integrate technology into teaching and learning (Palak & Walls, 2009) or are reluctant to use technology (Hermans et al., 2008). This lack of interest, or unwillingness on the part of teachers implies that it is their beliefs that play crucial roles in successful technology integration (Ertmer, 2005; Hermans et al., 2008; Tondeur et al., 2008). Chen (2008) used qualitative research methods and selected 12 Taiwanese high school teachers to explore the relationship between teachers' pedagogical beliefs and technology integration. The findings indicated inconsistency between the teachers' expressed beliefs and their practices, for example possessing a limited or misconstrued understanding of constructivist practices. A similar relationship between beliefs and technology integration is also evident in other studies (e.g. Ertmer, 2005; Ottenbreit-Leftwich et al., 2010; Donnelly, McGarr, & O'Reilly, 2011). Contextual factors such as curricular, peer, parental, and administrative expectations may have caused the inconsistency (Ertmer, 2005).

Burden et al. (2012) and Rikala et al. (2013) investigated teachers' beliefs and acknowledged that mobile technologies, such as tablet computers, do not necessarily transform pedagogical practices. Respondents from both these studies believed that they had aspirations to do so.

Karsenti and Fievez (2013) support the claims of Burden et al. (2012) and Rikala et al. (2013). Ottenbreit-Leftwich et al. (2010) used a case study approach that included interviews and observations to understand individual teachers' perceptions of their values and beliefs concerning integrating technology. Although, the study was small scale and only 8 teachers were interviewed, Ottenbriet-Leftwich et al. (2010) argued that the best way to understand teachers' values and beliefs was through interview, as this method allowed the teachers to comfortably reveal their subjective internal beliefs. The findings of Ottenbreit-Leftwich et al. revealed successful technology integration experiences of the teachers and the researchers argued that timely and relevant teacher training can improve teachers' practices.

Research (e.g. Ertmer, 2012; Kim et al., 2013) has provided more evidence that beliefs can influence the choices a teacher makes regarding the integration of technology for instructional purposes. Ertmer et al. (2012) used purposive sampling of 12 teachers to investigate the disparity between teachers' beliefs and technology integration practices. Although, the findings revealed that external barriers such as money, access, time, and state standards still existed, the teachers felt they were able to overcome any negative influence the barriers may have presented. However, the attitudes and beliefs of other teachers were perceived to be the greatest obstacle to students' use of technology. An exploratory mixed methods study by Kim et al. (2013) investigated how teachers' beliefs are related to technology integration practices. The findings of the study revealed that teachers with more student-centred beliefs were able to effectively integrate technology. The results suggest that there is a relationship among teachers' beliefs, effective teaching practices and technology implementation practices.

Recently, there has been increased interest in integrating tablet computers in classrooms, which is based on the belief that these mobile devices may replace traditional educational materials, such as text books and desktop computers. This interest is fuelled by claims that technology can be used in every conceivable manner to support student-centred learning practices (Blackwell, 2014). Ottenbreit-Leftwich et al. (2010) and Kim et al. (2013) concur that teachers' beliefs also have to be considered when introducing emerging technologies to enhance the learning process in the classroom. This is because teachers' adoption and use of technologies in their classroom practice is dependent on their readiness and beliefs (Howard et al., 2015). Jacobson et al. (2010) uphold the proposition of Ottenbreit-Leftwich et al. (2010) by stating that technological tools may not support a student-centred and student-directed curriculum if technology integration is not aligned with teachers' beliefs.

Student-centred learning practices focus on motivating and engaging learning activities and mobile technologies are appropriate for providing authentic learning experiences (Henderson & Yeaw, 2012). According to Blackwell (2014) technology in general, and tablet computers specifically, could change classroom practice. Although mobile technology can enable teachers to transform their teaching practices, previous studies have found that it is important that teachers' beliefs have to change to accommodate new teaching practices (Chai et al., 2009; Sang et al., 2010). Therefore, it is important to examine teachers' beliefs about the role of mobile technology, such as tablet computers, in order to find out if their beliefs reflect their classroom practice (Ihmeideh, 2009; Kim et al., 2013).

2.7.4 Factors affecting change in teachers' beliefs

There are several factors that influence change in teachers' beliefs which in turn affect their teaching practices. For instance, in a recent study, Nishino (2012) points out that teachers' beliefs are influenced not only by teachers' learning and teaching experiences but also by their in-service training. However, if teachers' beliefs are formed by learning (pre-service) and teaching (in-service) experiences, their beliefs may not change easily (Brownlee et al., 2001; Schommer-Aikins, 2004). In addition, studies such as that of Polat (2010) have shown that it is not easy to change teachers' beliefs about their professional practices, including, for example, choice of instructional materials. However, there is a paucity of research on change in teachers' beliefs. According to Raths (2001) "'change' in pre-service teacher beliefs, as a result of teacher education, is rather rare and controversial" (cited in Polat, 2010, p. 196). Furthermore, other studies have confirmed that changing teachers' beliefs is a big challenge (Pajares, 1992; Weinstein, 1989), while Kagan (1992) points out that teachers' beliefs do not change very much when they practice their teaching. However, researchers have revealed that teachers' beliefs could be changed through administering appropriate pedagogical treatments (Polat, 2010). In his study of 90 school teachers, Polat (2010) found that the teachers' beliefs about their teaching practices in the classroom may still be affected by the challenges they encountered during their practicum experience. According to Lim and Chan (2007) factors that affect teachers' beliefs are lack of experience and lack of understanding of the socio-cultural or school environment. In their study, Funkhouser and Mouza (2013) confirmed that participants' beliefs changed during the programme, largely influenced by practical experiences. Funkhouser and Mouza (2013, p.281) claimed that findings from their study were "encouraging" and they suggested that the changes in participants' beliefs about technology use were largely influenced by "the role of technology-using teachers".

To sum up, this section has reviewed literature on teacher's beliefs and focused on how the belief system has influenced the adoption and use of technology. The literature examined covered the nature of change in teachers' educational beliefs and practices and suggests that if teachers are situated in technology-rich learning environments, there could be a substantial change in teachers' educational beliefs and classroom practices. However, the changes may vary from one teacher to another. In order to change their beliefs, researchers argue that teachers need to also change their attitude, specifically regarding technology (Ertmer & Ottenbreit-Leftwich, 2010; Blackwell, 2014). Since attitude is the way teachers express or apply their beliefs, the next section will examine relevant literature on teachers' attitudes towards adopting technologies.

2.8 Teachers' attitudes

Teachers' attitudes towards technology are often based on how technology is integrated and used. This section aims to define attitude; discusses the relationship between attitudes and beliefs; discuss teachers' attitudes towards technology; the relationship between attitudes and knowledge; the relationship between attitudes and professional practices and to identify the factors associated with school teachers' attitudes towards technology.

One of the earliest definitions of attitude is that of Allport (1935, p.806) who defined it as "a mental and neural state of readiness, organised through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related". There are many diverse definitions of attitude, and although there have been changes in the conceptualisations of attitude over the years, recent researchers have defined attitude as a broad, yet relatively on-going evaluation of a person's behaviour towards objects, actions or symbols (Hogg & Vaughan, 2005; Eaton et al., 2008). Attitude can be described as comprising three components - an individual's cognitive beliefs about something, affective feelings or perceptions of these beliefs, for example emotions or passion, and behavioural intentions towards an object (Aiken, 2002).

Many years ago, Fishbein and Ajzen (1975, p.216) defined attitude as "an individual's positive or negative feeling (evaluate affect) about performing the target behaviour". Later Ajzen (2005, p.3) defined attitude as "a disposition to respond favourably or unfavourably to an object, person, institution or event". This suggests that an individual can react by responding positively or negatively and an individual's attitude consists of thoughts and beliefs, feelings, evaluation and readiness for action. Other researchers have consequently defined attitude as an evaluation of the knowledge that can be accessed from one's memory (Fazio, 2007). Likewise, Eaton et al. (2008) describe attitude as a disposition that guides our thoughts, biases our judgement, and influences our interpretation of events. For the purpose of this study, attitude is defined as an individuals' readiness to respond favourably or unfavourably to a technology or change initiative by shaping their desired behaviours and making an evaluative judgement (Serdyuko & Ferguson, 2011). This working definition has been formulated after critically examining the definitions of Allport, (1935), Fishbein and Ajzen (1975), Ajzen (2005) and Eaton et al. (2008).

2.8.1 Relationship between attitudes and beliefs

Teachers' attitudes and beliefs are both significant factors which influence the successful integration and use of technologies in classroom teaching (Binter & Binter, 2002; Blackwell et al., 2014; Kim et al., 2013). It is claimed that attitudes are shaped by beliefs and psychological notions that show positive or negative feelings towards an object (Pajares, 1992) and that teachers' beliefs are related directly or indirectly to teachers' attitudes (Chiu & Churchill, 2015). While beliefs about using technology play a crucial role in transforming classrooms, teachers' attitudes can influence the use of technology for teaching (Bai & Ertmer, 2008). Attitudes and beliefs are factors which effect positively or negatively on technology integration in classroom teaching (Hew & Brush, 2007; Inan & Lowther, 2010).

In a recent study, Chiu and Churchill (2015) investigated the relationship between teachers' attitudes and beliefs and found that the two elements can affect the use of technology in classroom teaching. However, the relationship between attitudes and beliefs is still inconclusive and the association between the two are not well understood (Alghamdi & Al-Salouli, 2013).

According to Levin and Wadmany (2006) it is difficult to change teachers' attitudes and beliefs because beliefs are related to behaviour and attitudes are a specific manifestation of beliefs.

According to Adler et al. (2005) it is necessary to understand the relationship between teachers' attitudes and teachers' beliefs as both are essential components of the teaching and learning process in the classroom. Likewise, Wilkins (2008), who examined the relationship between attitudes and beliefs, claims that both influence the teaching and learning process in schools.

Moreover, teachers' attitudes and beliefs are both prone to change during and after their teaching experiences (Ertmer & Ottenbreit-Leftwich, 2010).

2.8.2 Teachers' attitudes towards technology

A number of researcher (e.g. Bullock, 2004; Donnelly et al. 2011; Yilmas & Bayraktar, 2014; Li et al., 2015) suggest that the use of technology in schools depends on teachers' attitudes. For example, Kalogiannakis (2010) suggests that school teachers have positive attitudes towards technology in order to try new methods and approaches to teaching in the classroom. Since teachers' attitudes play an important part when adopting and integrating technology in classrooms, Sipila (2010) suggests that the characteristics of instructors are crucial factors that shape how technology is used in schools. Bullock (2004), however, pointed out that teachers' attitudes are major factors that either allow or restrict the use of technology in classrooms.

There is a strong relationship between teachers' attitudes and technology and most teachers have a positive attitude towards technology (Albirini, 2006). Likewise, studies have also shown that teachers with positive attitudes are comfortable spending valuable instructional time dealing with new and emerging technologies in classrooms (King-Sears & Evmenova, 2007; Yilmas & Bayraktar, 2014; Li et al., 2015). However, Kersaint et al. (2003) found that school teachers who have negative attitudes towards technology will feel less confident and comfortable with using technology in their classrooms. In sum, teachers' attitudes are a major predictor of the use of technology in schools (Albirini, 2006).

2.8.3 Relationship between attitudes and knowledge

The significance of the relationship between attitudes and knowledge has been exemplified by Grows and Jones (1988) who argue that researchers must consider these two constructs, as they are crucial for the effective delivery of instruction. Furthermore, many education theorists and researchers emphasise that attitudes are related to knowledge (Vaidy & Zaslavsky, 2000). These claims suggest there is evidence of a link between attitudes and knowledge and therefore the need to understand the effect of knowledge on attitude.

To integrate technology into the curriculum and the school system, teachers need not only the skills but also positive attitudes and knowledge (Baylor & Ritchie, 2002). Al-oteawi (2002) found that there is a relationship between attitudes and knowledge and that teachers have negative attitudes because they lack the knowledge of technology. According to Alkharusi et al. (2001) teachers are required to have strong knowledge and a positive attitude if they are to develop and apply teaching strategies and technology-enhanced classroom activities for learners. Many years later other researchers, such as Kurniawati et al. (2016) have provided evidence that if teachers are to play a significant role in education then an understanding of teachers' attitudes and knowledge is important. The study also found that the more knowledge a teacher has the more positive a teacher's attitudes will be, however, not all teachers have positive attitudes and the knowledge to develop and implement effective teaching strategies. Therefore, it can be concluded that attitudes and knowledge are both important and could affect positively or negatively on teaching strategies (Kurniawati et al., 2016).

2.8.4 Relationship between attitudes and professional practice

Researchers (e.g. Jeet-Kaur & Sharma, 2013; Nagy et al., 2012; Cheng et al., 2012; Sun et al., 2008) have identified that teachers' attitude towards technology integration in classrooms may lead to increased student motivation. However, professional skills play a unique and pivotal role in the effective implementation of technologies for teaching and learning, as it is the teacher who decides on the teaching strategies, teaching approaches and techniques for motivating and engaging the students. One can argue that teachers who successfully implement technologies are those who have positive attitudes and are satisfied with their practice (Cheng et al., 2012). It is therefore suggested that teachers who are professionally satisfied deliver effective instruction which is considered one of the main characteristics of effective teaching practice (Denessen et al., 2015). However, teachers may also have unfavourable attitudes towards integrating technology as they may have relatively low skills and low levels of self-efficacy (teachers' judgment of his or her capability) in using technology to teach subjects (Beilock et al., 2010). Self-efficacy for the purpose of this study refers to teachers' beliefs about their ability to use technology to achieve certain outcomes (Bandura, 1994; Paraskeva, Bouta, & Papagianni, 2008; Shea & Bidjerano, 2010). Consequently, this study seeks to establish whether teachers who have low levels of self-efficacy may refrain from using technology.

Likewise, a teacher reluctance to use technology may also be due to lack of skills. Wright and Wilson (2011) examined teachers, who graduated from a teacher preparation programme that included courses related to the use of technology for teaching and learning, to understand what they practiced. Results of interview and observation data indicated that the teachers were conversant with technology use and had developed the necessary skills, however, some teachers had not acquired the skills to professionally practice in the classroom. The question is whether these teachers had not acquired the skills or were just reluctant to embrace the technology.

There are several factors that contribute to teachers' use of technology and the motivation for incorporating it into their professional practice. Teachers' motivation for using technology may depend on their attitude and how they perceive its relevance or importance for teaching a particular subject or course (Kanaya et al., 2005). It may not be the lack of skills or low levels of self-efficacy that urge teachers to not use technology but their attitudes or feelings about the relevance of, or the need for, a technology-enhanced instructional strategy for a particular course.

Gibbone et al. (2010) investigated the attitudes and practices regarding technology use, and the relationship between attitude and practice, of a sample of physical education teachers. The results of this quantitative study showed that the teachers had positive attitudes but used technology minimally. This suggests that positive attitudes were not sufficient. The study also found that the factors that influenced teachers' attitudes to use technology were their perceptions of the relevance or importance of technology, teachers' instructional style or teaching strategies, contextual factors, and their skills to use technology. The findings of Gibbone et al.'s study are corroborated by Chow (2015), who found that one of the reasons teachers do not use technology is because they are entrenched in a particular teaching style.

2.8.5 Factors affecting teachers' attitudes

From reviewing the literature, a number of factors that have an effect on teachers' attitudes towards technology have been identified. Age is a demographic variable and a common assumption by researchers is that teachers who are older may have different attitudes and beliefs towards using technology as compared to their younger counterparts (Venkatesh et al., 2003; Kurga, 2014). There are claims that younger teachers use technologies more, as older teachers lack experience to use the technologies and feel enormously overwhelmed by the new technologies (Kurga, 2014). This suggests that there is a technology attitude gap between teachers brought up in differing environments - one which is technology-rich and one which is less so (Inan & Lowther, 2010; Kusano et al., 2013).

The second factor is teachers' classroom experience which may affect their attitude towards technology (Kusano et al., 2013). A study by Ogott and Odera (2012) administered questionnaires to determine the factors influencing Kenyan school teachers' attitudes towards the use of computers and the selection of online learning materials. The researchers found that teachers with less than 5 years' experience did not have positive attitudes towards the selection, development and use of online learning materials. The study by Ogott and Odera implies that teachers with more experience are more likely to hold positive attitudes towards effectively integrating technology into the teaching. The question is whether the teachers' lack of technology integration is influenced by their attitude or more importantly their TPCK.

Teacher training is the third factor and is a key component in determining teachers' attitudes. Training gives teachers the confidence to integrating technology into the curriculum (Hofer & Swan, 2011). Teachers with adequate training, as well as confidence in using technology, are reported to help enhance students' academic achievements (Huntington & Worrell, 2013).

However, Wright and Wilson (2011) claim that the training has to be continuous, as it can allow teachers to keep abreast of emerging new technologies.

A teacher's area of specialisation or specialised knowledge is the fourth factor. Teachers who specialise in a particular subject are considered competent as they can demonstrate specialised knowledge in the relevant content area. An area of specialisation enables a teacher to satisfactorily address higher order questions thoroughly in a particular field of study (Ogott & Odera, 2012). Specialisation is influenced by the fifth factor, which is educational qualifications. These two factors together can influence technology usage (Kurga, 2014). A study by Kurga (2014) found that teachers with high academic and professional qualifications have positive attitudes, and it is these attitudes that influence them to identify and select appropriate content (Ogott & Odera, 2012). On the other hand, teachers with lower academic qualifications may have negative attitudes (Chemwei et al., 2016), which can influence their views about using technology in their teaching.

There is a universality of the five factors (age, experience, training, specialisation and educational qualification) even though they have been identified in different environments. The literature, however, has shown that all these factors in some way influence teachers' attitudes towards technology use in the classroom.

2.9 Theoretical framework

This study is grounded in the theoretical frameworks of Technological Pedagogical Content Knowledge (TPACK) and Technology Acceptance Model (TAM) and the two models were chosen based on the assumption that they were suitable for understanding tablet computer integration by teachers.

2.9.1 Technology Pedagogy and Content Knowledge (TPACK)

Technologies are a global phenomenon and are a main part of our everyday lives and are increasingly being used to improve teaching and learning in education systems (Lawless & Pellegrino, 2007; Voogt et al., 2009; Williams et al., 2004). One of the most important steps in the integration of technology in education is the availability of equipment and necessary infrastructure (Norris et al., 2003). There are two main factors which have an effect on the integration of technology in education: environmental readiness (computers and the Internet, teacher knowledge, such as TPACK) and secondly, teachers' beliefs (Ertmer, 1999; 2005; Hew & Brush, 2007). Furthermore, researchers (e.g. Niess, 2005; Polly et al., 2010) suggest that in order to integrate technology in teaching, teachers should be able to integrate the knowledge about technology, pedagogy and content that they had gained during their teacher preparation courses.

Educators have to make efforts to prepare teachers for using technology for teaching and learning in the classroom (Koehler & Mishra, 2009). However, Koehler et al. (2005) claim that the nature of teacher knowledge is complex and argue that if teachers are to use technology for educational purposes it requires the development of a framework, which they refer to as TPACK.

Technological pedagogical content knowledge is a framework to identify the kinds of knowledge that teachers need when adopting and using technology for teaching. The TPACK framework is the result of an interaction between three bodies of knowledge, which according to Mishra and Koehler (2006) are: knowledge of pedagogy, knowledge of subject content, and knowledge of technology. They added the technology component to Shulman's PCK model and created new integrated pedagogies for teaching with technology (Koehler et al., 2007). The overlapping knowledge dimensions resulted in a total of seven TPACK components. (See Figure 3)

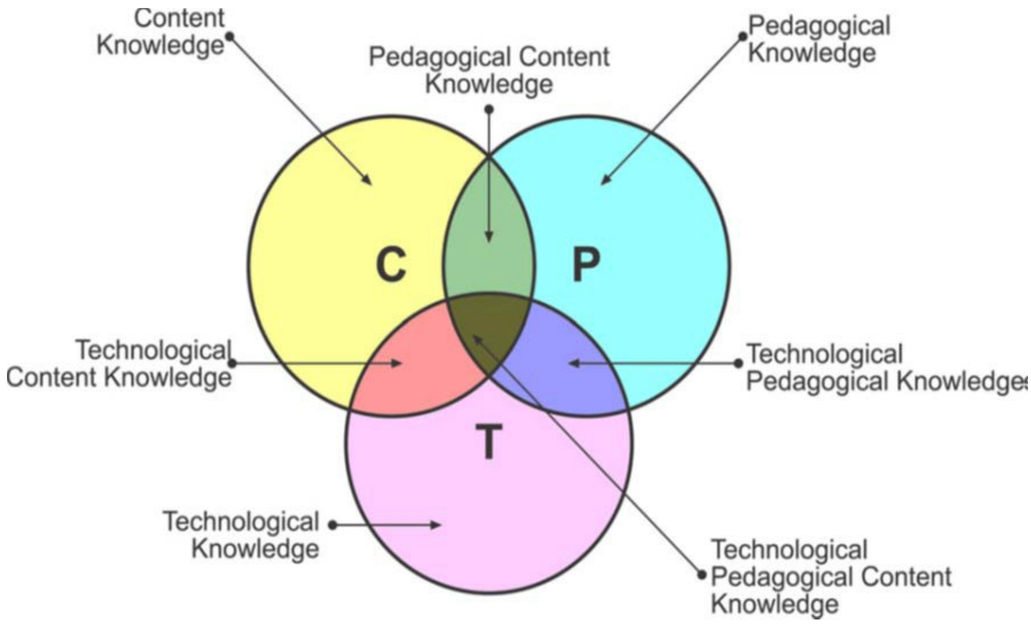


Figure 3: Technological Pedagogical Content Knowledge (Adapted from Koehler, Mishra & Yahya, 2007 p.742)

These components are: Technology Knowledge (TK) or teachers' awareness of various technologies; Content Knowledge (CK) or the awareness of the curriculum and subject-related content; Pedagogical Knowledge (PK) or awareness of the teaching approaches such as classroom management, assessment, lesson planning and student learning; Pedagogical Content Knowledge (PCK) or awareness and ability to use appropriate teaching approaches and practices to teach a specific subject; Technological Content Knowledge (TCK) or knowledge of how technology can be used appropriately to teach a specific subject innovatively; Technological Pedagogical Knowledge (TPK) or the knowledge of how various technologies can be used in teaching; and, Technological Pedagogical Content Knowledge (TPCK) or teachers' knowledge of subject matter and the knowledge of integrating technology effectively to support and enhance learning (Baran et al., 2011).

The TPACK model is considered important in the context of this study because "quality teaching" using tablet computers "requires developing a nuanced understanding of the complex relationships between technology, content, and pedagogy, and using this understanding to develop appropriate, context-specific strategies and representations" (Mishra & Koehler, 2006, p.1029).

2.9.2 Aligning tablet computers with the TPACK framework

Integrating technology in the classroom is more effective when teachers are capable of aligning the curriculum with teaching processes, and by having students in mind (Jonassen et al., 2008). It may give students the opportunity to access the course content on tablet computers as they see them as essential for 21st century education (Clark & Luckin, 2013) and teachers should have knowledge of the needs of the students. The TPACK theoretical framework can play a significant part in the understanding of teachers' knowledge. Teachers have to be empowered so that they can effectively integrate technology and understand how to shape instructional practices in which technological, content and pedagogical knowledge are embedded (Voogt & McKenney, 2017).

The TPACK model posits that it is not enough for teachers to be experts in the content or subject they teach but they also have to be familiar with the different pedagogies available to teach the material (Oberdick, 2015). This suggests that instructional practices will be effective only if teachers have the skills to align the appropriate technology with the teaching situation.

Integrating innovative technologies, such as tablet computers for teaching, requires teachers to acquire new technological and pedagogical skills (Clark & Luckin, 2013). Teachers need these skills to be able to transform the learning content and acquire TPACK (Koehler & Mishra, 2009).

In Kuwait, the new curriculum change initiatives call for teachers to “employ teaching and learning methods that integrate innovative and research-proven teaching strategies, modern learning technologies and utilize real-world resources and contexts” (Ministry of Education, 2015, p.108). All educators are required to gain the International Computer Driving License (ICDL) (Al Sharija & Qablan, 2012). There is, however, a paucity of research literature related to TPACK relating to Kuwait. Furthermore, teachers do not have the required knowledge or the technical and pedagogical skills to use emerging technologies (Al-Awidi & Aldhafeeri, 2017). However, the findings of an earlier study by Alayyar et al. (2012), which examined pre-service teachers’ TPACK, found that the attitudes of the teachers who had access to online materials and the opportunity to collaborate with experts in the field possessed greater ICT skills and TPACK compared to teachers coached by ICT, pedagogy, and content experts. Although the results of these two studies appear to contradict each other, the key difference is in the element of collaboration and the effect on TPACK. The findings are relevant, especially in the Kuwaiti context, where conventional teaching approaches with teacher-centred approaches are still predominant.

2.9.3 The relationships between TPACK and teachers' knowledge and skills

When integrating new technologies, such as tablet computers in teaching, teachers should be knowledgeable about flipped learning, an innovative and a new pedagogical approach which was introduced in 2006 and has the capacity for facilitating student-centred learning, teacher role transitions and institutional change (Hutchings & Quinney, 2015). It is an instructional approach in which teachers invert conventional classroom-based learning so that students become familiar with the lesson's content beforehand, at home, using technology and then deepen their understanding through discussion in the classroom (Mazur et al., 2015). In this scenario, teachers have to guide students to investigate topics through personal interest outside the classroom (Bledsoe & Pilgrim, 2015) to create more individualised and personalised lessons (Berson et al., 2012), and encourage collaborative learning (Burden et al., 2012; Hashim, 2014). This new educational paradigm requires teachers to not only integrate technology but also incorporate new skills and capabilities in order to improve students' learning (Oyanagi & Satake, 2016).

To achieve such student-centred learning environments, teachers need to have the diverse sets of knowledge and skills which are required to integrate technology with content and pedagogy to support teaching and learning processes. Teachers, who lack the required knowledge, or the skills to use technology, may not be able to integrate it successfully (Koehler et al., 2014). The TPACK framework is useful in that it has identified the specific knowledge areas that teachers need to possess in order to integrate technology into their practice. Whereas, if teachers are to acquire the required skills in using the technology, for example technical skills, professional skills, cognitive skills and digital literacy, researchers argue that training is crucial (Avidov-Ungar & Eshet-Alkalai, 2014; Lehiste, 2015). Without training, teachers may find it difficult to connect technical skills to subject area content and classroom practice (Harris & Hofer, 2009). They also need to move away from teacher-centred, lecture-based teaching, towards student-centred, interactive, constructivist learning. When making this shift from a teacher-centred model to teacher as facilitator, they need continuous professional development to acquire technological skills and apply new pedagogical approaches to improve teaching and learning (Lehiste, 2015).

2.9.4 Justification for using TPACK: Pros and Cons

A robust model, or framework, is required to help teachers develop their knowledge, skills and practice in relation to effective integration of technology, which in this study focuses on tablet computers. TPACK describes the complexities and challenges of technology integration, informs strategies required to better prepare future teachers for learning and teaching in the 21st Century, and informs the importance of teacher training. One of the benefits of using TPACK is that it allows teachers to make thoughtful decisions about what technology best suits their teaching and students (Oberdick, 2015). The TPACK framework, however, has been widely criticised, despite its frequent use. Parr, Bellis and Bulfin (2013) argue that the TPACK framework lacks consistency as the theorists Mishra and Koehler assert at times that it is a "new approach toward teacher knowledge" (Mishra & Koehler, 2008, p. 11), and "a new way of thinking about technology" (Mishra, Koehler & Kereluik, 2009, p. 5), and in a different situation, acknowledge that it is not novel after all: "We do not argue that this TPCK approach is completely new" (Mishra & Koehler, 2006, p. 1025).

Angeli and Valanides (2009) have claimed that TPACK lacks absolute theoretical clarity due to the lack of precise definitions of its components. According to Angeli and Valanides (2009), the margins between some of the components of TPACK are "fuzzy, indicating a weakness in accurate knowledge categorisation or discrimination" (p. 157). Brantley-Dias and Ertmer (2013) are of the view that the framework has too many domains of knowledge (for instance PCK, TCK and TPK) and that cannot be easily discerned from each other. This is especially noteworthy as not all teachers will be able to understand the differences between the myriad categorisations of knowledge (Chai, Ling Koh, Tsai, & Lee Wee Tan, 2011). Parr et al. (2013) also claim that the framework fails to understand the importance of language in knowledge creation and learning processes. Another criticism levelled by Graham (2011) is that it is not easy for researchers to understand the TPACK constructs and that there is the need for further theoretical development on it.

Nevertheless, in this study the TPACK framework is expected to assist in the understanding of teachers' knowledge, and skills, and how they transfer into their practice and underpin it. Using the TPACK framework, in this study, will allow the research to identify the sample group of teachers' knowledge development within the 7 components of TPACK when using tablet computers to transform their teaching. In addition, the TPACK framework is used in this study, has it has not been employed in specialised subject matters, such as practical studies. The findings of this study would be interesting as it will focus on a new content area which is associated with practical studies and has not been previously researched, especially in Kuwait.

2.9.5 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) posits that actual use of technology is influenced by behavioural intentions to use the technology, attitude towards using the technology, perceived usefulness (beliefs) of the technology, and perceived ease of use (beliefs) of the technology (Davis, 1989).

The TAM (Figure 4) has its origins in the work of Ajzen and Fishbein (1980) and the Theory of Reasoned Action (TRA) (Teo et al., 2008a). The TAM, developed by Davis (1980), has been the most popular framework used in technology acceptance studies and has been found to be appropriate in explaining users' beliefs and attitudes about the use (instructional or personal) of technologies and examining the external factors that influence the usage of these systems (Venkatesh, et al., 2003; Balavivekanandhan & Arulchelvan, 2015). The TAM was developed to also explain the factors critical to technology rejection, at the level of the individual user (Davis et al., 1989; Davis, 1989). According to Davis et al. (1989, p.985) the goal of TAM is:

> *... to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified.*

In other words, the main goal of TAM is to describe the influence of users' beliefs and attitudes on their intention to use technology (Venkatesh et al., 2003; Teo, 2009a). The model was extended, and the new version is referred to as TAM2 and includes social influence (subjective norm or beliefs of others, voluntariness, and image), cognitive instrumental processes (teachers' job relevance, output quality, and result demonstrability) and experience (Venkatesh & Davis, 2000).

The TAM has been successfully applied in many studies (e.g. Davis, 1989; Davis et al., 1989; Godoe & Johansen, 2012) that have examined educational technologies, which show that the model is a very good predictor of technology adoption and use. In addition, numerous studies (e.g. Venkatesh, et al., 2003; Teo, 2009b; Godoe & Johansen, 2012; Balavivekanandhan & Arulchelvan, 2015) have proved that the TAM can be used to measure teachers' beliefs and attitudes towards using technology, as a tool in teaching. Furthermore, it has been claimed that the majority of teachers' use technology because of their perceptions about its usefulness in their teaching (Nair & Das, 2012).

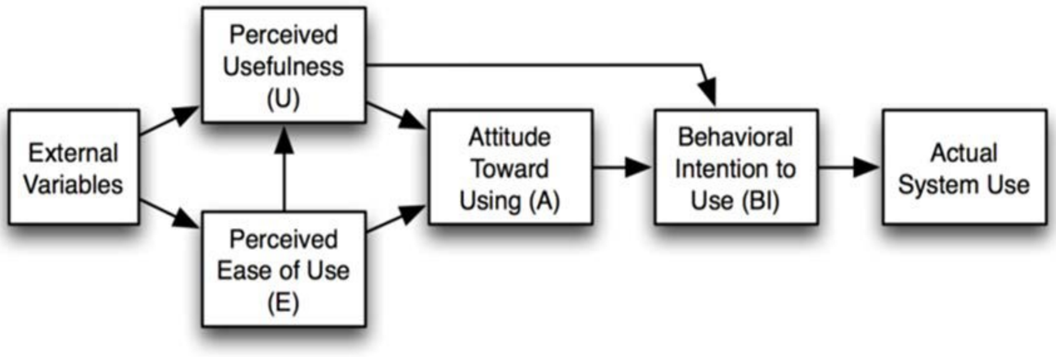


Figure 4: Technology Acceptance Model (Davis et al., 1989, p.985)

The two well established factors or variables of TAM are perceived usefulness and perceived ease of use, which are both assumed to be fundamental determinants of user acceptance (Teo et al., 2008a; Mac Callum et al., 2014). Davis (1989) claims that perceived usefulness and perceived ease of use are both beliefs that can lead to favourable attitudes and intentions to accept and use technology. Perceived ease of use is the effort needed to learn to use a new technology while perceived usefulness is the apparent value of a new technology or the belief about the usefulness of a tool that will enhance learning or teaching (Mac Callum et al., 2014).

2.9.6 The relationship between TAM, teachers' attitudes and beliefs

TAM is widely used to measure the beliefs and attitudes of users, which have major influences on the acceptance of new technologies (Venkatesh et al., 2003; Teo et al., 2008a; Sumak et al., 2011). These aspects, beliefs and attitudes, have been consistently found to influence teachers' adoption of technology (Mac Callum et al., 2014). The beliefs are the perceived usefulness of the technology and perceived effort needed to use a technology is perceived ease of use. Perceived usefulness is about the extent "to which a person believes that using the system will enhance his or her job performance", while perceived ease of use is about "a person's beliefs that using the specific technology will be free of effort" (Davis, 1989. p. 320).

Research shows that that there is a relationship between teachers' beliefs and levels and types of technology use in the classroom (Mueller et al., 2008; Tondeur et al., 2008). These two elements play a key role in the adoption of technology. Attitude is a predictor of the intention to use technology and the third is the attitude to use a technology (Teo et al., 2008b). Teo (2010) found that technological complexity, or problems and difficulties associated with using technologies, has a direct and significant influence on teachers' attitudes. In other words, attitudes may have a positive influence on one's beliefs towards the use of technology (Bagozzi, 2007). However, not all teachers may have positive attitudes and beliefs. Teachers with positive attitudes apply their beliefs when integrating technologies. Those with negative attitudes towards technology may need support and training (Mac Callum et al., 2014).

2.9.7 Justification for using TAM: pros and cons

The intension of this research is to intensify understanding about how and why teachers are integrating tablet computers in teaching and learning in Kuwaiti schools. Therefore, there is the need to shed light on the established variables of TAM and how they form a foundation for determining the influence of external variables on teachers' internal beliefs, skills, attitude and intention to integrate tablet computers. The TAM is most appropriate because it helps to predict users' behaviour by considering three components: attitude, subjective norm which shows social influence and perceived behavioural control (Cheung & Vogel, 2013).

Since the TAM has been used by researchers worldwide to understand the acceptance of technologies and learning systems, this framework is an ideal choice to examine matters of acceptance and rejection of technologies (Venkatesh & Bala, 2008). A significant number of studies have used TAM to explore acceptance of technology within educational settings (Cheung

& Vogel, 2013; Park et al., 2008; Park et al., 2009; Mac Callum et al., 2014). Cheung and Vogel (2013) used a survey and collected data from 136 higher education students at a university in Hong Kong to explain the factors that influence the acceptance of Google Apps in a collaborative learning project. The purpose of the survey was to investigate the attitudes of students (or their intention) towards the use of the technology. The results of the study demonstrated that the determinants of the TAM were the major factors that influenced the acceptance of Google Apps. The study found that perceived ease of use and perceived usefulness had influenced the attitude of students towards the technology. This is consistent with previous research, for example that of Park et al. (2008), who examined the factors that influence instructors' adoption and use of an Internet-based course management system in a private research university in the western U.S. to test the applicability of the TAM. The online survey results revealed that perceived ease of use of the system had a significant impact on perceived usefulness. In addition, perceived usefulness had a direct effect on behavioural intention to use. Moreover, instructors' motivation was also a significant factor that influenced the perceived ease of use, perceived usefulness, and behavioural intention to keep using the system. Another study, which supports these results, was carried out by Park (2009) who surveyed 628 university students in Seoul, South Korea. Park (2009) found that e-learning self-efficacy predicted both perceived usefulness and perceived ease of use of e-learning systems in a university. This result proved the TAM to be a good theoretical tool to understand users' acceptance of e-learning. Unlike Park et al. (2008) and Cheung and Vogel (2013) who focused on the factors that affect students' intention to use, Park (2009) chose social factors (subjective norm) that affect both behavioural intention and attitude towards e-learning. This subjective norm was found to be a significant factor that motivated students' intention to use e-learning.

Mac Callum et al. (2014) in their study extended the TAM with three new variables: digital literacy, ICT anxiety, and ICT teaching self-efficacy. A survey was used to measure the major variables in this study. The research found that perceived usefulness, ease of use, digital literacy, anxiety, and teaching self-efficacy were critical factors in lecturers' behavioural intentions to use mobile technologies for learning. The results of this study indicated the importance of these factors in the acceptance of mobile learning.

The main advantage of the TAM is that it helps researchers to understand how individuals, for example teachers or students, make decisions to adopt and use technology and provides specific factors that can be used to measure behavioural intention to continue using technology.

However, most TAM-research was qualitative and did not measure system use (Holden & Karsh, 2010). Therefore, there are calls for using acceptance theories instead of TAM in educational research (Sumak et al., 2011). Another major problem with the traditional TAM is its failure to account for user, structural, and background related characteristics, such as facilitating conditions (McFarland & Hamilton, 2006). Facilitating conditions are beliefs which can be perceived enablers or barriers in an environment, for example resources and ICT infrastructure, which may have an impact on the users' perception of ease or difficulty in carrying out a task (Venkatesh & Bala, 2008; Teo, 2010).

Although the TAM is a frequently cited model, not all researchers are certain of its practical effectiveness (Benbasat & Barki, 2007; Bagozzi, 2007; Chuttur, 2009; Turner et al., 2010; Hsiao & Yang, 2011; Priyanka &Kumar, 2013). Chuttur (2009) asserts that researchers are uncertain about the application and theoretical precision of the model and conclude that research on the Technology Acceptance Model (TAM) may have reached a saturation stage.

This suggests that researchers may focus on new models such as the Unified Theory of Acceptance and Use of Information Technology (UTAUT) (Venkatesh, et al. 2003). However, Benbasat and Barki (2007) state that the expansion of TAM and the emergence of new models, in order to adapt it to the increasingly evolving technology-enabled environments, has resulted in theoretical chaos and confusion. According to Priyanka and Kumar (2013), the theory does not have heuristic value, has limited explanatory and predictive power, and therefore is of no practical value.

There are others who claim that TAM is not adequate as it ignored the societal influence that dictates technology adoption. For example, Bagozzi (2007) argue that the model overlooks essential elements such as social and cultural aspects of decision making (Bagozzi, 2007). Moreover, it is claimed that the TAM has not been comprehensively tested outside developed countries, particularly not within Arab and Asian countries (McCoy et al., 2007; Teo et al., 2008b; Anderson et al., 2013). Therefore, it is claimed that there is a need for testing the TAM in different cultures (McCoy et al., 2007), especially Arab countries, in order to strengthen its cultural validity because Arab cultural beliefs are powerful predictors of resistance to technologies (Anderson et al., 2013). Furthermore, most of the tests have been carried out in non-educational contexts and this limits the application of TAM in educational settings (Teo et al., 2008a).

2.9.8 Aligning tablet computers with the TAM framework

Extensions, including external variables such as system quality, perceived self-efficacy and facilitating conditions (Fathema et al., 2015) to the original acceptance Model, may increase its validity as an acceptance model in educational settings. The integration of mobile technologies offers teachers and students a more flexible approach to learning (Mac Callum & Jeffrey, 2013). Mobile technology adoption by teachers is considered more significant as it has the potential to greatly influence the successful introduction of mobile learning (Mac Callum, 2010). More specifically, the adoption and the effectiveness of the integration of tablet computers depend largely on their acceptance by teachers. Therefore, there is the need to understand teachers' perceptions and beliefs that influence their decision-making processes (Kriek & Stols, 2010). The TAM can provide a meaningful theoretical explanation to facilitate a clear understanding of the relationship between teachers, their beliefs and attitudes towards the use of tablet computers in Kuwait. The assumption is that teachers who adopt and use tablet computers are goal oriented in their teaching, motivated by the purpose of integrating a technology in a traditional setting and, at the same time, constrained by social and institutional factors in the educational setting.

Literature suggests that teachers' knowledge of subject matter, general pedagogical knowledge, pedagogical content knowledge and TPACK can continue to develop as they engage in classroom practice (Tsui, 2003; Baumert et al., 2010; Sothayapetch et al., 2013; Hume & Berry, 2011; Mishra & Koehler, 2006). Studies also show that teachers use technology because of their existing attitudes and beliefs towards technology, in addition to their existing levels of knowledge and skills (Tamer, 2011; Ertmer et al., 2012). The literature shows that the TAM model can be used to investigate teachers' acceptance of new technologies. This study, conducted in Kuwait, investigates the use of tablet computers and assumes that teachers have specific motivations for integrating and using the technology. By applying empirical research methods to study teachers' beliefs and attitudes towards acceptance of tablet computers in the classroom. The present study is intended to outline factors at play in the inclusion of such technologies in the classroom.

2.10 Conclusion

The literature reviewed suggests that teachers' professional skills, technology skills and inter-personal skills are important factors that contribute to teacher's effectiveness in teaching and in enhancing student's learning outcomes. In particular, the individual characteristics such as teacher's attitude, beliefs, and knowledge motivate them to adopt technology. These characteristics have tremendous potential for transmitting values to students.

The two models that were discussed, namely the Technology Adoption Model (TAM) and Technological, Pedagogical and Content Knowledge (TPACK), explain the connections between technology, pedagogy, beliefs, attitudes and practice. The two models can be aligned with each other as TPACK could help identify the nature of knowledge required by teachers for technology integration while TAM could provide more meaningful information on the link between motivation or intention to use technology and successful technology integration.

Chapter 3 Research Methodology

3.1 Introduction

This exploratory-cum-explanatory investigation (sequential) took into consideration teachers' perception of their beliefs, attitudes, their perceived knowledge and skills. The research objectives are aligned with the research questions as identified in Figure 5.

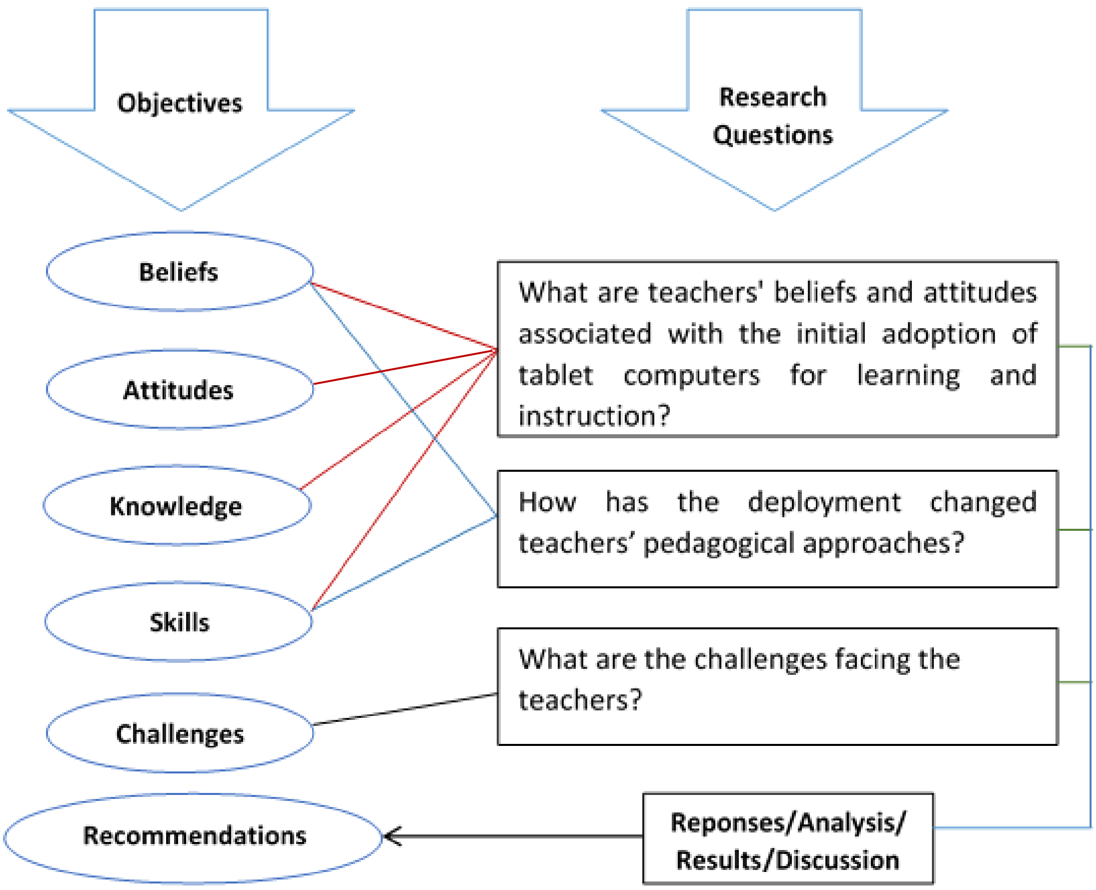


Figure 5: Research objectives and research questions (RQ1 Red line, RQ2 Blue line, RQ3 Grey line)

This chapter discusses the paradigm adopted and the philosophical assumptions underlying the research, describes the research questions, addresses the methodology that frames this study, the selection of the sample and the research instruments, as well as the procedures that were followed. This study adopts a mixed methods research design and employs quantitative and qualitative research methods. Data was collected from teachers through the use of questionnaires, interviews and observations to investigate teachers' beliefs about the use of tablet computers as a pedagogical tool in teaching Practical Studies (Electricity and Electronics) in Kuwaiti intermediate schools. Practical Studies (Electricity and Electronics) was chosen as the Ministry of Education has given importance to it with the objective of enabling students to experience the benefits of real-world learning and solving problems with technology, as well as to promote learner self-regulation. Tablet computers were chosen because the technology has a unique set of affordances that allows scaffolding instruction through the use of interactive apps which are crucial for teaching practical studies.

The chapter also addresses validity and truth value, reliability and trustworthiness, and culminates in describing the data analysis procedures that were used. Finally, it describes the range of ethical considerations that were drawn on in this thesis.

3.2 Paradigm, philosophy, and researchers' positionality

The term worldview refers to "a basic set of beliefs that guide action" (Guba, 1990, p.17) which is also referred to as paradigms (Lincoln & Guba, 2000; Mertens, 1998), epistemologies and ontologies (Crotty, 1998) or broadly conceived research methodologies (Neuman, 2000). Figure 6 shows the interconnectivity of the philosophical approach, selected strategies and methods of research, with each one influencing the other and combining to identify the research design.

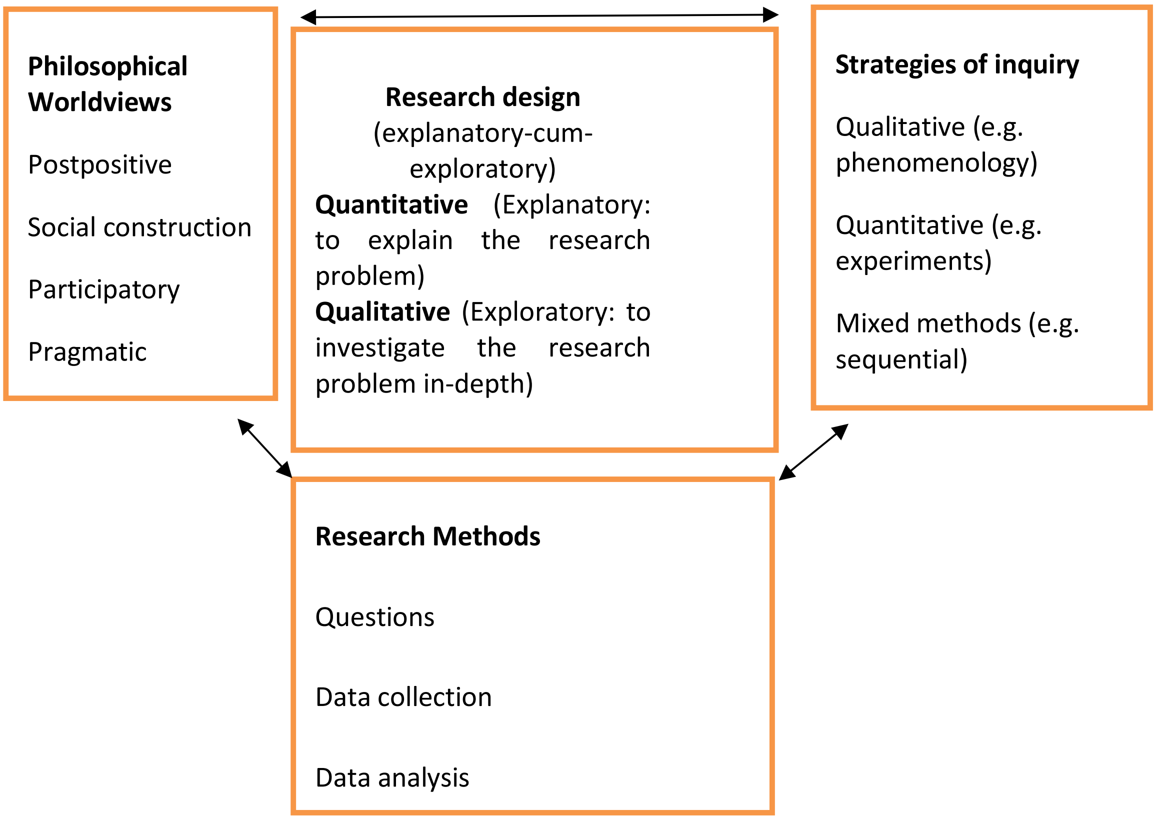


Figure 6: The interconnectivity of the philosophical approach, selected strategies and methods of research (Source: Creswell, 2014)

The research design is sequential, and is characterised by the collection and analysis of quantitative data followed by a collection and analysis of qualitative data. The study is intended to explain, rather than simply to describe, the integration of tablet computers in schools. By using qualitative methods, the study also explores the research problem by understanding teachers' beliefs and attitudes towards the integration of tablet computers, how they deploy the devices and the challenges they face.

3.2.1 The adopted paradigm

Initially, an interpretivist paradigm was chosen but later on the researcher did not want to adopt a philosophical assumption that would constrain the choice of research focus, research questions and the methods to be used. This was because the researcher wanted to focus on how best technology can be integrated in schools where traditional teaching methods are still in vogue.

However, as the aim of this study was not solely to understand and describe teachers' perceptions of their beliefs, attitudes, knowledge and skills in using tablet computers, but also to inform action, an exploratory-cum-explanatory research strategy was settled on. This strategy was considered as neither fully post-positivist nor interpretivist and was considered apt for finding answers to the research questions. This research involved making a number of pragmatic decisions during the research process design (Cohen et al., 2011), therefore the methodological perspective is driven by pragmatism.

A post-positivist worldview alone was not considered, as the research intention was not to measure objective reality or develop subjective meanings of the experiences of the teachers but draw conclusions by mixing two opposite approaches to inform how tablet computer integration can improve teaching practices. Regardless of the methodology, whether it be quantitative or qualitative (Cohen et al., 2011; Denscombe, 2010; Robson, 2011) a practice-driven strategy was required by the researcher to identify practical issues related to tablet computer integration.

A researcher has different worldviews, uses different methods, multiple data collection approaches and data analysis techniques (Creswell, 2014). This study is not about using a particular research method but is about the research problem and the use of different approaches available to understand and solve the problem (Creswell, 2014). Pragmatism is closely connected with mixed methods research (Creswell & Plano Clark, 2011) and was considered appropriate for this study as it allowed for the use of different methods of data collection which could be analysed, and the findings discussed within the context of appropriate existing research, in order to make realistic conclusions and recommendations for practice and further research.

The reason for adopting a pragmatic worldview was because the researcher did not want to use only deductive reasoning to confirm existing theories or to use only inductive reasoning to develop new theory. Instead, the intention was to employ an 'abductive' reasoning process which allows the researcher to move between induction and deduction and utilise both qualitative and quantitative methods and data. According to Morgan (2007) this can accommodate objectivity and subjectivity. The abductive process allows combining "qualitative and quantitative methods in a sequential fashion, where the inductive results from a qualitative approach can serve as inputs to the deductive goals of a quantitative approach, and vice versa" (Morgan, 2007, p.71). This methodological rationale proposed by Morgan draws the connection between epistemology and methodology and defines the pragmatic approach. This work has been used and validated by Denscombe (2008) and Shannon-Baker (2015). The objective was to give more importance to the research problem and to address qualitative and quantitative questions in order for the study to be more comprehensive (Creswell, 2014).

3.2.2 Philosophical assumptions underlying the research and methodology

A philosophical assumption can be characterised through its ontology, epistemology and methodology (Punch, 2009). The next step involved making philosophical assumptions to guide the research process in this study. Ontology is the nature of the reality (Creswell, 2014) or "the study of being" (Crotty, 2003, p.10). The ontological position of the researcher was to consider the nature of the reality of teachers and their use of tablet computers (reality) within the cultural context of intermediate schools in Kuwait. An outcome of this reality would be to make recommendations and inform decision-making at the school and policy levels.

Epistemology is the study of the nature of knowledge (Cohen et al., 2011) or "the production of the knowledge" (Burton et al., 2008, p.60). In other words, epistemology is the beliefs about the nature of reality (Crotty, 2003). According to Crotty (2003) epistemology can be objectivist or constructivist/interpretivist. Objectivist epistemology presumes that the meaning of reality exists, while constructivist or interpretivist epistemology assumes that knowledge or truth emerges when researchers engage with the realities. Creswell (2014) states that epistemology is about 'how' we know about what we know and 'why' we know what we know. By acquiring knowledge by reading different sources in the field, and also by collecting mixed data from the participants, the researcher established the epistemological position in this study. The epistemological view was to focus on teachers' beliefs and knowledge regarding the use of tablet computers as a pedagogical tool in classroom teaching. This involved spending time in school/classrooms with teachers and becoming an 'insider' while also keeping interference to a minimum.

Complementary methods were used to verify the insights gained from the teachers and classroom observations in an attempt to achieve inter-subjectivity or a balance between objective and subjective views (Biesta, 2010).

In this study, the epistemological position of the researcher was to build and maintain relationships with the teachers and create understanding and trust (Tashakkori & Teddlie 2010). The current study achieved this by using both subjective and objective data, merge views, and in the process answer the 'what' and 'how' of the research problem (Creswell, 2014). So, the questions that were asked by the researcher included 'what are the beliefs, attitudes, knowledge and skills of teachers about tablet computer integration to improve teaching practices' (ontology) and 'how tablet computer integration can be used to improve teaching practices' (epistemology) and 'what are the challenges facing the teachers?' Knowledge here refers to the different worldviews of the participants obtained using closed-ended measures, and open-ended interviews and observations.

To conclude, the researcher did not want to adhere to firm philosophical assumptions to guide the research process as these can restrict the scope of knowledge that can be gained (Morgan, 2007; Savin-Baden & Howell Major, 2013). The researcher also did not want to commit to any one system of philosophy as the intention was to draw liberally from both quantitative and qualitative assumptions, to have the freedom to choose data collection methods, to use 'what' and 'how' research questions, to use deductive and inductive approaches, and to embrace external worldviews.

3.2.3 Researcher positionality

The positionality, or the worldview of the researcher, refers to the position adopted in relation to a specific research area, for example philosophical, personal theoretical beliefs and perspectives through which the research process is viewed (Sultana, 2007; Holmes, 2012). In other words, positionality is the relationship between the researcher and the research topic or problem (Bourke, 2014). A researchers' positionality can impact all aspects of the research process (Foote & Bartell, 2011).

A researchers' position in a research project can either be that of an insider or an outsider (Weiner-Levy & Queder, 2012). While an insider can be a member of group, culture or organisational system where the research is to be carried out an outsider is a non-member (Merton, 1972). An insider can also be a researcher who is part of the organisational system where the research is to be carried out (Mercer, 2007). One of the advantages of being an insider is that it is easier to build relationships with members of one's own culture or group and collect data more quickly. Mercer (2007, p.6) claims that "It is generally presumed that access is more easily granted to the insider researcher and that the data collection is less time consuming".

The researcher in this study is a Kuwaiti national and thus has a close understanding of the culture being studied, making him part of the social world being studied. The researcher also used to be a senior school teacher in an intermediate school under the Ministry of Education, Kuwait and also has a background in using technology for teaching in the classroom. However, the researcher does not consider himself to be either an insider nor an outsider. Instead, the researcher occupied the space in-between and can therefore this position can be referred to as an "inbetweener" (Dwyer & Buckle, 2009; Milligan, 2016).

In order to minimise bias, an attempt was made to maintain a balance between objective descriptions of the facts (collected via questionnaires) and the subjective analysis and interpretation (interviews and observations) of those facts. This was achieved through triangulation, which involved integrating questionnaire, interview and observation data to facilitate deeper understanding of the research problem. The research participants were teachers from an intermediate school and the researcher was aware that their personal experiences and reflections could be considered as significant and authentic sources of information. While multiple tools and techniques were used to obtain different perspectives on teachers' beliefs, triangulation ensured that the information was gathered and evaluated in a comprehensive and unbiased manner.

Subjectivity can play a role in the way research participants' perceptions are interpreted, which led the researcher to be more reflective about how the beliefs and attitudes of teachers are to be viewed in this study. This involves self-scrutiny and a conscious awareness of the relationship between the researcher and the research participants (Bourke, 2014). Reflexivity allows a researcher to be sensitive to the cultural, political, and social context in which the research is situated. I maintained a reflective journal to record the subjective processes. I noted assumptions, concerns, and uncertainties in my field notes and memos, including my relationships with participants.

As the researcher, I acknowledge that the interviews and observations were carried out by me with male and female teachers. At the time of collecting and analysing the data, I was completely aware of the social setting and the social 'distance' between the researcher and the researched. Being a Kuwaiti national, I had knowledge of the institution where this study was situated, as well some of the participants, e.g. teachers and students in two schools. Participating as a Kuwaiti national with knowledge of the social setting gave me the opportunity to spend a lot of time with the participants (students and teachers) both in their groups and on an individual basis. This gave me the opportunity to get to know the participants very well. Although the participants were not paid any money for participating in this study, I had offered them beverages and small snacks during the interviews and observations. I also invited a teacher and three students for an inexpensive dinner. These actions are in keeping with local customs. This may have facilitated the negotiation for access to data, however, I tried hard not to let these personal relationships with the participants influence my actions while conducting the research or my interpretation of their responses, particularly while conducting the interviews and actions when observing them in the classrooms. All this may have influenced the lens through which I observed and processed the data, but I believe that by openly stating my beliefs, values and background I was able to prevent personal bias from influencing the study.

3.3 Research design

Choosing an appropriate research design was essential, not only for adopting the methods for collecting, analysing, and interpreting data in order to understand teachers' beliefs and attitudes about tablet computer integration, but also for answering the research questions (Easterby-Smith et al., 2002; Kumar, 2011). In order to address the research problems stated in the introductory chapter, and to fill the gaps that exist in current literature, it was necessary to employ a well-designed research strategy which would allow novel and insightful viewpoints to emerge.

For this study a mixed methods design was needed because just using one data source, in the form of questionnaires, was considered insufficient, since social reality such as teachers' perceptions of their beliefs and attitudes as well as their lived experiences cannot always be measured numerically (Silverman, 2006), therefore interviews and observations were also included as data collection methods. These qualitative methods allow the researcher to obtain a wider range of data that might not be captured by just using one approach (Creswell & Plano Clark, 2011). In the current study, the researcher captures teachers' perceptions by employing both quantitative (questionnaire) and qualitative (interview and observation) data collecting methods, which enables a more coherent assessment and explanation of the nature of teachers' beliefs and attitudes towards technology integration.

This study adopted a multistage sequential mixed methods research design. A thorough understanding of qualitative and quantitative research methods was also required when embarking on this mixed methods research project. The following subsections address the qualitative, quantitative and mixed methods approaches as well as the reasons behind the selection of these methods. Also, these sections provide a brief explanation of the instruments used to collect quantitative and qualitative data.

Qualitative research is used in understanding and describing the world of human experience (Myers, 2000). The approaches that are used in qualitative research include grounded theory, narrative enquiry, phenomenology, ethnography and case study (Creswell, 2014). Moreover, qualitative data can provide rich data about human behaviour and based on participants own meanings (Creswell & Plano Clark, 2011). Qualitative research, which aligns itself with the interpretivist paradigm, can be defined as:

> *an approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. The process of research involves*

> *emerging questions and procedures, data typically collected in the participant's setting, data analysis inductively building from particulars to general themes, and the researcher making interpretations of the meaning of the data.* (Creswell, 2014, p. 31)

One of the advantages of using a qualitative research approach is that it allows researchers to interact, create relationships and elicit information from people by understanding their emotions (Willis, 2008). In addition, qualitative research can be used to understand participants' attitudes and beliefs (Offredy & Vickers, 2010). On the other hand, the collection of qualitative data can be complex because not all participants may find it easy to effectively articulate their opinions (Willis, 2008). Qualitative data can be collected using various methods such as participant observation, focus groups and semi-structured interviews (Moriarty, 2011). The rationale for using qualitative methods in this mixed methods research is to capture the lived experiences of the teachers being investigated in real life settings (Henn et al., 2006; Bogdan & Biklen, 2007).

Quantitative research aligns with the positivist paradigm, and for researchers who use this approach reality is objective and independent of the researcher. Quantitative research can be either descriptive (observing or measuring existing variables and involves knowing the demographic characteristics of a sample, group or a phenomenon) or experimental (examines "cause and effect" and involves pre-test and post-tests of subjects, interventions or using experimental and control groups). Quantitative research can be defined as:

> *an approach for testing objective theories by examining the relationship among variables. These variables, in turn, can be measured, typically on instruments, so that numbered data can be analysed using statistical procedures.* (Creswell, 2014, p. 31)

The instruments that can be used in the quantitative research approach in social research are survey or survey questionnaire (Cohen et al., 2011). Quantitative researchers use surveys or questionnaires to collect numerical data which is analysed using statistical methods (Lewin, 2005). The numerical data can be collected after randomly selecting a sample that represents a population (Saunders et al., 2012). The objective is to generalise the findings of the study to an entire population (Bryman & Bell, 2007). Although numerical data does not provide researchers with rich in-depth information, a quantitative research approach was used in this study to help answer the research questions and to complement the qualitative data. In other words, quantitative methods were used to collect information on teachers' attitudes and beliefs and establish the incidence of tablet computer use by a fairly large number of teachers in different intermediate schools. Thus, an integrated research design is adopted for this study which includes the collection and analysis of both quantitative and qualitative data.

3.3.1 Mixed methods research approach

The previous sections have highlighted the different stand-points on important issues related to two different types of research methods: quantitative and qualitative approaches. This section focuses on the third model of research in social science research which is mixed methods approach.

Mixed methods research can be defined as an approach wherein the researcher mixes or combines quantitative and qualitative approaches as components of a research design and includes methods, issues, strategies and related philosophical issues (Johnson et al., 2007; Caruth, 2013; Creswell, 2014). Mixed methods research, also referred to as the 'third paradigm', is widely accepted and increasingly used by researchers in education research (Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 2010) due to the increased methodological sophistication of this approach (Creswell et al., 2011). While mixed research is widely accepted and used by researchers, it also has limitations. It is claimed that it is difficult for a single novice researcher to use two different methods or designs, and that it is time consuming and expensive (Reams & Twale, 2008; Cronholm, & Hjalmarsson, 2011). Therefore, the researcher, in this study, devoted time in advance, sought the help of a few seniors who had completed their PhDs and developed appreciation for different perspectives to help overcome this challenge. I particularly focused on in-depth interviewing, questionnaire development and administration, statistical analysis, thematic analysis and developed an understanding of how to use them in this mixed methods study. I paid attention to time management. Besides, there are also claims that combining two methods and defending the use of multiple methods is complex and therefore it is advocated that researchers should use either a quantitative or a qualitative research design and refrain from mixing the two designs in a single study (Caruth, 2013). Through self-directed training in mixed methods research I tried to overcome the tendency to rely on known methods. I spent time with seniors who had strengths in complementary methods to improve my confidence and apply this design rigorously. However, the current research adopts a mixed methods approach in order to handle a wider range of research questions, which is one of the strengths of this design. It also helped in choosing the particular research methods and data collection methods suitable for this study. In doing so, the approach provided a more complete and comprehensive understanding of the research problem which would not have been possible if either quantitative or qualitative approaches alone were used. Other advantages of mixing two research methods in one study is that it can help a researcher to arrive at a more robust conclusion, enhance the trustworthiness of the results through member-checking or respondent validation, triangulation, and for generalising the results (Plano Clark, 2010; Cronholm, & Hjalmarsson, 2011; Caruth, 2013). Most importantly, with regard to this current study, a mixed methods approach was deemed ideal for exploring the complexities of multiplex issues of education (Creswell et al., 2006; Onwuegbuzie & Turner, 2007).

3.3.2 Rationale for quantitative and qualitative research

The rationale for mixing both quantitative and qualitative research is that each approach has some weaknesses which are tabulated below:

Quantitative Research	Qualitative Research
Provides less elaborate accounts of human perception and beliefs	Findings are subjective and does not provide objectively verifiable results
Does not provide in-depth information about people's experiences	Results are influenced by researcher's personal biases and idiosyncrasies which distort the data gathered
Ignores the context of the study	Data cannot be generalised to other people or other settings
Does not allow researchers to study a phenomenon in its natural setting	It is difficult to test hypotheses and theories
Does not provide answers for 'why' and 'how' questions and therefore data can be too abstract.	

Table 3: Rationale for mixing data
(Adapted from: Johnson & Onwuegbuzie, 2004)

It is claimed that the mixing of quantitative and qualitative data allows researchers to use one research approach to counter the deficiencies of the other (Johnson & Turner, 2003; Onwuegbuzie & Leech, 2005; Reams & Twale, 2008; Ponce & Pagan-Maldonado, 2015). This suggests that the "goal of mixed methods research is not to replace either of these approaches but rather to draw from the strengths and minimise the weaknesses of both in single research studies and across studies" (Johnson & Onwuegbuzie, 2004, p. 14).

Finally, few studies have investigated teachers' beliefs and technology practices (Ertmer et al. 2012; Palak & Walls, 2009; Zehra & Bilwani, 2016), while most have either used quantitative questionnaires (for instance, Franklin, 2007; Rakes et al., 2006; Wozney et al., 2006) or qualitative observations and interview (for example, Levin & Wadmany, 2006; Windschitl & Sahl, 2002).

Therefore, there is the need for research that uses a mixed methods research design in this study.

3.3.3 Phases of the multistage research design

A multistage sequential mixed methods research design (Fetters et al., 2013), which consists of three phases is used in this study. The three phases are:

Phase 1	>	Phase 2	>	Phase 3
QUAN	>	QUAL	>	QUAL
Questionnaire	>	Interviews	>	Observations

This study is not a convergent parallel design where quantitative as well as qualitative data collection and analysis are carried out concurrently. In parallel designs the results are merged for comparison and then interpreted. However, this study is a multistage sequential mixed methods research design that commences with the collection and analysis of quantitative data. This sequential mixed method research can be referred to as an investigation in which the multiple stages of the research occur in serial order, with one phase following the other (Cronholm & Hjalmarsson, 2011). Teachers who took part in the interviews and observations were selected from among those who had completed the questionnaires.

The sequence of the methods deployed depends on the intent and needs of the study. In this study it is used to explain the relationships between the integration of tablet computers and the factors affecting teachers' beliefs about the technology. The quantitative results are used to inform the follow-up qualitative data collection. The qualitative results (interviews and the observations) are interpreted to explain quantitative results. In other words, the results of one method are used to develop and inform the other methods.

The following table (Table 4) illustrates how the research question, the instruments and the theoretical framework link together.

Research questions	Instruments	Type of data collection	Theoretical framework
RQ1. What are teachers' beliefs and attitudes associated with the initial adoption of tablet computers for learning and instruction?	Questionnaire/ Semi-structured interviews	Quantitative and qualitative methods	Technology Acceptance Model
RQ2. How has the deployment of tablet computers influenced or changed teachers' pedagogical approaches in intermediate schools?	Questionnaire/ Semi-structured interviews/ Observations	Quantitative and qualitative methods	Technological Pedagogical and Content Knowledge
RQ3. What are the challenges facing teachers who use tablet computers for teaching in intermediate school classrooms?	Questionnaire/ Semi-structured interviews	Quantitative and qualitative methods	Technological Pedagogical and Content Knowledge

Table 4: Research questions, instruments and data collection methods

Questionnaires and interviews were used to answer research questions 1, 2 and 3, while observations were also included to answer research question 2. These methods are discussed in the following sections.

As the qualitative phase followed the quantitative phase, the researcher was able to interview those participants who were in a better position to explain the numerical outcomes (Plano Clark, 2010).

3.3.4 Phase 1:

A questionnaire was administered to teachers purposefully selected from among those teaching practical studies employed in intermediate schools in Kuwait. The questionnaire was designed to provide data to answer the following research questions:

RQ 1: What are teachers' beliefs and attitudes associated with the initial adoption of tablet computers for learning and instruction?

RQ2: How has the deployment of tablet computers influenced or changed teachers' pedagogical approaches in intermediate schools?

RQ 3: What are the challenges facing teachers who use tablet computers for teaching in intermediate school classrooms?

This phase helped identify key issues and key variables. The questionnaire approach provided both direction and categories for the interview questions. In other words, guided by the answers to the questionnaire items, the interview schedule was further developed or refined, as "the intent of the design" was "to have the qualitative data helping to provide more depth, more insight into the quantitative results" (Creswell, 2014, p. 225).

3.3.5 Phase 2:

A semi-structured interview approach, consisting of open-ended questions, was used to elicit in-depth responses which would not have been possible in a questionnaire format. This technique allowed similar questions to be asked as those used in the questionnaire, in order to gather more detailed information and to reveal participants' perspectives of the situation under study (Cohen et al., 2011; Onwuegbuzie et al., 2012). The purpose of the qualitative phase (interviews) was to answer all three research questions.

3.3.6 Phase 3:

Results of the quantitative phase and the interviews were used to refine the observation schedule. The observation phase focused on RQ2: “How has the deployment of tablet computers changed or influenced teachers’ pedagogical approaches in intermediate schools?”

The interviews and observations provided comprehensive and in-depth answers to the research questions and helped explaining and interpreting the findings of the questionnaires. To help strengthen the research design and enhance the quality of the findings, the data from all three instruments were triangulated (Anney, 2014). Triangulation involved convergence of information from questionnaires, interviews and classroom observations. The three phases of data collection and analysis and how the results are discussed and interpreted are illustrated in the Table 5 below.

Phases	Approaches	Process	Analysis
Phase One	- Questionnaire administration	**QUAN** Questionnaire Data Collection	-N=150 -Likert scales
	-Scale reliability -Frequencies, mean, standard deviation	**QUAN** Questionnaire Data Analysis	-Descriptive statistics -Factor analysis
	-Purposeful selection of participants for interviews from those who already completed questionnaire -Developing interview questions	Connect to	-15 teachers -Interview schedule
Phase Two	-Individual face-to-face interviews	**QUAL** Interview Data Collection	-Transcripts
	-Abductive approach	**QUAL** Interview Data Analysis	- Thematic analysis - Codes and themes

Phases	Approaches	Process	Analysis
	-Purposeful selection of participants (the 15 teachers who were interviewed) -Developing observation protocol	Connect to	-15 teachers -Observation schedule
Phase Three	-Classroom observation	**QUAL** Observation Data Collection	-Transcribe schedule/field notes
	- Abductive approach	**QUAL** Observation Data Analysis	- Thematic analysis -Codes and themes
	-Triangulation	**Discussion**	- Variables and themes
	-Using qualitative results to explain quantitative results	**Interpretation**	-Explaining quantitative results -Deepening understanding

Table 5: Sequential phases of data collection and analysis

The design is best suited for this study because it is the intention of the researcher to:

1) Collect data to describe teachers' beliefs, attitudes, perceived barriers, and technology skill levels associated with the use of technology (Palak & Walls, 2009; Li et al., 2015).
2) Further understand the survey results in depth through interview and observation (Cronholm, & Hjalmarsson, 2011).
3) Purposefully select participants for the interview according to the initial quantitative results (Fetters et al., 2013).
4) Integrate the data during interpretation (Fetters et al., 2013).
5) Explain quantitative results by exploring certain results in more detail or helping explain unexpected results (e.g., using follow-up interviews to better understand the results of a quantitative study) (Terrell, 2012).

This mixed methods design is employed because teachers' beliefs are considered to be "a messy, ill-structured construct" which cannot be easily investigated (Palak & Walls, 2009). Moreover, the current study assumes that teachers' beliefs cannot completely explain how they are likely to use or integrate tablet computers. Therefore, different methods mixed and multiple variables (such as attitude, skills, knowledge, instructional strategies, teacher confidence and teacher technology use) can reduce inaccuracies that may arise when a single method is used, and to make better sense of the results when interpreting data (Teddlie & Tashakkori, 2009).

3.3.7 Sample and sampling frame

A purposive sampling technique is used to select the sample for the questionnaires and interviews. This sampling technique is useful for selecting information rich participants (Palinkas et al., 2015) or information held by only certain members of the community of teachers who have experience in using tablet computers. Although the researcher and the school principals selected the teachers, snowball sampling was also used to expand the sample size by asking a few participants to refer other teachers (with similar characteristics) interested in taking part in the study (ibid.).

Normally random sampling is used for administering questionnaires and to minimise bias in a representative sample (Kandola et al., 2014). However, purposive sampling, which does not allow selecting a representative sample, was used to study and obtain information from knowledgeable experts within the schools. The researcher was aware that the use of this technique would result in selection bias. However, it is claimed that the bias, which is associated with purposive sampling, contributes to its efficiency, and the method can deliver trustworthy results (Tongco, 2007).

During the selection process teachers with and without knowledge of use of tablet computers for teaching were selected to minimise bias. This was because questionnaire results from only teachers with knowledge of tablet computers for teaching would be unlikely to accurately quantify tablet computer usage in the general teaching population. Moreover, when analysing the data and interpreting the results, bias was documented by maintaining a reflexive journal (Patnaik, 2013). The journal was used to log details of how the researchers' perspectives or beliefs would influence the results (Jootun et al., 2009). Reflexivity or researcher's self-awareness and the strategies the researcher uses to reduce potential biases also contribute to the study's credibility, as it highlights the possible influences on the study (Jeanfreau & Jack, 2010; Patnaik, 2013). Furthermore, the interpretations were not applied beyond the sampled population.

Questionnaires were administered to approximately 150 teachers who were purposefully selected from among 202 practical studies teachers employed in intermediate schools in one district.

School principals were contacted via email. In order to seek the assistance of the principals, permission from the Ministry of Education was obtained. A copy of the approval letter from the Ministry of Education was also be sent as an attachment to the principals. This also entailed visiting a few schools (four) and meeting school principals who had not responded to the email and also in selecting teachers. The principals were asked to assist in selecting the teachers belonging to both genders and those with experience of more than 3 years. The teachers were selected based on the criteria that they are knowledgeable individuals and are aware of the phenomenon of interest by virtue of their experience. This makes them information-rich cases (Palinkas et al., 2015). Although principals were involved in selecting teachers based on the criteria provided, the researcher did not foresee any cause for concern, as the responses were kept confidential and respondents' names were anonymised.

The qualitative sample consisted of 15 teachers from one school district and these participants were selected based on the knowledge that they were using technology in their teaching at different intermediate schools. A purposive sampling technique was used to select the interviewees. The research participants were selected after examining the sample sizes recommended in the literature (Creswell, 2014; Mason, 2010). Creswell (2014) argues that the sample size depends on the approach adopted by the researcher and recommends 4-5 cases as sufficient for a case study, with 20-30 participants for grounded theory methodology, 1-2 cases for narrative inquiry, and 3-10 participants for qualitative phenomenological research. Mason (2010) carried out a review of qualitative sample sizes in PhD dissertations and found that sample sizes ranged from 10-40. These recommended sample sizes provided valuable direction for the current study and resulted in the selection of 20 teachers.

The teachers in the current study were selected based on the knowledge that the participants were tablet computer users. The key point was that the sample would simply be large enough. This would enable the researcher to hear all of the potentially significant opinions concerning the research topic. The rationale for selecting the teachers was based on their perceived experience in their field and in the use of technology for teaching and obtaining a wide range of information.

The sample was selected from among those teachers who had completed questionnaires. The selection criteria included selection of equal number of experienced (3 years and above) male and female teachers. The teachers who consented to take part in the interviews were also asked if they wished to be observed in their classrooms. As all the teachers were interested, the researcher observed the fifteen teachers who had taken part in the interviews.

3.3.8 Research instruments

The research questions in this study are designed to investigate teachers' beliefs about using tablet computers for teaching in intermediate school classrooms. The research instruments design and development are influenced by the literature, in order to find answers about teachers' beliefs, attitudes, knowledge and skills related to technology usage. The instruments include:

1. Questionnaires: a self-report, 5-point Likert scale, questionnaire to assess teachers' beliefs, attitudes knowledge and skills related to technology usage. (Appendix D.1 and D.2)
2. Interviews: semi-structured in-depth interviews to discover how the deployment of tablet computers had changed teachers' pedagogical approaches when teaching. (Appendix E.1 and E.2)
3. Observations: to observe the factors (knowledge, skills, attitudes and beliefs) that facilitate and inhibit school teachers' use of tablet computers in teaching; how the tablet computers support teaching and learning; and to find out if there is adequate support for the design and enactment of classroom teaching strategies. (Appendix F.1 and F.2)

The following sections address in-depth each of the instruments that were used in this study, as well as the rationale behind their selection.

3.3.9 Questionnaires - collecting numerical data

Questionnaires were used as they are considered to be well-established tools within social science research (Bird, 2009) and suitable for systematic collection of data (Payne & Payne, 2004).

Another rationale for using questionnaires was the fact that they are structured and can provide a baseline set of information. The purpose of using questionnaires was to reach a wide range of school teachers as possible in order to understand their beliefs about using tablet computers as a pedagogical tool in the classroom. The questionnaire allowed the researcher to divide the questions into categories for subsequent data analysis. It allowed the researcher to use closed-ended questions to gather information about the beliefs, attitudes, knowledge and skills of the participants. Most importantly, the use of the questionnaire allowed collecting data from a large number of participants. Moreover, questionnaires have been used in previous studies to examine the integration of tablet computers in education; for example, Karsenti & Fievez, 2013; Sundvik et al. 2016).

Several aspects were taken into account by the researcher when selecting this instrument for collecting data. Firstly, the researcher believes that the questionnaire is the most suitable method for collecting data in a standardised form (Kelley et al., 2003). Secondly, collecting quantitative information from all study participants face-to-face is not only time consuming but involves travelling to various schools located in different locations (ibid.). The benefits of using questionnaire are that a large amount of data can be collected from a large number of participants without costing too much of the time researcher's time (Cohen et al., 2011). Another advantage is that it is easy to analyse questionnaires, largely due to the availability of computer software packages that are easy to use (Fox & Bayat, 2008). However, the disadvantage of using questionnaires is that it is difficult to get all participants to answer all the questions, the selection of multiple choice answers by respondents without properly reading the question or be time consuming and need more time to respond to all the questions (Krosnick et al., 2005).

In designing the questionnaire, the researcher had taken into account certain factors, and one of which was to formulate clear research questions (Appendix D.1 and D.2). Therefore, care was taken to design questionnaire items that articulated the questions that the research intended to address (Crawford, 1997; Tully, 2014). The researcher also ascertained that the questions were clear, intelligible and unambiguously phrased (Sturgis, 2006) by piloting the research instrument. Short, simple and concise questionnaire items were developed to achieve reliability and validity, and in line with the participant's language and to avoid problems such as ambiguous questions (Bird, 2009). Another decision that had to be made when developing the questionnaire was whether to use closed or open questions. Closed questions were used as they 'are directly to the point and deliberately more focused than open-ended questions' (Cohen et al., 2011, p.321).

Moreover, closed questions can be answered within a short period of time (Oppenheim, 2005). Open-ended questions were not used as respondents may require more time to answer the questionnaire as they have to explain their experiences in detail. Since, interviews followed the questionnaire, open-ended items were not included. The multiple-choice questionnaire that was developed for the study used closed-ended questions and made use of a five-point Likert scale. The questionnaire was developed from existing validated questionnaires, for instance the TPACK scales developed by Canbazoğlu-Bilici et al. (2013) and the TAM constructs from the survey instrument designed by Teo (2009b). When developing the questionnaire relevant literature was also reviewed.

The rationale for using a previously validated and published questionnaire is that it measures what it claims to measure. It not only saves time but also enables comparing the findings of the current study with the results of the original studies (Boynton & Greenhalgh, 2004). Another benefit of using pre-existing instruments developed in other cultures is that they would have been comprehensively tested before use (Hyman et al. 2006). Although new items were not developed, the instruments have to be suitably translated for use in the Middle East. The questionnaire items have to be slightly modified so that they do not reflect the culture in which the original instruments were developed. Although, it may create issues concerning claims for originality, adapted or 'recycled' questions can be accurate measures of the concept of interest. The instrument used for the quantitative phase was not adopted but adapted as the items were re-worded. The degree of validity can be high and result in obtaining data of higher quality as the original questions were recycled (Hyman et al. 2006). Confirming the development or adaptation of a questionnaire and establishing validity can be carried out through a pilot test, factor analysis or Principal Components Analysis and Cronbach's Alpha (Fonseca et al., 2013). The current study used these criteria to validate the questionnaire.

Another validation process that was used in the current study was evaluating the psychometric properties of the pre-existing questionnaire items (Furr, 2011). The psychometric properties used to develop the questionnaire are tabulated in Table 5. The two main studies were that of Canbazoğlu-Bilici et al. (2013), who used a three-point Likert scale questionnaire to assess the self-efficacy beliefs of 808 preservice science teachers in 17 colleges for teacher education in Turkey, and Teo (2009b), who developed and administered a five-point Likert scale to assess technology acceptance of 475 pre-service teachers at the National Institute of Education (NIE) in Singapore.

Previous studies	Objective	Scales	Constructs/items	Validity of scales
Canbazoğlu-Bilici et al. (2013)	Assessed the self-efficacy beliefs of preservice science teachers with regard to their technological pedagogical content knowledge	Three-point response Likert scale consisting of 52 items	Technological Pedagogical and Content Knowledge	Demonstrated evidence of internal consistency and construct validity
Teo (2009b)	Developed instrument to assess pre-service teachers' technology acceptance	Five-point response Likert scale consisting of 18 items	TAM (Perceived Usefulness, Attitudes towards use), Technological complexity	Demonstrated acceptable level of reliability or validity.

Table 6: Psychometric properties of instruments used to develop the questionnaire

The TPACK and TAM constructs associated with this study's questionnaire items were adapted and rephrased making it easy for the respondents to understand. Table 6 contains 17 items related to TPACK adapted from Canbazoğlu-Bilici et al. (2013) and 18 items associated with TAM and technological complexity adapted from Teo (2009b).

Table 7: Constructs adapted from TPACK and TAM literature

Literature	Constructs		Statements/Items
Canbazoğlu-Bilici et al. (2013)	TPACK	1	I upload educational apps and administer lesson materials and quizzes.
		2	I trust using tablet computers can expand and update or in other ways refresh my subject knowledge.
		3	By using tablet computers, I am able to interact with students and share information more effectively.
		4	I use tablet computers to streamline the grading process.
		5	I believe that teacher who use tablet computers will be able to teach better by finding online information.
		6	I believe that tablet computers can enhance a student's ability to learn content knowledge.
		7	I believe that I am able to provide prompt, timely and quick feedback by using tablet computers.
		8	I believe that tablet computers can help in bridging in and out of class contexts.
		9	I know how to prepare lessons by using tablet computers or other technology tools.
		10	I know that I have the skills to prepare high quality lessons by using tablet computers or other technology tools.
		11	I know that I have the skills to prepare high quality lessons more quickly by using tablet computers or other technology tools.
		12	I have personal skills to use technology tools.
		13	I have professional skills for using tablet computers in teaching.
		14	I have skills in using other technologies, for example word processor, PowerPoint.
		15	I know how to integrate tablet computers into education to increase the quality and effectiveness of teaching.
		16	I know how to use tablet applications or programs which support my teaching.
		17	I know how to use the internet to find information to support my teaching.
Teo (2009b)	TAM Attitudes towards use	18	I have the necessary training and technical support to use tablet computers for instructional purposes.
		19	I am able to use tablet computers or other technology tools in my teaching.
		20	I believe that it is difficult to integrate tablet computers into the curriculum.
		21	I am of the opinion that there is a lack of content, context and pedagogical based teacher training programmes.
		22	I lack knowledge in using tablet computers for teaching.
		23	I do not have positive feelings towards using tablet computers for teaching.

Literature	Constructs		Statements/Items
		24	I do not have high skills to use tablet computers for teaching.
		25	Tablet computers are a major source of distraction for the students.
		26	Lack of training hinders teachers from using tablet computers effectively in teaching.
		27	Working with tablet computers is fun and interesting.
	TAM Perceived Usefulness	28	I like using tablet computers in my teaching.
		29	I am able to effectively deliver presentations by using a tablet computer.
		30	I am able to plan for the lessons when I use a tablet computer.
		31	Tablet computers are versatile tools which are ideal for educating.
	Technological complexity	32	I believe that the lack of access to the internet is one of the difficulties faced by teachers.
		33	I believe that there is a lack of content (appropriate programs or software) in Arabic.
		34	I am unable to deal with maintenance problems associated with integration of tablet computers.
		35	The wireless network is poor and is not effective as it does not support tablet usage.

The potential problems that researchers face when using questionnaires are response bias, nonresponse bias and sampling bias. Response bias is caused when respondents give wrong answers to questions and the responses result in incorrect data analysis (Sedgwick, 2013). Non- response bias occurs when some respondents consciously and intentionally do not respond to the questionnaire items or if they do respond it is different from that of other responders (Sedgwick, 2013). Incomplete questionnaires can lower confidence in the result. In order to minimise these biases care was taken during the development of the questionnaire to use clear language and avoid ambiguity.

3.3.10 Interviews - collecting in-depth information

Qualitative data were collected in this research by using interviews. An interview is 'an interactional communication process between two parties, at least one of whom has a predetermined and serious purpose that involves the asking and answering of questions' (Stewart, 2007; p.1). The rationale for using interview as a data source was that it is the most widely used method in social science and involves a sort of conversation or dialogue between the researcher and the participant that allows eliciting a participant's experiences, perceptions and feelings (Edwards & Holland, 2013).

A decision had to be made about choosing the appropriate interview type which is classified as structured, semi-structured, and unstructured (Cohen et al., 2011). Structured interviews allow participants to provide specific answers to predetermined questions and are more quantitative in nature, while unstructured interviews are more like a conversation than an interview (Patton, 2001). Semi-structured interviews allow researchers to ask predetermined questions but are flexible and interviewers can use prompts and cues to elicit rich in-depth information (Edwards & Holland, 2013).

A semi-structured interview was chosen for the data collection as the second research instrument in order to elicit in-depth information from participants about their beliefs and knowledge of technology and its use for teaching. Semi-structured interviews have been used in studies reviewed in literature, for instance Blackwell (2014) and Montrieux et al. (2015). An interview schedule (Appendix E.1 and E.2) has been developed to focus the conversation on the phenomenon being investigated. Audio recordings of the interviews were transcribed in Arabic. It was then translated from the source language (Arabic) to the target language (English). In order to ensure that meaning of the text was not lost, the English transcript was translated back to Arabic and again back to English.

Interview schedule development

The interview schedule has been developed by reviewing literature related to the research topic (e.g., Albirini, 2006; Al-Ajmi & Reys, 2007; Gibbone et al. 2010; Weber, 2010; Al Sharija & Watters, 2012; Karsenti & Fievez, 2013; Kim et al., 2013; Blackwell, 2014; Chow, 2015; Lehiste, 2015). The choice of interview questions and links to the literature is presented below. (See Table 8)

Previous studies	Themes	Questions developed
		Use of tablet computers in teaching
Gibbone et al. (2010); Chow (2015)	Teacher attitude-instructional style or teaching strategies	1. Why do you use tablet computers in the classroom? What are your primary reasons for using tablet computers? 2. How do you describe your experiences in using tablet computers? Are there dissimilar aspects between your use of tablet computers and other technologies?
Al-Ajmi & Reys (2007); Weber (2010)	Traditional teaching methods	3. How different is the tablet computers compared to traditional teaching approaches commonly used in most public schools in Kuwait? 4. How would you describe your teaching style? Why do you prefer this approach?
		Teachers' skills/knowledge in using tablet computers for teaching
Karsenti & Fievez (2013)	Teachers' knowledge of how to use technology	1. Do you think you have sufficient skills or knowledge in using tablet computers for teaching? How did you acquire these skills or knowledge?
Albirini (2006); Al Sharija & Watters (2012)	Lack of training	
Kim et al. (2013); Blackwell (2014); Lehiste (2015)	Need more support such as in-service training & professional development	2. What do you think are the reasons for your lack of competence and skills in using tablet computers in classrooms? 3. Are there training programmes for using tablet computers in classrooms? What are they? Who provides the programmes?

Previous studies	Themes	Questions developed
Karsenti & Fievez (2013); Montrieux et al. (2015); Culen & Gasparnini (2012); Iserbyt et al. (2014) Montrieux et al. (2015) Blackwell (2014)	Distraction factor; Difficult to make the transition from a physical book to tablet computers Fear of losing control over the class Difficulty in finding appropriate content	**Challenges and difficulties teachers face when using tablet computers for teaching** 1. What are the challenges you face when using tablet computers in classrooms? 2. What do you feel are the negative effects of using tablet computers in teaching?

Table 8: Interview questions and links to the literature

The general guidelines used for formulating the interview questions are based on the items included in the questionnaire. The schedule was further developed after collecting and analysing the questionnaire data. This allowed ensuring the consistency of interview results with data from other sources (Dedios et al., 2017).

3.3.11 Participant observation

Qualitative classroom observations are used as the third research tool to develop insight into the context, the environment, teacher behaviour, and how tablet computers are integrated for teaching. Observations were used as it allowed collecting live data (Cohen et al., 2011) or first- hand information (Silverman 2006) and gaining insight into teachers' beliefs and attitudes towards the use of tablet computers. The rationale for using observations in this study was because the researcher was interested in observing the behavior of participants "as they naturally occur in terms that appear to be meaningful to the people involved" (Mertens, 1998, p. 317), for instance during classroom practice (Wellington, 2000). Moreover, observations have been used to study tablet computer integration in classrooms, for instance by Blackwell (2014) and Sung et al. (2016).

Participant observation was used "to interact with the participants while collecting data from them" (Mertens, 1998, p. 317). There are different levels of participation when observing research subjects. Mertens (1998), who cited Spradley (1980), classifies participant observation as non-participation or observing without being present, passive participation or being visibly present but not interacting with research subjects, moderate participation or interacting with research subjects on occasions, active participation or engaging with the participants in their activities, and complete participation or fully participating by blending with the research subjects. In the current study, the researcher adopted passive participation. This method fits with the research design as it enables the researcher to observe without having to participate as a research subject in their activities.

In longitudinal studies, classrooms can be observed repeatedly over a long period of time, however in the current study observation sessions were recorded for a period of 45 minutes or one class period. The researcher was part of the phenomenon being studied and made notes using a pre-structured schedule, for instance the way teachers were using previously uploaded files or using specific apps for familiarising students with new concepts. One of the drawbacks of conducting observations in Kuwait and other Arab states is teachers' reluctance to the idea of using video recording as most of them are not comfortable with it. Moreover, permission to use video recording has to be sought from the Ministry of Education, students, parents and teachers, and the researcher believes that this exercise would be time consuming. Therefore, a pre-structured observation protocol was used to collect relevant information besides making field notes.

The observation protocol (Appendix F.1 and F.2) has been developed by the researcher to observe the way teachers integrated tablet computers. The rationale for using the protocol is to structure the field notes and to support the accurate recording of what is happening in the classrooms. In particular, it allowed observing and identifying whether teachers were using tablet computers in ways contrary to their expressed beliefs. The UTeach Observation Protocol (UTOP) developed by the UTeach Faculty at University of Texas, Austin, U.S.A (Walkington et al. 2011; Wasserman & Walkington, 2014) consisting of 4 sections, namely Classroom Environment, Lesson Structure, Implementation, and Content was developed by building upon the Classroom Observation Protocol of Horizons Research (Walkington et al. 2011). A few modifications were made to the original observation schedule. Only some UTOP indicators, Classroom Environment and Instructional orientation/strategies related to teachers' beliefs were used which are the focus of the current research.

3.3.12 Methodological Triangulation

Reliability in this mixed methods study involved the triangulation of different data sources.

These sources were described in the earlier sections. Triangulation is "the use of two or more methods of data collection in the study of some aspects of human behaviour" (Cohen et al., 2011, p.141). In other words, the collection of data using different research instruments can enhance the reliability of the data and consistency of the results. The advantages of using triangulation are that it helps the researcher to better comprehend the research problem, problem, and that it ensures the reliability of the research finding (Creswell, 2007). Triangulation provides a wider range of quality data than would be obtained from a single approach. Moreover, in this study, the purpose of triangulation was to integrate data obtained from questionnaires, interviews and observations and facilitate a deeper understanding of tablet computer integration.

There are many different types of triangulation. Data triangulation involves the use of different data sources, such as interviews, observations, surveys and focus groups and may include data collected using the same method or different methods. Investigator triangulation involves integration of data collected by multiple researchers in a study. Methodological triangulation is more widely used in education research which is the use of "either the same method on different occasions, or different methods on the same object of study" (Cohen et al., 2011, p.143). By using different methods, such as quantitative and qualitative, a researcher can have a more complete picture of the phenomenon or question (Teddlie & Tashakkori, 2009). On the other hand, theoretical triangulation involves the use of multiple theories or perspectives to interpret data.

The advantages of triangulation include "increasing confidence in research data, creating innovative ways of understanding a phenomenon, revealing unique findings, challenging or integrating theories, and providing a clearer understanding of the problem" (Thurmond, 2001, p. 254). On the other hand, the disadvantage of using triangulation in research is that it can be time consuming to check reliability (Hammersley, 2008; Guion et al., 2011). Other disadvantages include the "possible disharmony based on investigator biases, conflicts because of theoretical frameworks, and lack of understanding about why triangulation strategies are used" (Thurmond, 2001, p. 256). In this study, methodological triangulation was used to obtain rich and robust data using quantitative and qualitative methods and to facilitate deeper understanding of teachers' beliefs about tablet computer integration in Kuwaiti schools.

The integrated research design adopted for this study served three purposes: (a) triangulate different views on the factors that influence teachers' initial adoption of tablet computers and its impact on teachers' pedagogical approaches, in order to strengthen the trustworthiness of the findings; (b) use questionnaires, interviews and observation data in a complementary fashion to produce a better understanding of the research problem; and, (c) allow for some generalisation as the teachers who took part in the questionnaire were representative.

3.3.13 Pilot Study

A pilot study is the foundation of good research design and it is essential to conduct one to examine and revise the research instruments, such as questionnaires, semi-structured interview schedules and observation protocols. A pilot study can be defined as a small-scale test of the methods and procedures that a researcher will ultimately use in large scale study and to check the feasibility of the techniques (Hazzi & Maldaon, 2015). It involves the administering of the instruments to a small sample of participants whose demographic characteristics are similar to the target population for whom it has been designed (Clark & Libarkin, 2011; Phellas et al., 2012). It is claimed that one of the benefits of piloting the research instrument is to enable the researcher to address the validity and quality of the questions (Yin, 2014). Piloting the data collection instruments also allows researchers to test and revise the procedures and the questions. To sum up, the importance of conducting a pilot study is to improve the quality and add value to the main study. The main aim of the pilot study in this study was to develop the research instruments and to ensure that they were the most appropriate tools to investigate teachers' beliefs regarding the use of tablet computers.

When designing the questionnaire, the questions were organised to cover beliefs, knowledge, skills, and challenges and difficulties of using tablet computer as a pedagogical tool for teaching in the classroom. The questionnaires were tested on individuals (Table 9) who were similar to those of the research participants (Phellas et al., 2012).

Table 9: Participants in the pilot study

Designator	Qualification	Job Title
A	PhD in Education	Assistant professor Kuwait University
B	Master in Education	PhD Student
C	Master in Education	PhD Student
D	Master in Education	PhD Student

3.3.14 Ethical Considerations

Ethical considerations are important issues in educational research and there are a number of ethical issues that a researcher should consider (Pring, 2000). The main goal of ethical consideration in this study research is to ensure that participants are not at risk of harm, as a result of their participation at any stages of the research (Flick, 2006).

An information sheet highlighting the significance of the research was distributed to participants, before asking them to take part in the study. The information sheet (one for each research instrument) explained how the research is relevant to the participants (see Appendix D.3, E.3, F.3). Obtaining informed consent was one of the important requirements for the ethical conduct of this research. After explaining the purpose of the study and the sequence in which data would be collected, informed consent was obtained from the participants (see Appendix D.4, E.4, F.4). They were duly informed that they were free to withdraw at any time from the study. A further ethical issue is confidentiality and anonymity of the participants. In order to maintain anonymity, names of participants were substituted with designators, for example letters A, B, C, D and so on. To respect the confidentiality and privacy of participants they were assured that the information obtained from them would not be made public. Prior to the start of the research, university approval was obtained from the ethics committee of the university.

3.3.15 Data analysis: methods and approaches

Data analyses for this study included quantitative and qualitative techniques to address the research questions. The analysis of the survey data involved scale reliability and descriptive statistics were used to calculate the frequency, as well as the mean and standard deviations of the collected data. The survey data was statistically analysed using the Statistical Program for Social Sciences (SPSS 22) software. SPSS software enables researchers to explore numerical data (Bryman & Cramer, 2011). In this study, the software offered fast and reliable statistical analysis for quantitative data (Bird, 2009). SPSS was chosen because it is widely used by education researchers (Arkkelin, 2014).

The rationale for using simple descriptive statistics and factor analysis as well as principal component analysis was to obtain a rich and descriptive account of specific teachers from intermediate schools in Kuwait. Moreover, there is no intention to statistically calculate the applicability of the findings to a broader population. Conversely, this phase of the mixed method descriptive study identifies factors influencing use of tablet computers within a specific context.

Qualitative data analysis is iterative and data analysis takes place immediately after data collection. Qualitative data, namely interviews and observations, were thematically analysed using Microsoft Word. The rationale for using Word was that it is an easy and very useful tool (Wong, 2008). The choice of this approach was that the researcher wanted to manually analyse the data. Moreover, the data was in Arabic and NVivo a qualitative data analysis software is not compatible with this language as the software does not read right-to-left language scripts.

A hybrid approach to thematic analysis was used by adopting a data-driven inductive approach as well as a theoretical deduction approach. The rationale for using thematic analysis was that it can identify patterns of meaning across a dataset, in response to research questions (Braun & Clarke, 2006). One of the advantages of thematic analysis is that it can be used within different frameworks and to answer different types of research question. It is moreover appropriate for analysing questions/responses related to people's experiences, or individuals' views and perceptions (Braun & Clarke, 2006). The thematic analysis consisted of six phases, as suggested by Braun and Clarke (2006):

1) The first step involved getting acquainted (familiarising oneself) with the data, reading and re-reading it and making notes to record initial ideas.

2) Next, initial codes were generated by highlighting specific aspects of the interview responses and observation schedules.

3) The next step involved searching for themes by gathering all coded data related to each potential theme.

4) The themes were then reviewed.

5) The reviewed themes were refined and renamed.

6) Finally, a report (see results chapter) was produced, which includes a selection of rich, compelling excerpts from the interview transcripts and field notes.

The interview transcripts and observation schedules were read and re-read, and notes were made to code the data. The thematic analysis focused on identifying the key themes that emerged from teachers' narratives in which they revealed their perceptions of integrating tablet computers for teaching. These initial themes were categorised or organised, compared, reviewed and scrutinised to see if they were related. Redundant themes were subsequently isolated and combined with others.

The methods for quantitative and qualitative data collection and analyses can be implemented sequentially or simultaneously. Although the researcher in this study has adopted a pragmatist stance the current study focuses on giving priority to qualitative method. Quantitative data were collected and analysed followed by interviews and observations. The priority and temporality were QUANT>QUAL or a quantitative phase followed by the qualitative phase.

Mixed methods data analyses involve quantitative and qualitative data analyses. These are then integrated in research studies. As stated earlier, in the current study, methodological triangulation was used to triangulate different data sets. This was done by analysing both qualitative and quantitative data separately. The first stage involved analysing the questionnaire data to determine the factors that facilitate teachers' use of tablet computers in teaching and the challenges facing teachers who use tablet computers for teaching. The second stage involved coding which helped determine and identify the themes that emerged from the text. The themes that recurred were used to understand teachers' pedagogical reasoning for integrating tablet computers, how the use of tablet computers would change teachers' pedagogical beliefs and approaches, as well as the challenges they faced while integrating the technology. The qualitative phase was shaped directly by the results from the quantitative phase. The integration occurred during interpretation of the results. In other words, in this study a multistage sequential mixed methods research design (Fetters et al., 2013) was used. The qualitative results were used to substantiate and help explain in more detail the quantitative results.

In order to triangulate the data, a protocol based on the procedures suggested by Farmer, Robinson, Elliott and Eyles (2006) was applied to integrate and interpret key findings from the questionnaires, interviews and classroom observations. This involved comparing key qualitative factors and themes with the quantitative variables. The conversion of quantitative data into narrative data that can be analysed qualitatively is referred to as 'qualitizing' (Tashakkori & Teddlie, 1998). In this study, qualitizing data involved summarising the sample, using word categories based on information derived from descriptive statistics, and describing the principal component analysis–derived patterns. During data transformation, quantitative results, or numeric scores, were converted into natural textual description. In other words, quantitative data were transformed into categories or patterns for combination with the qualitative themes or categories.

'Convergence coding' (Farmer et al., 2006) was applied to establish convergence between the quantitative and qualitative results. Convergence is a strategy used to determine if qualitative and quantitative results provide the same answer to the same question (Aarons et al., 2012). The use of convergence coding helped determine if there was agreement/partial agreement, silence or dissonance in terms of the data from the different methods. Agreement indicates that codes from quantitative data agree with qualitative data or vice versa and that the finding have been identified; partial agreement refers to lack of complete agreement between quantitative and qualitative data, or that the finding has been covered partially; silence refers to codes that are found in one data set and not found in another data set, and that the finding appears only in one data set; and, dissonance refers to disagreement between data sets, for example meaning and importance are different, and therefore the finding has been contradicted (Farmer et al., 2006).

3.3.16 Summary of research methods

The purpose of this chapter was to make explicit the philosophical assumptions underpinning the choice of the research design, the paradigmatic views mixed methods research draws upon and the three research instruments that were used to carry out the research. The chapter presented the research questions and linked it with the research instruments. This particular combination of methods is expected to allow the researcher to investigate teachers say about their attitudes, beliefs, knowledge and skills when using tablet computers for teaching. Finally, this chapter briefly discussed the framework for analysing the data.

Chapter 4 Data Analysis

4.1 Introduction

This study employed an integrated mixed-methods data analytic approach. This chapter provides a detailed explanation of the data analytic strategies undertaken in this study to document the key findings. The chapter consists of three main sections which present the quantitative and qualitative findings which are organised under the three research questions. Attempts were made to address the research aims presented in the introductory chapter.

Factor Analysis was used to enhance the construct validity of self-reporting scales, to measure variables, and reduce a large number of variables into a smaller set of variables or factors. It enhances the reliability of the scale by identifying and removing inappropriate items. The analysis used was Exploratory and the aim was to explore the underlying theoretical structure of the phenomena. Principal Component Analysis was used to identify and extract factors. Exploratory Factor Analysis allowed describing and identifying latent constructs or factors.

4.2 Phase One: Quantitative Findings

The analysis of the survey data involved the use of descriptive statistics to determine the frequency, as well as the mean and standard deviation, of the collected data. These statistical procedures were applied to all three research questions. (See Table 10)

Research questions	Statistical procedures
What are teachers' beliefs and attitudes associated with the initial adoption of tablet computers for learning and	Descriptive statistics/Factor Analysis/ Principal Component Analysis
How has the deployment influenced or changed teachers' pedagogical approaches in intermediate schools?	
What are the challenges facing teachers who use tablet computers for teaching in intermediate school classrooms?	

Table 10: Research questions and related statistical procedures

Descriptive statistical analysis was carried out followed by the application of Factor Analysis as well as Principal Component Analysis to analyse the survey data. Descriptive statistics present the frequency, mean values and standard deviation of the construct items. The use of descriptive statistics helped the researcher to meaningfully describe and summarise the raw data, which consisted of 35 items (Table 11). The item numbers correspond to their order in the survey instrument.

Table 11: Descriptive statistics

#	Items	M	SD	N
1	I can upload educational apps and administer lesson materials and quizzes.	4.15	1.032	150
2	By using tablet computers, I am able to interact with students and share information more effectively	4.20	.990	150
3	I use tablet computers to streamline (reorganise or restructure) the grading process	4.09	1.045	150
4	I believe that I am able to provide prompt, timely and quick feedback by using tablet computers	3.71	1.144	150
5	I have the necessary training and technical support to use tablet computers for instructional purposes	4.03	1.155	150
6	I am able to use tablet computers or other technology tools in my teaching	4.09	1.064	150
7	I believe that it is difficult to integrate tablet computers into the curriculum	4.19	.992	150
8	Tablet computers are a major source of distraction for the students	4.09	1.019	150
9	Working with tablet computers is fun and interesting	4.33	.886	150
10	I like using tablet computers in my teaching	4.21	.950	150
11	I am able to effectively deliver presentations by using a tablet computer	4.15	.951	150
12	I am able to plan for the lessons when I use a tablet computer	4.29	.862	150
13	I am unable to deal with maintenance problems associated with integration of tablet computers	3.97	.937	150
14	I trust using tablet computers can expand (increase) and update (inform) or in other ways refresh my subject knowledge	4.39	.904	150
15	I believe that teachers who use tablet computers will be able to teach better by finding online information	4.14	.883	150
16	I believe that tablet computers can enhance a student’s ability to acquire content knowledge	4.14	.898	150

#	Items	M	SD	N
17	I believe that tablet computers can help in bridging in and out of class contexts	4.37	.893	150
18	I am of the opinion that there is a lack of pedagogy-based technology training programmes for teachers	4.15	.925	150
19	Lack of training hinders teachers from using tablet computers effectively in teaching	4.30	.888	150
20	Tablet computers are not versatile tools which are ideal for educating students	2.79	1.281	150
21	I believe that the lack of access to the internet is one of the difficulties faced by teachers	3.72	1.094	150
22	I believe that there is a lack of content (programmes and software) in Arabic	2.44	1.272	150
23	Tablet computers cannot improve teaching experience	2.48	1.314	150
24	I know that I have the skills to prepare high quality lessons by using tablet computers or other technology tools	2.27	1.180	150
25	I know that I have the skills to prepare high quality lessons more quickly by using tablet computers or other technology tools	3.06	1.238	150
26	I have personal skills to use technology tools (for communicating, using word processor)	3.70	1.116	150
27	I have professional skills for using tablet computers in teaching (for time management, planning lessons)	4.03	1.006	150
28	I have skills in using other technologies for example using PowerPoint, video projectors, Smartboard etc.	3.93	1.004	150
29	I do not have high skills to use tablet computers for teaching.	3.99	.952	150
30	I know how to prepare lessons by using tablet computers or other technology tools	4.03	.955	150
31	I know how to integrate tablet computers into education to increase the quality and effectiveness of teaching (for example managing content, evaluating students, and engaging students in collaborative activities)	3.95	1.002	150
32	I know how to use tablet applications or programmes (mobile apps) which support my teaching	3.62	1.066	150
33	I know how to use the internet to find information to support my teaching	3.67	.981	150
34	I lack knowledge in using tablet computers for teaching all subjects	3.12	1.093	150
35	I have positive feelings towards using tablet computers for teaching	4.05	1.064	150

Note: N=Respondents/M=Mean/SD=Standard deviation

Descriptive statistics demonstrated that there was variation in the responses for each item and between items. Findings suggest that participants scored high in their beliefs and attitudes towards tablet computer integration. Teachers' beliefs that the use of the devices helped them to expand their subject knowledge was relatively positive with a high mean score (M = 4.39 and SD =

.904) which was followed by their beliefs that tablet computers can bridge in and out of class contexts (M = 4.37 and SD = .893). This suggests that the teachers were able to use tablet computers to enable students to become active participants not only in the classrooms but also in out-of-school settings. Other items with a relatively high mean score were teachers' belief that tablet computers enabled them to interact with the students and share information more effectively (M = 4.20 and SD = .990) as well as to plan lessons (M = 4.29 and SD = .862). The item with a very low mean score was teachers' beliefs that they had the skills to prepare high quality lessons by using tablet computers (M=2.27 and SD=1.180). Other items with low mean scores were teachers' beliefs that there is a lack of content in Arabic (M=2.44 and SD=1.272) and that the devices cannot improve teaching experience (M=2.48 and SD=1.314). Participants' beliefs that they lacked training (M = 4.30 and SD = .888) and lacked adequate pedagogy-based technology training programmes (M = 4.15 and SD = .925) also were instances of high mean scores. The results of the descriptive analysis are not representative of the entire population and therefore further analysis was required.

Exploratory Factor Analysis

Factor Analysis involved conducting a series of correlation analyses referred to as Correlation Matrix (see Appendix D.7). A correlation of all the items was run between all items, and from the Correlation Matrix, one can observe high and low correlations between the variables. The 'determinant score' was above the rule of thumb of .00001 which suggests that there were no computational problems with the factor analysis (Yong & Pearce, 2013). It also indicates that there were patterned relationships among the variables.

Tests for factorability were carried out using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test. The KMO "represents the ratio of the squared correlation between variables to the squared partial correlation between variables" (Field, 2009, p. 647). This measure suggests that any component with an eigenvalue greater than 1.00 can be retained and interpreted. For the purpose of this research, a minimum value of .6 for determining factorability was considered (Tabachnick & Fidell, 2013). As the KMO value was .937, it is assumed that the correlation patterns are relatively solid (Figure 7; Table 12) and therefore, it is assumed that the factor analysis yielded a clear and reliable result.

KMO Range	Recommendations
0.90 to 1.00	Marvellous
0.80 to 0.89	Meritorious
0.70 to 0.79	Middling
0.60 to 0.69	Mediocre
0.50 to 0.59	Miserable
0.00 to 0.49	Unacceptable

Figure 7: Suggested KMO values (Source: Kaiser, 1974; Field, 2009)

The Bartlett's test measure helped in identifying relationships between the variables. It is generally used to test if the significance value is less than 0.05. The data here suggests that the Bartlett's test is highly significant ($p < 0.001$).

Table 12: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.920
Bartlett's Test of sphericity	Approx. Chi-Square	5127.647
	df	595
	Sig.	0.000

In order to measure the internal consistency or reliability of the items, Cronbach's alpha was used. Items are considered to have an acceptable level of internal consistency if the alpha value is more than 0.7 (Streiner & Norman, 2008). Others advocate that an α of 0.8 is reliable (Field, 2009).

However, Cronbach's alpha value of (.913) suggests good internal consistency or that the questionnaire is highly reliable. (See Table 13)

Reliability Statistics

Cronbach's Alpha	Items
.913	35

Table 13: Cronbach's Alpha

Factor Extraction and Retention

The next step was to make the decision about which factors to retain, as this is a critical component of Exploratory Factor Analysis. The number of components extracted was equal to the number of variables analysed, meaning that the researcher needed to decide just how many of these components were truly meaningful and thus worthy of being retained for rotation and interpretation (Yong & Pearce, 2013).

It was initially expected that only some of the initial components would account for a meaningful level of variance and the later components would mainly account for trivial variance. The Correlation Matrix showed that each item measured some aspect of the teachers' perceptions of tablet computer use. The variance accounted for by the components is presented in the Principal Component Analysis. (See Table 14)

Total Variance Explained

Items	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	16.032	45.806	45.806	16.032	45.806	45.806	8.038	22.965	22.965
2	3.430	9.799	55.604	3.430	9.799	55.604	7.796	22.273	45.238
3	2.437	6.962	62.567	2.437	6.962	62.567	3.536	10.103	55.341
4	1.925	5.499	68.066	1.925	5.499	68.066	2.601	7.432	62.773
5	1.348	3.852	71.918	1.348	3.852	71.918	2.274	6.498	69.271
6	1.051	3.004	74.921	1.051	3.004	74.921	1.978	5.650	74.921
7	.948	2.708	77.629						
8	.787	2.249	79.878						
9	.689	1.969	81.847						
10	.656	1.873	83.720						
11	.555	1.585	85.306						
12	.508	1.450	86.756						
13	.502	1.435	88.192						
14	.407	1.162	89.353						
15	.374	1.069	90.422						
16	.357	1.021	91.443						
17	.303	.865	92.308						
18	.295	.843	93.151						
19	.260	.744	93.895						
20	.234	.670	94.565						
21	.210	.601	95.165						
22	.196	.561	95.726						
23	.177	.507	96.233						
24	.167	.478	96.711						
25	.152	.435	97.147						
26	.142	.405	97.552						
27	.140	.399	97.951						
28	.131	.375	98.326						
29	.119	.341	98.667						
30	.102	.291	98.959						
31	.096	.274	99.233						
32	.088	.253	99.486						
33	.075	.213	99.699						
34	.069	.198	99.897						
35	.036	.103	100.000						

Extraction Method: Principal Component Analysis.

Table 14: Principal Component Analysis

The Principal Component Analysis shows eigenvalues that are variances of factors. This helped determine how many factors to retain (Yong & Pearce, 2013). In the first set of columns, after the initial eigenvalues were computed, the initial number of factors was equal to the number of variables. In the second set of columns (Eigenvalue), the variance in successively extracted new factors may be found, expressed as a percentage of total variance. Principal Component Analysis allowed organizing data from a large number of variables (N=35) into 6 factors because of the correlation they have with each other.

An inspection of the scree plot which graphs the eigenvalue against the factor numbers shows that 6 factors can be retained (Appendix D.8). Each point on the plot represents a particular factor and only those factors with values above the point where the curve levels out were retained, demarcated by a line. Thus, 6 factors were retained, substantiating the eigenvalue ruling.

Meanwhile, all factors below the break point were eliminated (Yong & Pearce, 2013). Since it is claimed that interpreting Scree plots is subjective (Tabachnick & Fidell, 2013) and as there is no consensus on which factors should be retained (Pett, Lackey & Sullivan, 2003) the researcher used judgement to interpret factors. In order to only use those items with high factor loading, the components were rotated (See Table 14).

The rationale for rotating the factors was to allow for better interpretation, since un-rotated factors are ambiguous (Yong & Pearce, 2013). Rotation was performed after extraction to maximise high correlations between factors and variables and to minimise low correlations (Tabachnick & Fidell, 2013). Varimax rotation was used here to minimise the complexity and maximise the variance of each of the factors (Thompson, 2004).

The rotation yielded an interpretable simple structure which also showed the values of these factors (Table 14). However, some of the items loaded strongly on more than one factor (see the loadings which are highlighted in red font). This suggests complex relationships and as the normal convention is to remove it (Knafl & Grey, 2007), these items with 'split' loadings (Yong & Pearce, 2013) were discarded. The rotation reduced the number of variables from 35 to 30 see. (See Table 15)

	Items	Components/Factors					
		1	2	3	4	5	6
1	I can upload educational apps and administer lesson materials and quizzes.		.770				
2	By using tablet computers I am able to interact with students and share information more effectively		.769				
3	I use tablet computers to streamline (reorganise or restructure) the grading process		.845				
4	I believe that I am able to provide prompt, timely and quick feedback by using tablet computers		.741				
5	I have the necessary training and technical support to use tablet computers for instructional purposes		.780				
6	I am able to use tablet computers or other technology tools in my teaching		.806				
7	I believe that it is difficult to integrate tablet computers into the curriculum		.768				
8	Tablet computers are a major source of distraction for the students		.832				
9	Working with tablet computers is fun and interesting	.638	.583				
10	I like using tablet computers in my teaching	.660	.563				
11	I am able to effectively deliver presentations by using a tablet computer	.624	.567				
12	I am able to plan for the lessons when I use a tablet computer	.846					
13	I am unable to deal with maintenance problems associated with integration of tablet computers	.620					
14	I trust using tablet computers can expand (increase) and update (inform) or in other ways refresh my subject knowledge	.697					
15	I believe that teachers who use tablet computers will be able to teach better by finding online information	.724					
16	I believe that tablet computers can enhance a student's ability to acquire content knowledge	.759					
17	I believe that tablet computers can help in bridging in and out of class contexts	.816					
18	I am of the opinion that there is a lack of pedagogy-based technology training programmes for teachers	.750					
19	Lack of training hinders teachers from using tablet computers effectively in teaching	.787					
20	Tablet computers are not versatile tools which are ideal for educating students					.785	
21	I believe that the lack of access to the internet is one of the difficulties faced by teachers					.567	
22	I believe that there is a lack of content (programmes and software) in Arabic					.601	
23	Tablet computers cannot improve teaching experience					.621	
24	I know that I have the skills to prepare high quality lessons by using tablet computers or other technology tools						.542
25	I know that I have the skills to prepare high quality lessons more quickly by using tablet computers or other technology tools						.734
26	I have personal skills to use technology tools (for communicating, using word processor)				.529		
27	I have professional skills for using tablet computers in teaching (for time management, planning lessons)			.634			
28	I have skills in using other technologies for example using PowerPoint, video projectors, Smartboard etc.			.682			
29	I do not have high skills to use tablet computers for teaching.	.532		.637			
30	I know how to prepare lessons by using tablet computers or other technology tools	.538		.544			
31	I know how to integrate tablet computers into education to increase the quality and effectiveness of teaching (for example managing content, evaluating students, and engaging students in collaborative activities)			.710			
32	I know how to use tablet applications or programmes (mobile apps) which support my teaching				.843		
33	I know how to use the internet to find information to support my teaching				.768		
34	I lack knowledge in using tablet computers for teaching all subjects						.598
35	I have positive feelings towards using tablet computers for teaching				.679		

Table 15: Rotated Component Matrix

The next step involved revisiting the descriptive data, combining it with the factor analysis performed, scrutinising each item related to the factor on an individual basis, labelling the identified factors or meaningful components, and answering the research questions (Tables 15, 16, 17, 18, 19 and 20).

Overall, factor analysis was used to identify factors that represented relationships among group variables and not for testing hypotheses. Principal Component Analysis helped in identifying and extracting factors, interpreting which variables were attributable to a factor, as well as giving that factor a name or theme so that these labels or constructs reflected the theoretical and conceptual intent. The factors extracted in this study represented the critical factors of tablet computer integration from the perspectives of the teachers.

4.2.1 Interpretation of Factors

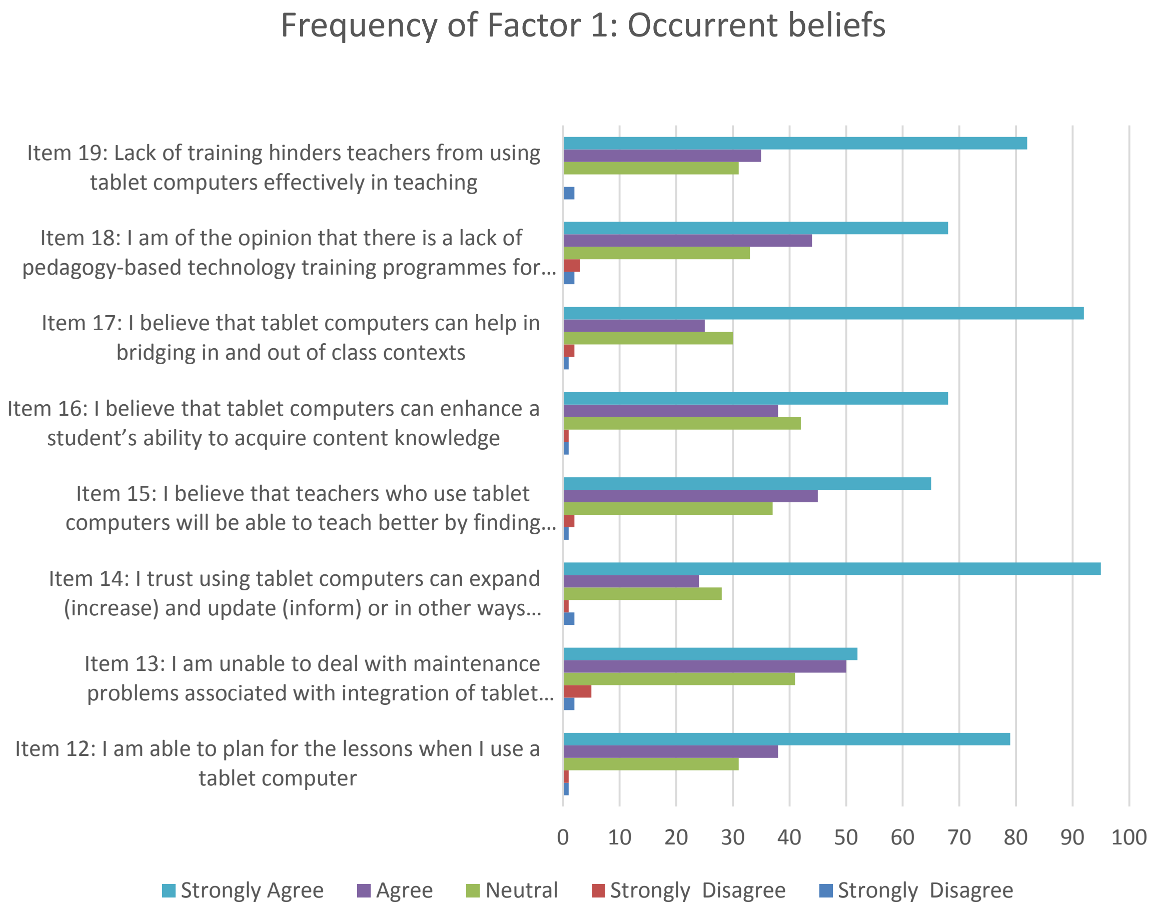
Factors are completely abstract and made up of numerical units that are not apparent or obvious. These measures are therefore only useful if they are given an identity (Beavers et al., 2013). The factors in the present study were therefore interpreted based on the researcher's judgement with each of the six factors being assigned a meaning. The interpretations were not based on theory or previous knowledge and no attempt was made to withhold or distort certain information. The meanings were derived from the factor loading patterns obtained by exploring the significant loadings for each factor. Variables with higher loadings and what these represented were crucial in interpreting the factors. The revisited descriptive statistics consequently allowed the use of a percentage distribution of responses to the variables within each factor.

4.2.2 Factor 1: Occurrent beliefs

Teachers' occurrent beliefs refer to their explicit judgments about using tablet computers. Teachers in this study had such beliefs consciously in their minds when using tablet computers as well as affirmative attitudes towards the intention to use the devices.

All the items associated with the first component deal with teachers' beliefs about using tablet computers, and so it made sense to label this component 'occurrent beliefs'. In this instance, teachers' beliefs mean the positive or negative way they view tablet computers and their use. The teachers' occurrent beliefs were guided by their attitudes which in turn influenced their behaviours towards tablet computer use in their classrooms.

Table 16: Factor 1: Occurrent beliefs



Factor 1 had items (Table 16), for example 'I am able to plan for the lessons when I use a tablet computer', 'I believe that teachers who use tablet computers will be able to teach better by finding online information' , tablet computers can expand knowledge, 'help in bridging in and out of class contexts', and 'I believe that tablet computers can enhance a student's ability to acquire content knowledge', which suggest that the teachers had positive beliefs about tablet computers. However, two other variables 'lack of pedagogy-based technology training programmes for teachers' and 'lack of training hinders teachers from using tablet computers effectively in teaching' suggest that the teachers would be more inclined to use the technology if there were training programmes. Table 16 shows that most teachers either agreed or strongly agreed with all the items constituting Factor 1. It is noteworthy that there were significant neutral responses to all the items associated with this factor. These responses are valuable in that they translate to the fact that the integration of tablet computers did not have a significant influence on some of the teachers to lead them to have a positive or a negative opinion on the questionnaire items.

Triangulation of questionnaire and qualitative findings will focus on these neutral responses in order to provide a better understanding of the teachers' occurrent beliefs.

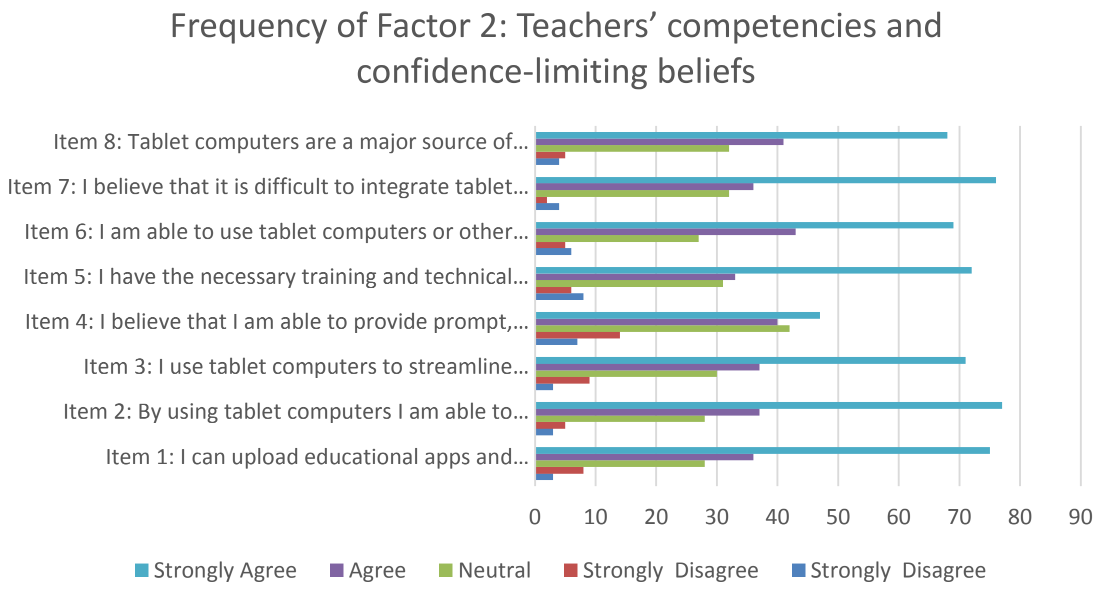
It is important to note that this factor includes attitude variables (for example 12, 13) and belief variables (for example 14, 15, 16, 17, 18, 19). This factor loads onto teachers' reported level of using tablet computers that enhances students' ability to learn (Item 16) and for planning lessons (Item 12). It can be inferred that teachers' intention for using these devices was to acquire subject knowledge that would enable them to prepare lessons (Items 14 & 15). Although the factor explains that the devices can bridge formal and informal learning (Item 17), teachers also felt that they had issues due to their inability to handle technological issues (Item 13). Teachers believed that the provision of technical support, technical training and pedagogy-based technology training may make some difference (Items 18 & 19). Such judgements were consistent with the circumstances and beliefs of a majority of the teachers.

Overall, this factor has made explicit teachers' personal considerations about using tablet computers. The teachers' occurrent beliefs can be seen as indicative of the quality of their relationship with the devices. This factor takes into consideration both the teachers' occurrent beliefs and the manifestations of these in practice, in order to provide a better understanding of how beliefs and attitudes about tablet computers influence teachers' practices. Although the loadings have variables which are varied, they share some conceptual meaning.

4.2.3 Factor 2: Teachers' competencies and confidence-limiting beliefs

Factor 2 was given the label 'teachers' competencies and confidence-limiting beliefs' which relates to competence and attitudes towards using emerging technologies to support practice. The group of items showing high loadings on the first factor is illustrated in Table 17.

Table 17: Factor 2: Teachers' competencies and confidence-limiting beliefs



This factor is connected to many variables which convey information that teachers' ability to use technology (Item 1 & 6) had created dynamic learning environments which foster student-teacher interaction. The results also supported that teachers' self-efficacy (Item 6) may have influenced their choice of instructional strategies. Items 1 and 6 are actually associated with technology self- efficacy (factor 3) but have loaded on this factor. Although factor analysis is a data-reduction technique, it was unable to reduce some of the overlapping variables. In order to meaningfully interpret a factor, it should have at least two or three variables (Williams, Brown & Onsman, 2010), but 8 variables had loaded onto factor 2, including Items 1 and 6, and therefore meaningful interpretation was a challenge. Nevertheless, the researcher labelled this factor as teachers' competencies and confidence-limiting beliefs' because the labelling of factors is a subjective and inductive process (Williams, Brown & Onsman, 2010).

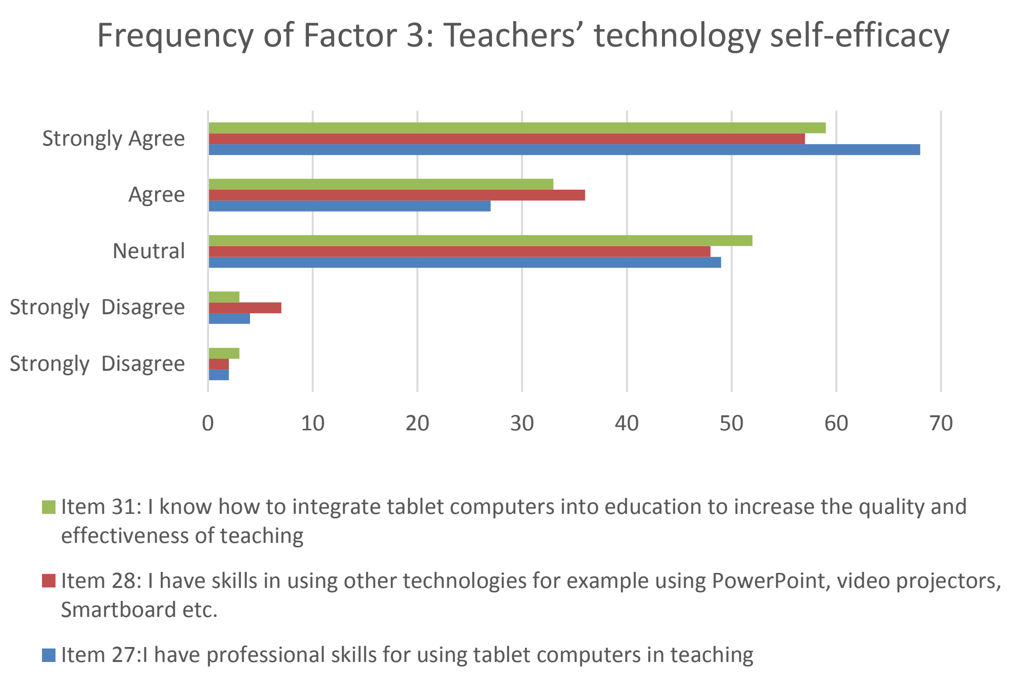
The results also suggested that tablet computers were breaking the traditional bond between teachers and students and changing the way they interact (Item 2). The teachers also felt that rapport between students and teachers is essential to learning for classroom discussions and assessing students. By restructuring assessments and using formative feedback the teachers indicated that they wanted to address multiple aspects of learning (Item 3 & 4). In other words, the tablet computers they integrated allowed a richer menu of approaches to assessments and feedback.

Although teachers' competencies allowed them to use tablet computers their confidence-limiting beliefs suggest that integrating the technology into the curriculum was difficult (Item 7). Judging by their abilities, as reported through their positive responses to most of the items in this factor, the teachers had the skills to use the technology but were still lacking confidence. This suggests that the teachers lacked technological pedagogical knowledge. Although this is a self-efficacy issue, the interview responses are expected to clarify if this difficulty was due to a standardized and mandated curriculum. The respondents identified technology training as a key component in a teacher's attitude and confidence when it comes to the integration of the devices into the curriculum (Item 5). Another issue which is related to technology and practice is that of classroom management as evident in the responses to Item 8. This suggests that the pedagogical reasoning and methods for the use of tablet computers is still unclear for some teachers who believed that tablet are a source of distraction (Agree 27.3%; Strongly Agree 45.3%).

4.2.4 Factor 3: Teachers' technology self-efficacy

The third factor is referred to as 'teachers' technology self-efficacy' which relates to teachers' confidence in tablet computer usage. Self-efficacy, in this study, is a major component as it helps in understanding the perceived ability of teachers to use tablet computers. Factor 3 refers to the ability or the self-perception of the teachers' competency in using tablet computers, including appropriate use of professional knowledge and skills. It can be postulated that teachers with strong self-efficacy are confident in their capabilities to work effectively with technology and therefore integrated the technology in teaching.

Table 18: Factor 3: Teachers' technology self-efficacy



The results (Table 18) show that the teachers had professional skills for using tablet computers (Item 27) using other technologies, and knowledge of how to integrate tablet computers to enhance quality of teaching (Item 31). These results suggest that the teachers had technological and pedagogical knowledge. The teachers considered that pedagogical knowledge related to the specialised knowledge they have for creating effective teaching and learning environments for all students by integrating tablet computers (Item 31). While pedagogical knowledge is key for a teacher's professionalism, the teachers reported that professional competence in using technology also involves skills which contribute to the effectiveness of teaching (Item 27). When it comes to knowledge about how to use tablet computers and other technologies or software to enhance teaching quality, the teachers again pointed to the importance of the teacher's skills (Item 28). Once again, as was the case in Factor 1, there were significant neutral responses to all the items associated with this factor. Results of the interviews and triangulation of questionnaire and qualitative findings is expected to provide a better understanding of how the teachers are differentiating between skills and pedagogic knowledge.

4.2.5 Factor 4: Integrating technology, skills, knowledge and attitude

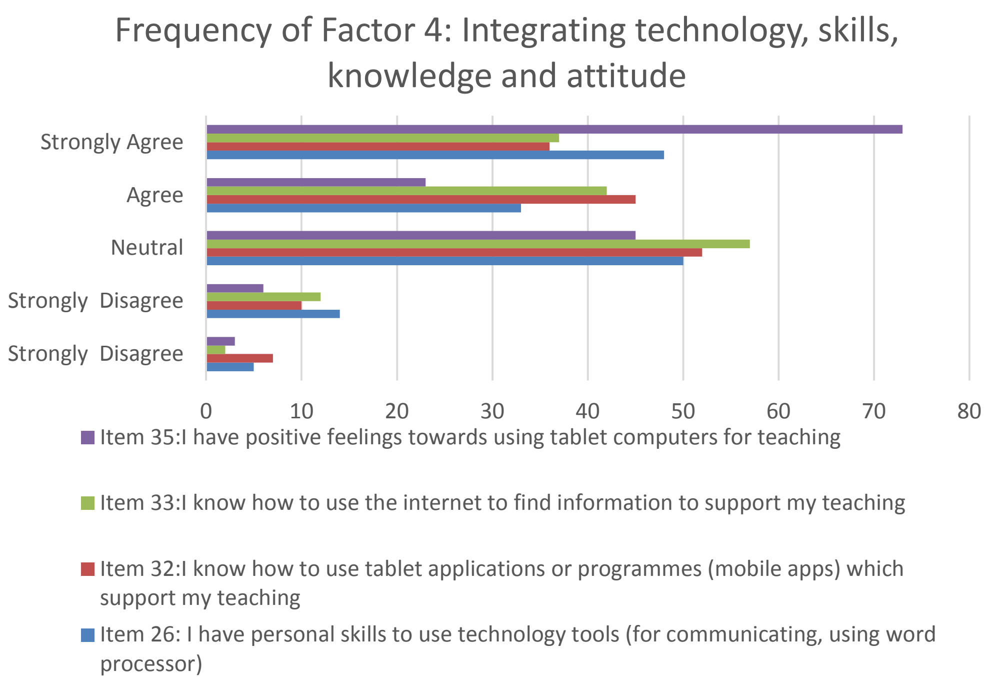
Technology knowledge is about what a teacher understands regarding how to integrate tablet computers in order to improve instructional strategies and strengthen content knowledge for students. It refers to teachers' understanding of how to use the technology in an expert manner.

Teachers can be considered expert in this context if they have the skills for integrating knowledge of technology, pedagogy and content.

This factor consists of items with significant loadings, for example 'know how to use tablet applications or programmes', 'know how to use the internet to find information', and 'have positive feelings towards using tablet computers for teaching' suggest teachers' positive attitudes towards integrating the technology.

Despite the high percentage of neutral responses (see Table 19) to all the four items associated with this factor, the results indicated that tablet computers seemed to fit with the pedagogical practices of the teachers, namely their skills (Item 26, 32, 33), and attitude (or positive feeling) towards using the devices for teaching and learning (Item 35).

Table 19: Factor 4: Integrating technology, skills, knowledge and attitude



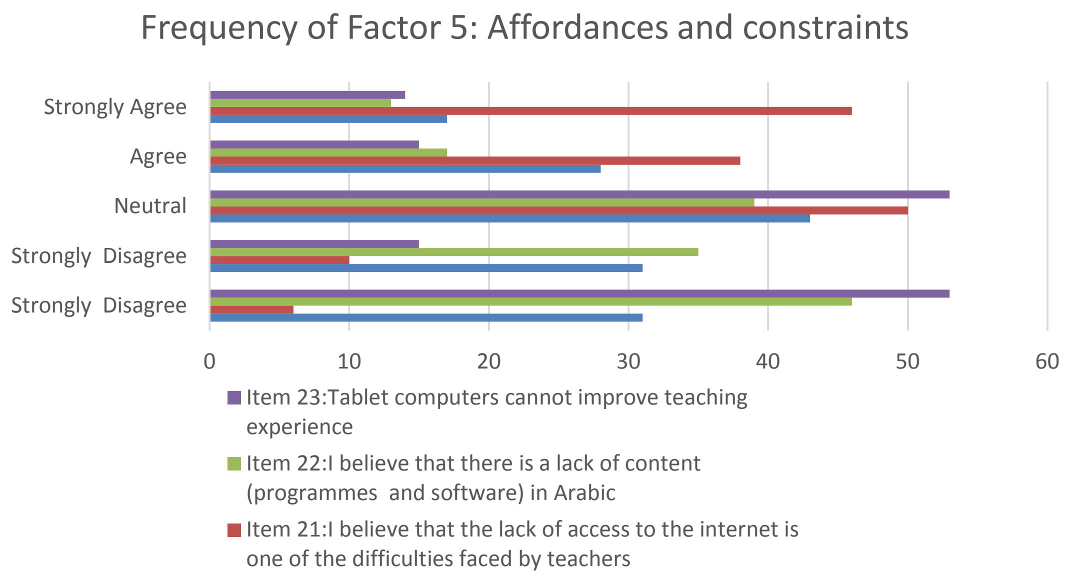
This factor suggests that the teachers were using their skills to use the technology as a 'tool' to support or mediate pedagogical practices. The variables therefore reflect the links between technology and the teachers' skills to use the devices in transformative ways. However, the neutral responses show that the teachers were moderately comfortable with the technology.

4.2.6 Factor 5: Affordances and constraints

Factor 5 was given the label 'affordances and constraints', which relates closely to 'perceived usefulness' from the technology acceptance model (TAM) and teachers' technological knowledge (TPACK). It also relates to the teachers' perception of the difficulty of using tablet computers. For the purpose of this study, affordances refer to the resource or support that tablet computers offers teachers. It includes all actions that are physically possible when using the devices for teaching. Here, constraints are the opposite of affordances and refer to restrictions or limitations.

Findings (see Table 20) reveal that teachers were aware of the perceived usefulness of tablet computers, for example the applicability of tablet computers or considering them as versatile instructional tools and technological constraints such as 'lack of content in Arabic'. Most teachers disagreed or strongly disagreed to these statements (see Table 19). Although the items might seem constraints focused, the researcher assumes that disagreeing with a barrier is an affordance. Teachers disagreed that tablet computers were not personal constraints and in fact improve teaching experience. This suggests that those who agreed to the statement (Item 23) could be identified as the central barrier to technology uptake in classrooms. However, the respondents attributed 'lack of access to the internet' as a constraint, which lead them to perceive tablet computers as difficult to use. It can be inferred that if teachers find it difficult to use tablet computers due to lack of access to the internet, then the perceived usefulness of tablet computer can decrease. Such perceptions can also suggest that the teachers were struggling to integrate the technology. On the other hand, this response can also be perceived as an excuse on the part of those teachers (Agree 25.3%; Strongly Agree 30.7%).

Table 20: Factor 5: Affordances and constraints



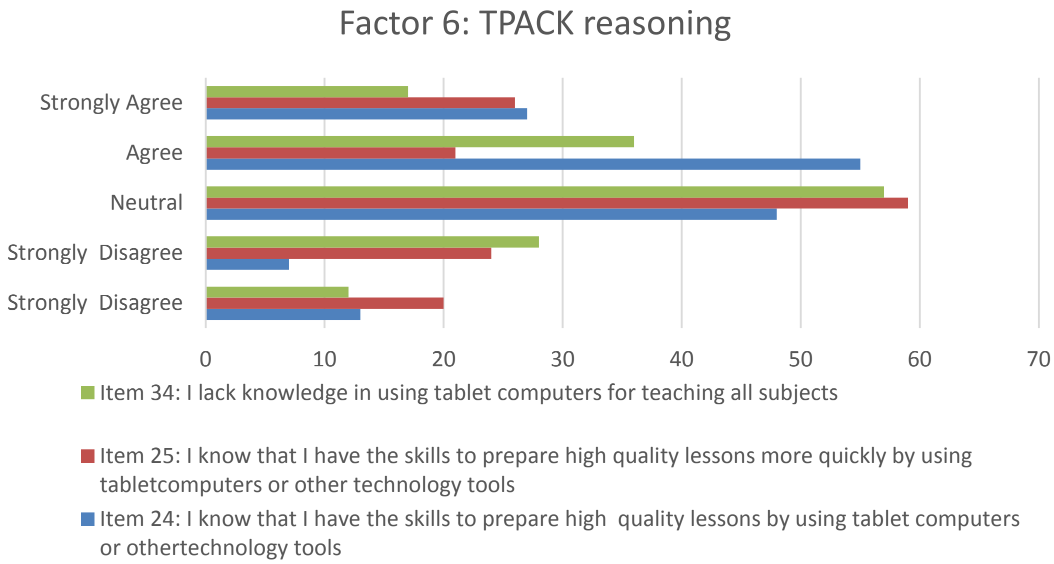
The above responses indicate that teachers' technological and pedagogical knowledge also include knowing the pedagogical affordances and constraints of tablet computers and other associated elements, such as internet connectivity and apps or online content.

4.2.7 Factor 6: TPACK reasoning

Factor 6 was given the label 'TPACK reasoning', which relates to using a comprehensive range of knowledge to integrate technology in content areas. Here, TPACK reasoning refer to the knowledge and abilities of teachers to create content using tablet computers and transforming teaching.

The teachers' responses (Item 24) indicate that their mastery of the devices to create quality content was key to their pedagogical reasoning (see Table 21). However, judging by the significant number of neutral responses, the teachers were not certain if they had the skills to access seemingly limitless online information and plan lessons much faster by using tablet computers (Item 25). The findings confirm that the teachers were also concerned with the contextual constraints, for instance the lack of knowledge in teaching all practical subjects (Item 34).

Table 21: Factor 6: TPACK reasoning



4.2.8 Summary

In summary factor analysis was used to identify factors or latent constructs from the descriptive data while principal component analysis was used to transform the correlated variables into a smaller number of components. The six factors were teachers' occurrent beliefs, competencies and confidence-limiting beliefs, technology self-efficacy, integrating technology, skills, knowledge and attitude, affordances and constraints, and TPACK reasoning. The findings reveal that the majority of the participants had positive attitudes towards tablet computers and had the skills to use the technology but lacked training to translate their skills and knowledge into practice. The teachers incorporated the tablet computers to enhance their pedagogical practices and make connections to their beliefs about the technology by adjusting their attitudes towards the devices and integrating them into the classroom. The teachers were aware of the affordances and constraints of the technology and used their professional and pedagogical knowledge and skills to use the devices. Although the quantitative results provided a summary of the teachers' frequency of response and helped identify the six factors, they also form the basis of additional inquiry. The following sections, which focus on qualitative findings, delve more deeply into different aspects of the research issues relating to, for instance teachers' beliefs, attitudes, knowledge and skills to integrate tablet computers in classrooms.

4.3 Phase two: Qualitative Interviews

This section presents the data analysis framework for the interview data and an analysis of the results. As indicated in the research methodology chapter, a semi-structured interview schedule was used to collect data from fifteen teachers in intermediate schools in Kuwait. The aim of analysing the collected data was to gain an understanding of teachers' beliefs and attitudes associated with the adoption of tablet computers for teaching and learning. Whether the deployment changed teachers' pedagogical approaches, and the challenges facing the teachers. The qualitative data was thematically analysed using inductive and deductive approaches (see Chapter Three - Research Methodology) and the chapter presents the main themes and findings.

4.3.1 Qualitative data preparation

The researcher used an audio recording device to capture the words of the participants in interviews and observation. With a recording, the interviewer was able to focus on listening and responding to the participant, without being distracted by needing to write extensive notes (Stuckey, 2014). The data was analysed using Microsoft Word. A word-processed document was created after closely listening to the audio recording of the interviews. The responses were in Arabic and had to be translated into English. In order to become familiarised with the data, the researcher personally transcribed the audio files, which were played over and over to check the accuracy of the transcription. Verbatim transcriptions of the data ensured establishing reliability, dependability, and trustworthiness of the study (Stuckey, 2014).

The data preparation also involved anonymising the data (Jamieson, 2016) by ensuring that each participant's name was replaced with a code (for example T1, T2, T3 and so on). The master list of the teachers' names and the codes assigned to them were stored in a secure location to avoid a breach in confidentiality.

4.3.2 Integrating inductive and deductive procedures

In mixed methods research quantitative and qualitative approaches are used. A deductive approach is normally used to test pre-conceived ideas and a researcher normally starts by reviewing existing theories about a phenomenon (Johnston, 2014). On the other hand, an inductive approach is used for developing new theory or explaining the phenomenon (Jamieson, 2016). The aim of the research in this study was to address the research questions and explore associations between teachers' beliefs and attitudes towards tablet computers as well as their knowledge and skills in using the devices.

In the current study, a hybrid approach to thematic analysis was used by adopting both inductive and deductive procedures. The integration of both the inductive and deductive procedures is also referred to as abduction (Lewins & Silver, 2014). The researcher started the analysis with predetermined categories, for example, theory or concept driven and derived categories inductively during data analysis (Hamad, Savundranayagam, Holmes, Kinsella & Johnson, 2016). The study incorporated both a data-driven inductive approach as well as a theoretical deduction approach (Fereday & Muir-Cochrane, 2006).

4.3.3 Thematic analysis

The rationale for using thematic analysis is that it can identify patterns of meaning across a dataset, in response to research questions (Braun & Clarke, 2006). The thematic analysis consisted of six phases, as suggested by Braun and Clarke (2006): getting acquainted (familiarising oneself) with the data by reading and re-reading it and making notes to record initial ideas; generate initial codes by highlighting specific aspects of the interview responses and observation schedules; searching for themes by gathering all coded data related to each potential theme; review the themes; refine the reviewed themes and renaming them; and finally producing the report which involved selecting rich, compelling excerpts from the interview transcripts and field notes/memos. The final stage involved connecting the main categories to each other, interpreting data and writing the narrative.

After familiarisation with the data during transcription, the next step involved breaking the data down and looking for parts of the transcripts that were relevant to the research questions. Colour coding was used to highlight the text which was then categorised and formatted into tables so that it could be used in the data analysis process. In doing so, the researcher was able to form a general impression of themes contained in the data. Not all themes were based on prior reading of the literature and the responses to the questionnaire items. Memos were created to note the initial themes that emerged. Member checking with the teachers helped in increasing the accuracy of their narrative or experiences (Hammersley & Atkinson 2007). For example, one of the teachers was asked about the nature of pedagogy-based technology training that they needed and in response the teacher (T6) elaborated that there was the need for training that would allow them to deliver truly flexible, personalised learning and teaching.

The researcher sought review and feedback from the teachers during the interviews, in order to reduce biases. Member checking, or respondent validation helped in analysing the initial propositions and confirming the researcher’s interpretations. The process involved checking if the key themes and findings were consistent so that it could be confirmed by the teachers. When a theme was identified which seemed to indicate a certain aspect of teachers' beliefs and attitudes, the researcher asked respondents to clarify the accuracy of the responses or findings via member checking. This chapter contains examples of how the participants’ perspectives and experiences were revealed.

4.3.4 Interview Results

This section is a narrative which clarifies the process of analysis of the research data. The stories told by the teachers about their perceptions of tablet computer integration were thematically analysed by dissecting them into themes that develop a general knowledge narrative. The main goal of the data analysis was to answer the research questions. The analysis eventually revealed nine main themes and sub-themes. (See Table 22)

Research question	Themes	Deductive/Inductive
RQ1. What are teachers' beliefs and attitudes associated with the initial adoption of tablet computers for learning and instruction?	Affordances.	Deductive
	Teachers’ dispositions.	Inductive
	Self-efficacy belies. Sub-theme: Lack of self-efficacy.	Inductive
	Self-efficacy beliefs. Sub-theme: Increased self-efficacy.	Inductive
	Self-efficacy beliefs. Sub-theme: Collective efficacy.	Inductive
RQ2. How has the	Increased communication and collaboration.	Inductive

Research question	Themes	Deductive/Inductive
deployment of tablet computers influenced or changed teachers' pedagogical approaches in intermediate schools?	Alters teaching practice.	Inductive
	Fosters authentic assessment.	Inductive
	TPACK skills. Sub-Theme: Skills to teach self-regulation.	Deductive
	TPACK skills. Sub-Theme: Technological and Pedagogical knowledge.	Deductive
	TPACK skills.	Deductive
RQ3. What are the challenges facing teachers who use tablet computers for teaching in intermediate school classrooms?	Sub-Theme: Technological and Pedagogical knowledge.	
	Inadequate policies. Sub-Theme: Lack of adequate training.	Inductive
	Inadequate policies. Sub-Theme: Lack of support.	Inductive
	Inadequate policies. Sub-Theme: Lack of autonomy.	Inductive
	Inadequate policies. Sub-Theme: Mandated curriculum.	Deductive
	Actual and envisioned barriers. Sub-Theme: Source of	Inductive
	Actual and envisioned barriers. Sub-Theme: Lack of	Inductive

Table 22: Main themes and sub-themes and related research questions

The design of this network of themes involved in-depth repeated analysis and was geared towards answering the key research questions. The findings are arranged thematically to highlight key findings. Those themes, organised by research questions, are explored further in the following sections.

RQ1. What are teachers' beliefs and attitudes associated with the initial adoption of tablet computers for learning and instruction?

The themes that provided the answers to this research question were affordances, teachers' dispositions, and self-efficacy beliefs (and sub-themes lack self-efficacy, increased self-efficacy, and collective efficacy).

4.3.4.1 Affordances

This theme refers to teachers' beliefs about the real and possible uses or limitations of tablet computers as technological tools for teaching and learning. Affordances refer to the qualities or properties of an object or product, for example, tablets that define its possible uses or how it can or should be used, for example, for teaching learning or for entertainment purposes.

When asked about their experiences in adopting tablet computers, most teachers felt that the devices provide multimodal affordances such as: *user-centred apps, interactivity* and *creativity.* One respondent was of the belief that tablets afforded digital reading:

> *"Initially, I thought that tablets cannot replace paper-based text books. Recently e-textbooks have been introduced for students. The Ministry of Education, along with a software development firm called ReDSOFT, have created a very appealing and remarkable app available on Apple devices. It allows students and teachers to download all the books for all grades."* (T1 on 6/5/2017)

This response indicates that paper-based textbooks were not used, as tablet computers have the potential to hold hundreds of textbooks, and this technology allows students to interact with these books. It also demonstrates that government run intermediate schools in Kuwait have begun transitioning from paper textbooks to digital learning environments. The teacher was grounded in the belief that the rationale for the introduction of tablet computers was because of its potential for making available interactive book apps. By suggesting that the apps were 'appealing' and 'remarkable', the teacher was making it apparent that the design features of the apps can alter the nature of learning, for example enhance visual and auditory learning.

One teacher considered tablet computers as enhancing creativity:

> *"... ideal for teaching practical subjects such as electricity and renewable energy. My students are using illustration apps such as SmartDraw for creating electrical diagrams. They are doing this instantaneously which is not possible with other technologies."* (T2 on 10/5/2017)

The teacher saw the possibility of integrating the devices to allow students to use interactive apps to draw diagrams. In other words, the teacher was implying that tablet computers were integrated to address visual and auditory modalities, as well as to engage students. T12 was another teacher who experienced students *"using electrical drawing software and using free pre- drawn electrical templates to draw diagrams".* (T12 on 21/5/2017)

Other affordances that the teachers attributed to tablet computers were: *portabilty* (T7 on 13/5/2017, T13 on 20/5/2017), *convenience* (T1 on 6/5/2017), *encourages students to become independent learners* (T6 on 11/5/2017), *appeal to students who prefer touch screens* (T14 on 17/5/2017; T15 on 25/5/2017), enhance *"creativity"* (T12 on 21/5/2017), and *extend learning beyond classrooms* (T7 on 13/5/2017, T13 on 20/5/2017). By describing the characteristics of tablet computers, all these teachers were claiming that they were aware of its affordances to support learning.

The portability of the devices also allowed teachers to take learning out of the classroom and provide positive reinforcement for learners.

> *"The tablets allow slow learners to download the videos and watch them at home to better understand the concept."* (T2 on 10/5/2017)

This teacher was claiming that tablet computers were useful because of his belief in its relevance outside the classroom. T2 was making it clear that the portability affordance of the tablet computers was being harnessed to support differentiated learning or providing learning tasks that support the different learning goals, styles, attitudes and abilities of students.

Three teachers, who were interviewed, pursued a shift to personalised learning because tablets can be used for "one-to-one" learning because all students have access to these devices. *"Tablets also are flexible as I can design lessons specifically for one particular student"* (T8 on 14/5/2017), *"send content"* (T10 on 15/5/2017) *"such as lessons and course materials"* and use it for *"assessment"* (T11 on 23/5/2017). These teachers had taken advantage of the affordances of tablet computers with the knowledge that they can quickly deliver engaging material to the students in real time, in just a couple of taps.

Teachers also commented that student preference was a positive element linked to using the devices. Although (T9) a teacher with 9 years' experience, lacked training, he was willing to use *"tablets for teaching"* as these technologies are used by students *"in their daily lives"* (T9 on 16/5/2017). Similar views were expressed by another teacher who stated that young learners develop the competence to use technology naturally through observation: *"Unlike most technologies, tablets provide more opportunities for students as they do not need any training"* (T10 on 15/5/2017). This comment must have been based on the teacher's assumption that students are habitually involved with these devices, to use technology intuitively and not necessarily as a learning tool. However, one teacher voiced concern by stating that students need direction and that teachers have to provide assistance to facilitate knowledge acquisition:

> *"Tablets and other technologies allow students to get more information as compared to*

traditional learning but the students need guidance." (T10 on 15/5/2017)

This is a significant finding because the teacher was personally convinced of the affordances of tablet computers but was equally aware that students need support in order to understand concepts, although they are practiced users of digital technology.

4.3.4.2 Teachers' dispositions

This theme refers to the characteristic attitudes of the teachers: both positive and negative. The teachers' dispositions were guided by their beliefs and attitudes towards technology. Teachers' attitudes towards tablet computers, for the purposes of this study, include the value the teachers place on the importance of these devices for teaching and learning, as well as the perceived ease and convenience of the technology.

Five teachers (T1, T2, T5, T6 and T10) mentioned that their own attitudes and beliefs, as well as knowledge and skills, were the strongest contributory factors to their abilities to integrate tablet computers. Few examples of such responses were that *"tablets inspire action"* (T1 on 6/5/2017) and *"increased confidence"* (T6 on 11/5/2017) in using the devices for teaching. Similar opinions were voiced by other teachers who felt confidence in their ability to engage students:

"Whenever I give students some homework, it stimulates personal interest." (T2 on 10/5/2017)

"I want to deliver lessons to students incorporating interesting and stimulating tasks." (T5 on 8/5/2017)

The teachers were giving assignments or delivering lessons with an encouraging attitude so that the tablet computers would kindle students' personal interest in carrying out their tasks. The two comments (T2 on 10/5/2017, T5 on 11/5/2017) indicate teacher attitude and the ability to foster the positive attitude of students towards learning. Teachers' knowledge and skills development was evident in these responses as they wanted to successfully align the technology with content and pedagogy as well as their objectives. Overall, these teachers considered tablet computers as instructional tools that can enhance student learning.

One teacher's attitude to extended learning was that students should acquire knowledge outside of the traditional classroom methodology:

"I do not want students to receive all the information from me." (T5 on 11/5/2017)

The intention of this teacher was to provide a supplementary learning environment for students.

The teacher viewed learning from a new perspective and belief that technology-supported environments are places where students can acquire additional knowledge.

For other teachers (T5 with three years' teaching experience and T10 with four years' experience), the main reason for integrating tablet computers was to positively impact students. They were *"open to change"* (T10 on 15/5/2017) and *"not resistant to tablets or change, unlike many teachers in Kuwait"* (T1 on 6/5/2017). These respondents strongly believed that they were more willing to try or apply tablet computers. However, there were three teachers with negative attitudes. An interesting theme that emerged from their responses was the need for relevance. Teachers (T3, T4 and T9) considered that there was not a clear underlying pedagogical focus for using tablet computers, which reduced this technology's relevance: *"I think tablets are not relevant for teaching my subject"* (T3 on 7/5/2017). This teacher perceived that tablet computers were not ideal for *"seriously browsing the Internet"* and that they are *"only good for casual browsing"* (T3 on 7/5/2017). This remark indicates that tablet computers were being used by students for irrelevant browsing. On the surface, the teacher was implying that by casually browsing the Internet the students were only gaining factual knowledge. During the respondent validation process, the researcher received feedback from the informant (T3 on 7/5/2017) that although serious browsing was better for analytical skills the students would not use technology for that purpose. Another teacher remarked: *"I do not think that tablets are relevant or can change my style of teaching"* (T4 on 9/5/2017). The responses of T3 and T4 demonstrate that they had deeper inner beliefs. In other words, they did not want to use tablet computers because they believed that the devices would change their teaching style. There was a sense of unwillingness on both respondents to use the devices to complement teaching. When asked about the usefulness of tablet computers, as compared to other technologies, one teacher replied that the devices were *"only a substitute for other existing technology"* and not *"as functional as compared to laptops"* (T4 on 9/5/2017). Most importantly, there was the belief that these devices had not altered their *"teaching style or practices"* (T3 on 7/5/2017). The disposition of the teachers (T3 and T4) was that they were not willing to adopt tablet computers as they did not want to change their pedagogical practices.

The above responses show that tablet computers were not central to these teachers' teaching beliefs. Teacher (T4 on 9/5/2017) attributed the inability to use tablet computers to lack of training, which was in contrast to many teachers who were able to learn to use the devices by independently exploring the device's capacity. Yet another respondent, who did not have a positive attitude, remarked: *"I don't like students copying answers from tablets"* (T9 on 16/5/2017). Although this could apply to any medium of access to information, the comment does identify and show the teacher's awareness of the ease of plagiarism that mobile technologies provide. The same teacher (T9) also evaluated the technology and its fitness for purpose:

"I think not all apps found on tablets are valuable for the students. I would rather look at other

resources which I can readily access." (T9 on 16/5/2017)

This again suggests that the teacher was reluctant to use the tablet computers as the belief was that these technologies were not entirely suitable to the pedagogical needs of teaching.

In the perspectives of teachers (T3, T4 and T9), the use of the tablet computers is limited as they view it as an ineffective replacement for traditional teaching methods or other technologies. Their bias against tablet computers leaves them unused in the classroom. Moreover, they did not appear to realise that the traditional boundaries of the classroom have expanded beyond the classroom.

4.3.4.3 Self-efficacy beliefs

For the purpose of this study, self-efficacy is defined as teachers' beliefs in their own ability to influence or achieve certain outcomes in children by integrating tablet computers. The three sub-themes which were merged to create this central theme are lack of self-efficacy, increased self- efficacy and collective self-efficacy. This theme provides answers to the research question by portraying how teachers feel, think, motivate themselves and behave when integrating the devices in classrooms.

4.3.4.4 Sub-theme: Lack of self-efficacy

Lack of self-efficacy refers to teachers' lack of confidence in integrating tablet computers. They are unsure of their capabilities and therefore avoid, resist or feel less confident in using tablet computers.

A small group of teachers (T3, T4 and T9) who also happened to have lowest perceived self- efficacy compared to the rest of the sample, treated technology with distrust and saw it as potentially impractical. The following comments provide sufficient evidence indicating teachers' lack of self-efficacy in using tablet computers:

> *"It can be a challenge to motivate students to do activities at home to prepare or extend their learning."* (T3 on 7/5/2017)

> *"I need technological skills, the skills to create content and also teaching skills. I have not fully acquired the skills."* (T3 on 7/5/2017)

The beliefs of these teachers suggest that they did not have positive attitudes. By claiming that it was difficult to motivate students to learn independently, the teachers demonstrated a lack of confidence in the ability to promote students' learning. Teachers (T3 and T 4), although skilled in the classroom and in pedagogy, doubted their skills:

"I still think that the conventional skills were better than technology skills." (T3 on 7/5/2017)

"I am very uncertain about my ability to effectively teach my students using tablets." (T3 on 7/5/2017)

"I have been told my colleagues that tablets have made them change from being conventional teachers to those who adopt new methods. I hope that this will happen to me." (T4 on 9/5/2017)

When questioned in the interview, the teachers' responses suggested that they were uncertain if they had the right skills to respond to students. The fear and apprehension towards technological change may have influenced the technology self-efficacy of one teacher, as illustrated by the following comments:

"I am learning to use tablets for teaching, but it is slow. I am afraid that I may not do justice to my job. Also, I don't want to make mistakes in front of my students." (T4 on 9/5/2017)

"I am anxious that I am not a person who can fix technical issues while teaching with tablets. Also, I am afraid of taking the risk of using tablets in classrooms." (T4 on 9/5/2017)

"I don't want to lose control over my students or my teaching." (T4 on 9/5/2017)

Being a self-proclaimed low technology self-efficacy participant, teacher (T4) shared how his attitude towards tablet computers restricted its use for teaching and learning. The fear of losing control of the classroom seemed to have frustrated this teacher. While acknowledging that tablets are useful, T4 admitted being technologically challenged. However, this teacher (T4) who had taught for eight years had aspirations for adopting the technology. Yet another respondent with a similar attitude was of the opinion that he was unable to change his pedagogical style:

"I am finding it difficult to change my style. How can I get them to learn about a topic or concept by going out and finding information for themselves?" (T9 on 16/5/2017)

This teacher, who was used to traditional teaching practices, had confidence issues with technology, for instance in adapting teaching to the classroom or motivating students to acquire knowledge on their own.

The personality traits identified as a result of the interviews were that the teachers (T3, T4 and T9) were not innovative, lacked determination and did not want to be risk-takers.

4.3.4.5 Sub-theme: Increased self-efficacy

Six out of the fifteen teachers had higher self-efficacy levels and were more committed. They had strong beliefs in their competencies to use tablet computers.

During the interview, one teacher (T1) with five years of teaching experience stated:

"Most teachers like me have taken our own initiatives and learnt how to use the tablets for teaching through trial and error." (T1 on 6/5/2017)

This suggests that T1 had very high technology self-efficacy. Other teachers, who reported an overall sense of growth in efficacy in using tablet computers, remarked:

"Initially I was a little nervous, to be honest. I still had to learn myself before using it." (T1 on 6/5/2017)

"I have begun to feel that I am using tablets far more than I used to. I acquired the skills on my own." (T12 on 21/5/2017)

They attributed their success to their efforts as well as their knowledge and skills. They were confident in their abilities (T5 on 11/5/2017) to use the tablet computers for creating lessons (T13), communicating and assessing students (T14 on 17/5/2017), and use the devices *"to work in partnership with the students"* (T15 on 25/5/2017).

4.3.4.6 Sub-theme: Collective efficacy

Another key theme that emerged was collective efficacy, between teachers and students, in terms of tablet computer usage. Students and teachers working together were able to find solutions to problems which was a key element in fostering the development of collective efficacy. Collective efficacy refers to the beliefs of teachers that they can actively engage students in order to have a positive effect on the learners.

Teachers worked with peers/colleagues and students as partners to solve problems associated with using tablet computers as pedagogical tools, as the following description indicates:

"I have begun acquiring the skills to use it for creating lessons, teaching, monitoring and assessing students. My colleagues help me." (T4 on 9/5/2017)

Others, for instance T8, a teacher with four years teaching experience, learnt from fellow colleagues how to use his device, while T12, a teacher with three years teaching experience, taught other colleagues and students. The teachers also approached students to help them in using the tablet computers. One teacher, who was not ashamed of such actions, reported:

"when navigating with tablets I sometimes face difficulty [hesitates] ... I am more used to laptops. The kids help me in the classroom." (T7 on 13/5/2017)

The reason provide by one teacher for approaching students was because of the belief that young learners are *"far better at using hand held devices such as tablets"*, and as the students were willing to help they took advantage of the opportunity (T12 on 21/5/2017).

The responses indicate that although the teachers did not have technological skills or knowledge, they had confidence that their lack of skills did not have a detrimental effect in terms of avoidance of teaching the subject.

RQ2. How has the deployment of tablet computers influenced or changed teachers' pedagogical approaches in intermediate schools?

The themes that provided the answers to this research question were increased communication and collaboration, alters teaching practice, fosters authentic assessment, and TPACK skills (including sub-themes technological and pedagogical knowledge, and skills to teach self- regulation).

4.3.4.7 Increased communication and collaboration

This theme refers to the possibility of using tablets to communicate with one another, work in groups, share ideas, and solve problems. Teachers' responses demonstrate that there was improved communication with students. There were several instances when collaboration took place. According to teacher (T2) with three years teaching experience:

> *"I encourage students to learn by using tablets and correct them if they provide wrong answers. I have been corrected too."* (T2 on 10/5/2017)

This is about collaborative learning, as it gave the teacher the opportunity to learn from the process and to correct misunderstandings.

Tablet computers provide instant access to social networking and teachers used the apps for communication. For instance, one teacher who collaborated on a daily basis claimed:

> *"I created a Facebook page for the class and asked all students to use their tablets to communicate via Messenger."* (T14 on 17/5/2017)

This teacher considered communication with students important in order to facilitate learning. Like T14, there were seven other teachers who used their devices to facilitate the desired group interactions. According to one teacher with four years teaching experience:

> *"Sometimes I have problems with the apps. I talk to the students and we try to figure it out together."* (T10 on 15/5/2017)

To apply learning in the classroom, the teacher depended on the support of his students. Other teachers used the tablet computers to "connect" or "interact" with their students and learn together (T7 on 13/5/2017, T11 on 23/5/2017and T14 on 17/5/2017) as they felt that the interactive devices gave them "greater freedom" to share ideas (T13 on 20/5/2017) and offer feedback to students (T6 on 11/5/2017, T15 on 25/5/2017). They appeared to thrive on frequent dialogue.

This is real collaborative learning which benefits everyone. These teachers were using technology to not only communicate with students but also to store and retrieve class materials. Teachers who integrated the tablet computers facilitated constant feedback, which enables students to learn through discussion, clarification of ideas and evaluation of others' ideas. This theme can be categorised as an affordance as it supports communication and also teaching by enhancing and extending the teachers' abilities.

4.3.4.8 Alters teaching practice

This theme refers to how tablets have changed teachers' teaching practices. These devices alter the way teachers interact with students. There is a change in teachers' role also; rather than lecture students, teachers can now engage students in discussions. Instead of designing lesson plans alone, teachers can ask students to offer their input.

There were also teachers who recognised significant modifications in their practice that were associated with tablet computer use. In the views of one teacher:

> *"I want students to interact. My relationships with my students changed. My style is to support students. Using this new style, I offer guidance instead of lecturing. Whenever I lectured in the*

past I have seen students feeling sleepy." (T1 on 6/5/2017)

T1 was suggesting that by offering scaffolds or providing support, students could progressively move towards stronger understanding. This again is one of Vygotsky's ideas. One teacher who co-constructed knowledge with learners by using tablet computers commented that the intention was to build relationships with them (T8 on 14/5/2017). These responses (T1 and T8) show there are changes in teachers' instructional relationships with students.

A teacher with four years' experience claimed that:

"The integration of tablets in my school has increased my pace of learning and the need to use these new technologies." (T7 on 13/5/2017)

This response suggests a connection between the teacher's beliefs about teaching practices and technology implementation practices. There were other teachers like T1, T7 and T8 who had positive attitudes. According to T7 (on 13/5/2017), students can learn independently if tablet computers are integrated and if they are provided with assistance. This teacher also indicated the development of a positive attitude and growth over the years:

"I have over the past few years watched them clicking away on their devices, chatting during class intervals, I wanted to use this to my advantage." (T7 on 13/5/2017)

This is indicative of an adaptive and enabling behaviour. The teacher was enabling the students to acquire conceptual, social, and practical skills. There was also evidence that the teachers interviewed were keen on moving away from traditional teaching methods:

"I am one who wants students to become active learners and not depend always upon me. The national curriculum for this subject requires that teachers use the prescribed textbooks and impart knowledge to students. I am against this." (T12 on 21/5/2017)

Likewise, teachers also did not want students to approach them for everything suggesting that students were encouraged *"to search online, watch videos, make notes and to begin to develop new resources"* (T13 on 20/5/2017). The teachers integrated the devices in such a way that it matched their own teaching philosophies and delivered content, for instance they provided feedback *"even during the weekend and on holidays"* (T15 on 25/5/2017), assessed students and posted class schedules (T14 on 17/5/2017), and allowed students to *"engage in social and class-related conversations"* (T14 on 17/5/2017). Two teachers in particular (T14 on 17/5/2017 and T15 on 25/5/2017) indicated how the use of tablets can help them take their roles as teachers beyond the classroom.

A teacher, with over 8 years of teaching experience, who was reluctant to use tablet computers also believed that these technologies were very important in education and for students'future success:

"I understand that when I use these skills in classrooms I can help students to acquire the skills they need in future life." (T3 on 7/5/2017)

According to another teacher:

"I realise that if I use traditional educational practices I may not have the skills to effectively teach these students who are used to tablets." (T9 on 16/5/2017)

Although these two teachers lacked skills they had aspirations that there was the need to acquire the skills suggesting that they hoped to alter their teaching practices. On the contrary, teachers who had already acquired the skills and had the confidence were intending to use tablets to their advantage. For instance, one of the teachers remarked:

"I don't want to stand up and teach the way that I used to. Initially I never liked students stopping my lecture and asking questions. It was always me that asked questions, not the students. That has changed now." (T5 on 11/5/2017)

Another teacher added:

"I prefer an indirect approach. That which encourages students. That which involves the technology that students prefer." (T10 on 15/5/2017)

Other respondents gave students more freedom, after they had integrated tablet computers:

"Although schools have provided students with tablets, I also allow them to bring their own. I want my students to have the freedom to use their devices and to work at a speed that is comfortable to them. Not just in classrooms but also from home. They can then discover what they want to learn from the lessons I created for them or search online for other sources." (T6 on 11/5/2017)

"After I started using tablets I have stopped setting rules or controlling students." (T12 on 21/5/2017)

"I give students choices. I did not do this when using conventional teaching methods. I allow them to make decisions whether it is right or wrong because only then can they learn. Tablets allow

them to learn this way." (T11 on 23/5/2017)

The above responses indicate that by embracing new methods of teaching (T2, T8, T10), the teachers were able to adapt their teaching styles, for instance by giving students more independence as well as more options and choices so that they can reflect on their own interests and preferences and learn on their own. They were planning more interactive and creative opportunities for their students. The teachers did not intend to use the device in traditional 'drill and skill' ways but wanted to leverage the unique potentials of the tablet computers to support student-centred learning. Overall the teachers wanted to suit students' learning styles (T11 on 23/5/2017) or meet the needs of students (T6 on 11/5/2017, T7 on 13/5/2017). These teachers consistently portrayed a positive attitude. One particular response from a teacher with six years' experience stands out:

"If my teaching practices are not tuned to the needs of the children, then tablets won't work in the classroom. I have to do more than provide content. I have to create content, engage students and make them more attentive." (T15 on 25/5/2017)

However, one teacher (T1) went on to share thoughts about how some teachers were unable to do what most teachers were doing:

"It is difficult to change the beliefs of some of our teachers who are used to traditional teaching practices." (T1 on 6/5/2017)

T1's comment indicates that teachers in Kuwait generally are not keen on changing their mindset, or in other words willing to change their beliefs. In effect, according to this teacher most teachers in Kuwait want students to be simply passive recipients, devoid of vigour and engage in memorisation or rote learning to succeed in exams. This teacher's argument is that changing teachers' views is not easy as their beliefs come from the experience that they brought into these beliefs. In other words, T1 was claiming that teachers were not interested in altering traditional practices or tilting the balance in favour of a more student-centric learning environment by adopting tablet computers in classrooms.

Besides wanting to change their pedagogical styles, the teachers also wanted to *"get involved in curriculum design"* as they were *"the ones actually implementing tablets in classrooms"* (T1). This is about updating the curriculum to accommodate tablet computers in a 'new' pedagogical approach required by new and emerging technologies. The researcher sought clarification from the informant during respondent validation and T1 suggested that although teachers had high expectations they also wanted a more participatory approach to curriculum development, which is lacking in Kuwait.

The overarching theme 'alters teaching practice' is a key finding. Teachers in Kuwait who used to control access to knowledge are now transforming themselves into facilitators or enablers; they are not seen to be controllers who set rules. Most teachers (n=12), barring a few (n=3) were guiding students on how to learn using tablet computers, search for information or content, engage in dialogue or discussions, and share ideas.

4.3.4.9 Fosters authentic assessment

Traditional assessments place importance on standardised tests that are supposed to demonstrate students' learning capabilities. Teacher participants (T2, T6, T7, T8, T11, T12 and T15) in this study reported that they used tablet computers to assess and evaluate their students' meaningful intellectual accomplishments or knowledge of subject matter. They encouraged problem-solving skills, social skills, and attitudes that are used in a real-world, or simulation of a real-world situation.

A teacher who reflected on past experiences explained how student assessment has changed after the introduction of tablets computers:

"Prior to the introduction of tables, I used to take time to assess students. Now I do not use paper-based tests. I assess them whenever required immediately in the classrooms." (T2 on 10/5/2017)

According to this teacher, the rationale for adoption of tablet computers was to assess students and provide immediate feedback. This teacher also wanted students to access information from the tablets (T2 on 10/5/2017). Other teachers used the devices to change the assessment experience for students:

"I not only use tablets for teaching but also for assessment. The way I assess my students has also changed because I do not rely only on paper-based tests, but also via tablets." (T6 on 11/5/2017)

"I don't believe only in giving tests to students. I want to assess their performance continually, not on one day." (T7 on 13/5/2017)

These teachers were against administering standardised paper-and-pen tests to evaluate students. This suggests that tablet computers are gradually shifting the paradigm from paper-pen-based to computer tablet-based systems of examinations in Kuwait.

There was also a strong dislike of the standardised curriculum (T8 on 14/5/2017). Teachers wanted creativity in the regular school curriculum and were of the belief that the integration of tablet computers could help in enhancing ingenuity. One teacher, a harsh critic of the curriculum prescribed by the Ministry of Education, retorted:

> *“Traditional teaching approaches are based on the nationally mandated curriculum and the achievement of individual students. However, tablets are different. I use it for assessments but not to test the performance of individual students.”* (T8 on 14/5/2017)

When asked to clarify, during an informant feedback session, T8 (on 14/5/2017) claimed that schools have to question the traditional academic and didactic schemes developed by curriculum developers in Kuwait. Other teachers used apps to nurture students’ problem-solving skills by encouraging them to draw diagrams and answer questions independently (T11 on 23/5/2017 and T12 on 21/5/2017).

Using tablet computers was seen by teachers as providing choice and feedback for the students. Two teachers (T7 and T8), who used tablets in innovative ways, remarked that they encouraged students to use tablet computers as “clickers”, a classroom response system.

T8 claimed:

> *“I prompt the class, allow students to answer questions. I receive the responses automatically from the students on my tablet.”* (T8 on 14/5/2017)

T7 provided the justification for the use of this response system by saying that it enabled students to *“answer questions”* and allowed the teacher to provide *“feedback”* on a student’s progress (T7 on 13/5/2017). These two teachers talked about how much better it was to have a way to provide students with immediate feedback. They conveyed the feeling that tablet computers allowed them to provide immediate feedback and helped their students understand concepts faster. A similar sentiment was voiced by T15:

> *“I also use my tablets and the cloud to set, collect and grade work online. Students do not have to go through stress waiting for results, as through tablets they can have instant access to grades and feedback than via a laptop.”* (T15 on 25/5/2017)

The responses that helped generate the theme ‘fosters authentic assessment’ demonstrate that by integrating tablet computers the teachers were one touch away from student assessment and classroom management. Moreover, the teachers seemed to be empowered, as the technology allowed them a reprieve from tedious grading.

4.3.4.10 TPACK skills

There were responses which were categorised under a theme defined as TPACK skills. TPACK or Technological Pedagogical Content Knowledge is an amalgamation of teachers' knowledge of curriculum content, general pedagogies, technologies, and contextual factors that influence learning (Koehler & Mishra, 2008). For the purposes of this study, these skills include the ability to use tablet computers to engage students to access information, judgmentally assess the usefulness of the information, analyse it by sharing and discussing the information, and communicate the information to other students. Teachers need these skills (for instance skills to teach self-regulation and technological and pedagogical knowledge which incidentally are the two sub-themes) to respond to the developing expectations of students, and to take advantage of the opportunities afforded by tablet computers.

4.3.4.11 Sub-theme: Skills to teach self-regulation

Self-regulation is important because of the part it plays in teaching students how to control their learning environment. The teachers also indicated a belief that integration of tablet computers allows students to take control of their own learning as self-regulated learners and work independently to meet specific goals. The strategies used by the teachers were:

> *"I do not interfere in their learning when they use tablets. I want them to search and find information on their own. I have the skills to guide them."* (T1 on 6/5/2017)
>
> *"I incorporate tablets to allow my students to assume responsibility for their learning. I do not want to direct the lesson unlike most teachers in Kuwait. I attempt do make them independent learners. They can do lessons on their own."* (T7 on 13/5/2017)
>
> *"Tablets allow students to construct knowledge on their own … but teachers have to guide them."* (T9 on 16/5/2017)
>
> *"I assist students but do not interfere too much in what they do."* (T11 on 23/5/2017)

The intention of the teachers was to empower students and give them ownership and responsibility for their learning by having them independently perform the tasks once they were shown how.

> *"I show the students how to use conversion apps such as Electrical Converter and they start*

searching for similar apps and discover it on their own." (T5 on 11/5/2017)

"I want the students to learn on their own." (T12 on 21/5/2017)

These strategies are student-centred, and inquiry based, which results in students gradually becoming more autonomous. Overall, the teachers' perceptions of the pedagogical opportunities and pedagogical use of tablet computers seem to focus on motivating students, to keep them on- track towards their learning goals and accomplishing academic tasks.

4.3.4.12 Sub-theme: Technological and Pedagogical Knowledge

The responses that generated this sub-theme suggest that Kuwaiti school teachers need a variety of technological and pedagogical skills along with knowledge of their practical subjects and experience in using effective approaches for teaching. The teachers need to be competent in not only basic skills, but new skill sets such as flexibility, confidence, communication, the ability to engage, understanding of new and emerging technologies, and the ability to empower students.

One teacher identified tablet computers as interactive tools that get students involved in creating content:

"I ask students to create their own content, for example I ask them to create drawings of how solar panels work. I show them how to do it. The key aim was to motivate and engage students to be more actively involved in creating content." (T2 on 10/5/2017)

The intention of the teacher was to allow students to develop better understanding of the topics they were creating the content on. In order to enhance student collaboration as well as their learning experience the teachers were using technological and pedagogical skills to teach students to create content, store and share it with other students:

"I have the skills to teach the students how to log into our classroom cloud computing storage, retrieve lessons and use it in classrooms." (T1 on 6/5/2017)

Although technology can allow students to search and find information, teachers reported that they had the skills to provide assistance, for instance by interacting with students, not embracing traditional educational practices, integrating interactive apps, and finding appropriate content. Five teachers expressed views that they had these skills (T8, T9, T10, T11, and T13).

By stating *"I show videos to learners who cannot keep pace with other students"* (T2 on 10/5/2017), the teacher not only demonstrated technological and pedagogical skills but also used it to encourage students on how to solve a problem.

T5, a teacher with 3 years of teaching experience, shaped and adapted personal skills to accommodate the requests of students:

"Since students are asking me to send information or lessons via these devices, I have to follow their request. To do so I need skills. I think I have these skills." (T5 on 11/5/2017)

T5 made personal judgments and followed students' requests to disseminate appropriate content. On the other hand, another teacher who lacked the skills or knowledge, expressed scepticism about the usefulness of the technology for teaching practical subjects:

> *"I am very sceptical about using tablets. I don`t know how to use it in the class. I always feel that it is for entertainment only as it has no educational value."* (T9 on 16/5/2017)

This comment shows lack of teaching pedagogy and understanding of how technology and pedagogy can work together. Most teachers who had technological and pedagogical knowledge, attributed their skills to the training they received. However, they sought more training to hone their skills.

4.3.5 RQ3. What are the challenges facing teachers who use tablet computers for teaching in intermediate school classrooms?

4.3.5.1 Sub-theme: Technological and Pedagogical Knowledge

In terms of some teachers (T3 and T4 in particular), the biggest challenge was their lack of knowledge and skills, as they had not learned how to use the technology. In the interviews, they explained:

> *"I have some skills in processing information which allow me to create the content, but I am not yet ready."* (T3 on 7/5/2017)
>
> *"I still lack skills. Yet I use tablets as I think I have to keep current with the devices that children like."* (T4 on 9/5/2017)

T4 was a teacher who not only lacked skills but also pedagogy-based technology training.

"I need more training for familiarising with the device and its educational applications in practical subjects." (T4 on 9/5/2017)

Both teachers did not have an understanding of the pedagogical principles that govern the application of tablet computers into teaching and learning. There is a lack of pedagogical clarity on part of these teachers, which is also related to their attitudes towards tablet computers.

However, teachers with skills and pedagogical clarity felt that they wanted to use the tablet computers in novel ways.

According to T6, a teacher with 10 years' experience:

"I have skills. However, it is not skills in using tablets that are important. I feel that tablets have to be used in innovative ways." (T6 on 11/5/2017)

The teacher then continued and stated that pedagogy-based technology training is crucial for integrating tablet computers. It is evident from this response that T6 wanted to use the technology as a tool to support instruction, for example the need for delivery of truly flexible, personalised learning and teaching, but did not have training. These examples were provided by the teacher when member checking was undertaken.

Another challenge was that teachers were more focused on the technology and not the pedagogy. For instance, T13, a teacher with eight years' experience, who had acquired the skills to identify and use apps for teaching and learning used only apps for teaching basic electronics.

4.3.5.2 Inadequate policies

This refers to lack of vision of the policies of policy makers that do not align the curriculum with technology integration, not supporting teachers, not involving teachers in decision making and not providing adequate training opportunities for teachers.

4.3.5.3 Sub-theme: Lack of adequate training

Lack of sufficient training and attitudinal barriers had prevented teachers from utilising tablet computers competently in their pedagogy (teaching). Almost all the teachers indicated that training was needed in the use of tablet computers and described their feelings about available professional development opportunities at their schools. This suggests that they needed more technological and pedagogical knowledge.

"I am using tablets but the teacher preparation programme I received as a student-teacher was not appropriate." (T1 on 6/5/2017)

T1 was implying that the teacher preparation programmes did not properly reflect the technological teacher competencies, which are important criteria for teachers in the age of technology. Other teachers did not feel that their experiences would expand their knowledge. Therefore, they suggested:

"I do not know how to efficiently and effectively use these devices. I need more professional training." (T6 on 11/5/2017)

"There are training programmes but I am not sure if they are effective. They are of short duration and the programmes are meant only for teaching us how to operate the tablets, but not for teaching …. We need more professional help and hope that the Ministry of Education would do more by organising more workshops and training programmes." (T1 on 6/5/2017)

The teachers wanted the Ministry to formulate comprehensive training programmes that (T2 on 10/5/2017, T10 on 15/5/2017) and which *"can address the deficits in my knowledge about new teaching approaches"* (T13 on 20/5/2017). These remarks suggest a deficiency in the training provided by the Ministry of Education.

Therefore, these teachers wanted policy makers to provide adequate training opportunities. The teachers who showed signs of frustration commented:

> *"the most important challenge is being an untrained teacher and surrounded by kids who are skilled in using tablets."* (T4 on 9/5/2017)
>
> *"We are not adequately trained. Yet we are expected to use tablets and other technologies."* (T9 on 16/5/2017)
>
> *"policy makers are only interested in technology implementation and are not bothered about training teachers."* (T15 on 25/5/2017)

Other teachers shared similar sentiments in their personal interviews. They reported that they needed training in using tablet computers so that they could be incorporated *"into the curricula"* (T6 on 11/5/2017), to design curriculum (T7 on 13/5/2017), and *"to use the tablet as an educational tool"* (T8 on 14/5/2017), to improve student performance (T3 on 7/5/2017), and *"to create digital content for* *students in Arabic"* (T11 on 23/5/2017). One teacher in particular elaborated:

> *"I need training to understand how to teach differently. I have read about student-centred approaches, but I am not sure how I can use the knowledge I have gained to use the tablets to increase educational outcomes of students."* (T14 on 17/5/2017)

The responses indicate that training programmes have to be designed with the objective of increasing teachers' attitudes towards tablets, increasing teacher motivation to take part in the training, and enhancing technological and pedagogical skills. The responses also demonstrate that there is a significant amount of training and support required to help teachers understand how to leverage tablets as education tools.

4.3.5.4 Lack of support

The theme 'lack of support' is different from lack of training and refers to teachers' perceptions that policy makers do not pay attention to their technological and pedagogical needs. There was perceived lack of support for teachers to acquire and develop knowledge, skills and values in order to be effective in the classroom, for example professional support (focusing on professional knowledge and learning).

Specifically related to external barriers, the teachers described the lack of administrative or technical support:

> *"The Ministry of Education does not focus on the pedagogical need for such technologies. I do not want the Ministry to demonstrate 'how' tablets can be used, but to create specialised courses by consulting schools and then supporting us to implement the devices."* (T2 on 10/5/2017)
>
> *"Moreover, the Ministry of Education, which organises the training programmes, has not distributed tablets to all teachers."* (T3 on 7/5/2017)

This sentiment was echoed by almost all the teachers (for instance T4, T5, T8 and T15). Consequently, the teachers felt that the policy makers did not support them (T10 on 15/5/2017 and T11 on 23/5/2017) and had no *"real intention"* to change their practices (T15 on 25/5/2017). Once again, there was a sense of dissatisfaction in the way they are treated.

Support included technical support, as well as ongoing support beyond the initial training, when a new initiative/technological resource becomes available. Teachers need to receive support not only when they initially use a new technology resource but also when they practice using it and begin to integrate it in their classrooms.

4.3.5.5 Lack of autonomy

A pervasive theme that emerged was lack of teacher autonomy which refers to lack of freedom or professional independence to make technology-related curriculum decisions. The teachers interviewed were of the opinion that the Ministry of Education, which had mandated the national curriculum, infringed upon teacher autonomy by undermining the professional status and expertise of teachers.

According to T1, lack of autonomy was the biggest barrier to teachers, causing them to take their own initiatives:

"the problem is that the Ministry of Education is against involving schools or teachers in developing content or courses." (T1 on 6/5/2017)

"We are not encouraged to create content or select apps for educational purposes by the Ministry. Yet we are taking our own initiatives." (T14 on 17/5/2017)

Teacher autonomy, within a rigid national curriculum, prohibited teachers from making changes to the curriculum or in individualising the curriculum when integrating tablet computers.

Nevertheless, the teachers were bypassing or evading the policies.

"we are not allowed to do so. Yet some teachers, including me, are not delivering the same lesson to all students. We modify it." (T7 on 13/5/2017)

"There is no clear strategy for the implementation of tablets. Schools or teachers and head teachers are not consulted." (T12 on 21/5/2017)

The exclusion of teachers from the planning and decision making had frustrated them.

"we should be given the freedom to access or create on our own." (T13 on 20/5/2017)

This respondent was implying that teachers do not have autonomy in decision making. T13 asserted during an informant feedback session that it is the teacher who decides which curriculum, pedagogical, and technological innovations and strategies have to be employed.

Overall, according to the teachers their experiences have shown that the use of tablet computers requires a degree of autonomy. Although the accountability systems in Kuwait are eliminating their independent decision-making the teachers want to demonstrate resilience by exercising professional autonomy.

4.3.5.6 Mandated curriculum

The previous theme had shown that there is tension between the mandated curriculum and teacher autonomy. The theme 'mandated curriculum' indicates that the curriculum that is developed and authorised by the government (Ministry of Education) is not aligned with the teaching practices of teachers and does not meet student needs.

The teachers in this study questioned the suitability of the mandated curriculum. The following remarks reflect this questioning:

> *"I am against standardised curriculum as they do not meet the needs of students."* (T8 on 14/5/2017)
>
> *"The curriculum is not suitable for tablet integration."* (T1 on 6/5/2017)
>
> *"The curriculum mandated by the government is rigid and does not allow teachers to adapt and use it in tablets."* (T6 on 11/5/2017)

T7 also reiterated the claims of T6 but added that:

> *"Teachers are unable to deliver content based on the individual needs of students."* (T7 on 13/5/2017)

T7 was stating that the curriculum hindered teachers from adopting approaches that were pertinent to their students. Another teacher was dissatisfied with the quality of the apps recommended by the Ministry which were not interactive:

> *"I am interested in trying the apps installed in tablets as they contain courses related to the national curriculum. However, these apps, which only contain content, are not interactive."* (T8

on 14/5/2017)

The teacher was implying that the mandated curriculum is not aligned with teaching practices. T8 was claiming that teachers' instructional practices were disconnected from their teaching philosophies.

Overall, the responses of the teachers that contributed to the generation of this theme have made it apparent that the national curriculum cannot be the only source of information. The teachers were against a one-size-fits-all curriculum. They were calling for an adaptable curriculum that could be customised, and one which could be personalised to address students' diverse learning styles. A major gap that was uncovered is the disconnect between the policy makers, who make the key decisions on tablet computer integration, and the reality of the teachers who implement the technology in schools.

4.3.5.7 Actual and envisioned barriers

Despite positive attitudes towards tablets, teachers expressed fears and concerns over the appropriate use of tablet computers in the classroom. The two key barriers were 'source of distraction' and 'lack of resources'. Hence, the theme 'actual and envisioned barriers'.

4.3.5.8 Sub-theme: Source of distraction

A pervasive theme that emerged was that tablet computers were a source of distraction. There was the belief among almost all the teachers that these mobile devices distract students which consequently lead to learners not paying attention to their studies.

As one of the interviewees put it:

"Watching videos on tablets have become a habit among young students. I experienced this on several occasions." (T8 on 14/5/2017)

Such beliefs were articulated by another teacher (T9), while T11, a teacher with eight years' experience, seemed frustrated:

"I have also come across students watching videos not recommended by me." (T11 on 23/5/2017)

Inappropriate use of technology can lead to distraction and overuse by students, and such a sentiment was voiced by T13:

"I think there's an element of getting distracted. They are accessing social media, YouTube videos, instant messaging, and other non-academic content." (T13 on 20/5/2017)

These are legitimate concerns associated with use of the devices for accessing online information. The reasons why the teachers were concerned was that students can freely use the devices to access offensive or inappropriate information not suited for their age. Although accepting that tablets are a distraction, T12 seemed to give in to the students by saying:

"It is difficult preventing them from doing what they are doing as some kids are also using their own pocket Wi-Fi devices." (T12 on 21/5/2017)

Teachers were also coerced by parents into monitoring the activities of their children.

"Parents of some of my students have asked me not to allow students to use tablets for doing assignments. The reason is that the students are spending more time on their tablets at home and not studying." (T14 on 17/5/2017)

Although, this is a constraint, it is also about classroom management. In order to cope with classroom management issues caused by the tablet computers and their influence on students, some of the participants stated that distracting stimuli should be minimized. The strategies adopted, and the recommendations made by the teachers are quoted below:

"There is the common argument that students will use tablets for chatting during class hours. However, we teachers are trying to control it by not allowing them the access." (T5 on 11/5/2017)

"I have seen students stopping their classroom tasks and answering a personal message. However, teachers will have to motivate the students not to do so and also exercise some control." (T10 on 15/5/2017)

In order to reduce disturbance, the teachers employed measures with the aim of creating an optimal classroom environment:

"Tablets and other mobile devices are a distraction. Now students have to log on to the school network which filters media content." (T2 on 10/5/2017)

> *"I was worried about students spending considerable amount of time using their tablets for watching movies or chatting. The students are now required to log on to access the school Wi-Fi which bars certain websites."* (T15 on 25/5/2017)

These measures were adopted by the teachers with the hope of minimising the use of tablet computers by students for non-learning purposes. They appeared to convey the message that they may not be able to remove the devices from students which were handed to them as part of the Ministry of Education's policies to foster personalised learning. As long as the tablet computers remain in the hands of students, the teachers have realised that they have to manage the personal use of the devices in the classroom in a better manner.

The teachers, with a much more positive attitude, did not consider the devices an issue. For instance, T7 (on 13/5/2017) stated that there are no negative effects, while T6 (on 11/5/2017) claimed that tablet computers are not a distraction anymore. T13 summed it up by saying that *"the benefits outweigh the drawbacks."* (T13 on 20/5/2017)

4.3.5.9 Sub-theme: Lack of resources

One significant barrier was the lack of vital resources, for example interactive apps. Besides the lack of skills and knowledge, as well as training, participants also explained the need for increased access to resources in order to have the chance to practice using them (T8, T10, T13, T14 & T15). According to one teacher:

> *"Tablets may be amazing but most apps that are available on iPad's iTunes and Google's Play Store are in English. I need training to create courses in Arabic."* (T10 on 15/5/2017)

What the teacher meant was lack of adequate resources such as apps in Arabic. T10 clarified that training was required to help in creating apps and adapting existing resources. Likewise, another teacher also wanted resources to help design courses.

> *"Besides the text books, which can be accessed from the apps created by the government, we also need access to other sources of content that is appropriate for use with tablets."* (T13 on 20/5/2017)

Another respondent (T15) expressed concern about the lack of access to resources that could be used to integrate technology:

"I need access to apps/tools that can be used for practical subjects." (T15 on 25/5/2018)

All the aforementioned comments suggest that if the teachers are required to integrate tablet computers, they must have access to the resources. However, one interesting finding was that peer teachers did not emerge either as a support or as a barrier. None of the teachers discussed connectivity and technical glitches as barriers.

4.3.6 Summary

This section presented the major themes and sub-themes that emerged from the in-depth analysis of the collected data. The descriptions of these themes attempt to provide a solid rationale for the ensuing research findings.

The themes discussed demonstrate that teachers' attitudes affect their degree of commitment to developing and mentoring excellent teaching practices. There were teachers who were at a point of change and were in a dilemma whether to choose conventional approaches or use tablet computers for teaching. However, most teachers were more open to this change.

The primary reasons for limited commitment to use tablet computers by some respondents (especially T3, T4 and T9) were teachers' beliefs and negative attitudes, inadequate teacher skills and knowledge as well as preparation. These three teachers lacked determination and considered that tablet computers were not functional and therefore irrelevant for teaching. They presumed that students would not use the technology for learning. Most importantly, there was reluctance to change their pedagogical practices which in turn had diminished the self-efficacy of these teachers. Overall, the teachers' attitude to technology seemed to have played a deciding role in their acceptance of tablet computers.

The teachers saw tablets as tools that complement teaching but found it difficult integrating the technology in the classroom particularly when resources, support, and training were not readily available and ongoing to ensure successful integration. The interviewees stressed that training, that can increase teachers' skills and their confidence in those skills, could bring about change in attitudes and practice.

Finally, in spite of the beliefs that tablet computers are a source of distraction and that they do not have adequate resources or training, these teachers found ways to work around these negativities, thus reducing the overall impact of these when using tablet computers in their teaching practices.

4.4 Phase Three: Classroom Observations

This section presents the data analysis framework for the observational data and the results. The observations allowed the researcher to witness first-hand the lived experiences of the teachers who were integrating tablet computers in their classrooms. The natural setting gave a better sense of the classroom, the teacher, and the way they integrated the tablet computers.

The teachers who took part in the interviews were asked if they were willing to be observed in their classrooms and as stated in Chapter Three, all 15 teachers agreed to take part. The 15 teachers were from 15 classrooms and they are referred to as Teacher 1 from Classroom 1, Teacher 2 from Classroom 2 and so on. The duration of each observation depended on the period or extent of the lesson. As this was an intermediate school the classroom lesson varied in duration from 45 minutes to an hour.

Each teacher was observed, and their behaviours were recorded using the observation schedule (Appendix F.1 and F.2). Field notes were also maintained which helped in documenting the proceedings, and the interactions that took place in the classrooms. The field notes complemented the observation schedule. The data was reviewed and coded immediately after each observation.

The schedule and field notes were thematically analysed; the researcher looked for patterns that would generate themes related to the research question:

RQ2. How has the deployment of tablet computers influenced or changed teachers' pedagogical approaches in intermediate schools?

Recurring words or phrases were highlighted, and codes were established to identify patterns from which themes could be generated. After revisiting all the collected data and field notes, 8 themes emerged. These themes were derived inductively. The data was then re-examined with the themes in mind to ensure nothing relevant was missed. When writing the results, specific extracts from the observation schedule and the field notes were used to illustrate these themes. These extracts are indicated by the use of single quote marks or italics. During the data analysis, the researcher contacted the relevant teachers to clarify any ambiguities in the observation notes made by the researcher.

In the following sections the results are presented thematically according to key aspects that were examined: the classroom environment; the way the teachers were using tablet computer technology in the classroom; the instructional strategies used by the teachers and their behaviour, knowledge, skills, challenges and difficulties; as well as teacher-student interaction.

4.4.1 Observation results

The 8 themes that provided the answers to the research question (question 2) were 'technology- rich', 'scaffolding student understanding', 'lack of self-efficacy', 'a traditional didactic approach', 'feedback immediacy', 'increased self-efficacy', 'increased interaction and participation (collaboration), and 'student-centred'.

In the following section, reporting on the classroom observations, direct extracts from the researcher's field notes are presented in italics within the narrative text.

4.4.1.1 Technology-rich

Technology-rich classrooms refer to the way in which teachers facilitate the use of quality technology tools and information resources and apply effective teaching strategies to determine the effectiveness of technology. The data indicated that there was an increasing level of tablet computer use, as well as other technologies, by the teachers in most classrooms (see Figure 8).

The teachers (N=12, except for three teachers from classrooms 3, 4 and 9) were orchestrating the technology's features to student learning. They had motivated students, who were observed looking up information from flexible sources, assembling different information, and creating their own content and understanding. Most teachers did not exercise too much control and there was a clear departure from a passive classroom environment to one that was active.

> The teachers had created technology-rich classrooms because there was 'access to the Internet' (all the 15 classrooms), and availability of 'tablet computer charging stations' in multiple locations within the classroom. (Classroom 1, 2, 5, 10, 14, 15). The teachers used several types of content resources, all of which were available as apps, such the app developed by the Ministry of Education that houses all lessons and materials (Classrooms 1, 7, 8. 10, 11), electrical unit conversion apps (Classroom 5, 12), apps to draw basic electrical circuits (Classroom 6), using SmartDraw (Smartdraw, 2018) for basic electrical diagrams (Classroom 11), electrical drawing software as well as free pre-drawn electrical templates to draw diagrams (Classroom 12), use of Kahoot a game-based learning platform (Kahoot, 2018) for multiple-choice quizzes (Classroom 13), and using an app called How to Make Electricity (Classroom 15). One teacher in particular was

using Planboard (Planboard, 2018), an app for planning lessons (Classroom 7), while two other teachers (Classrooms 7 and 8) were using tablets as clickers and eliciting responses from students was observed regularly.

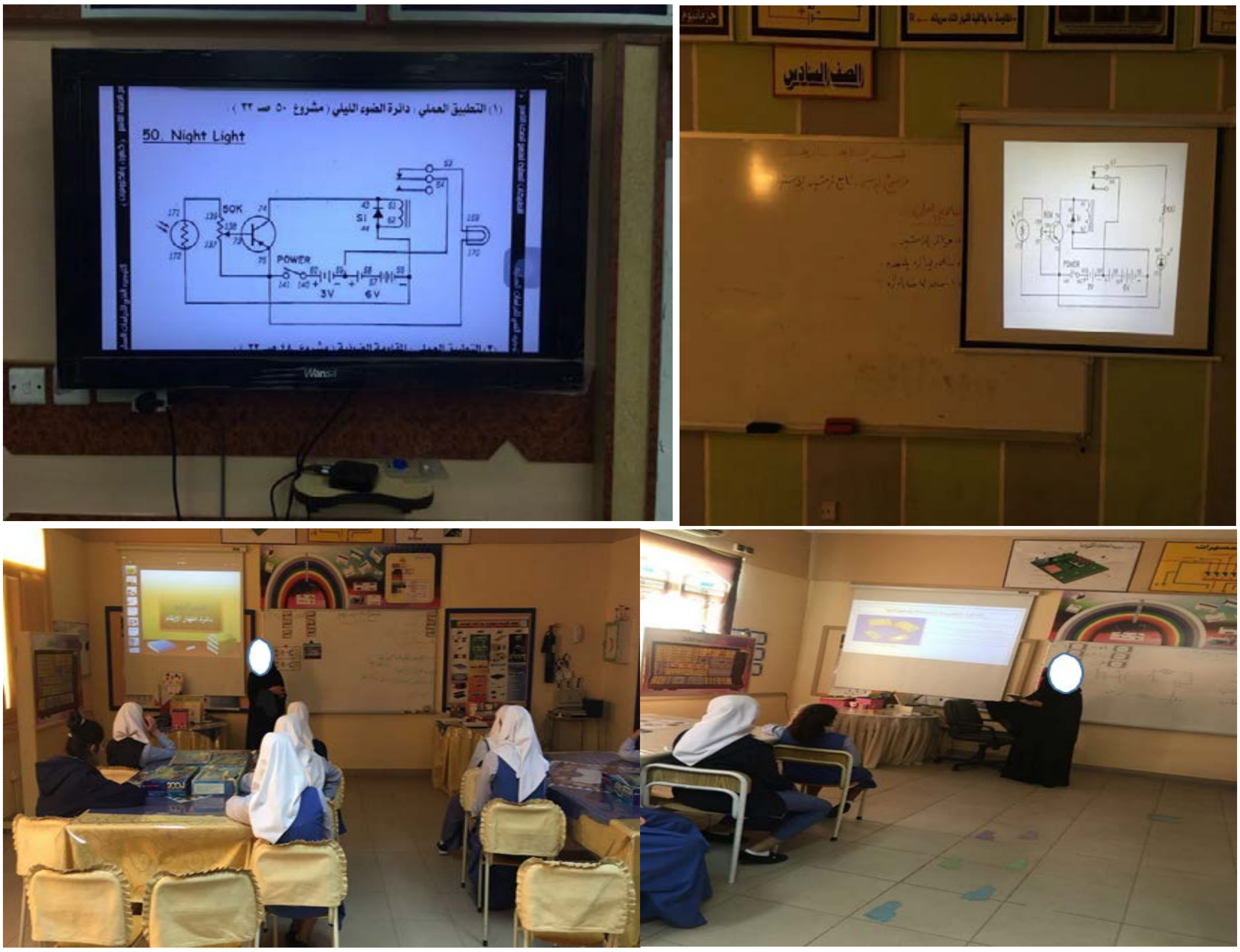


Figure 8: Examples of technology-rich classrooms in which tablet computers were connected to televisions and data show projectors

Although the tablet computers were supported by *software tools* (Classroom 11), the teachers also incorporated *interactive whiteboards, data show projectors and televisions* (see Figure 8) which were *connected to the tablet computers* (Classrooms 1, 2, 7, 8, 10, 12, 13, 14, and 15).

Although the students had laptops (Classrooms 2, 4, 12, 13, 5, and 6), the researcher did not observe students or teachers using the devices. A significant finding that the researcher logged as a field note was that most teachers did not hand out any printed material to students.

The teachers designed active learning environments which included seating arrangements with no rows of desks (Classroom 2). In one classroom, the researcher observed the teacher battling with access to reliable wireless connectivity, however, all the students and the teacher had tablets and the teacher was able to rely on a pocket Wi-Fi. (Classroom 14)

The classroom observations revealed that teachers were creating paperless classrooms as they were using tablet computers instead of books, paper and pens, and supplementing the devices with other technologies such as data show projectors (see Figure 9). On a regular basis most teachers (except from classrooms 3, 4 and 9) were observed using tablet computers to support instruction. The researcher also observed that these teachers were using conventional teaching strategies so that they could stay within their area of pedagogical comfort. It appears that they valued other forms of instruction over tablet computer integration.

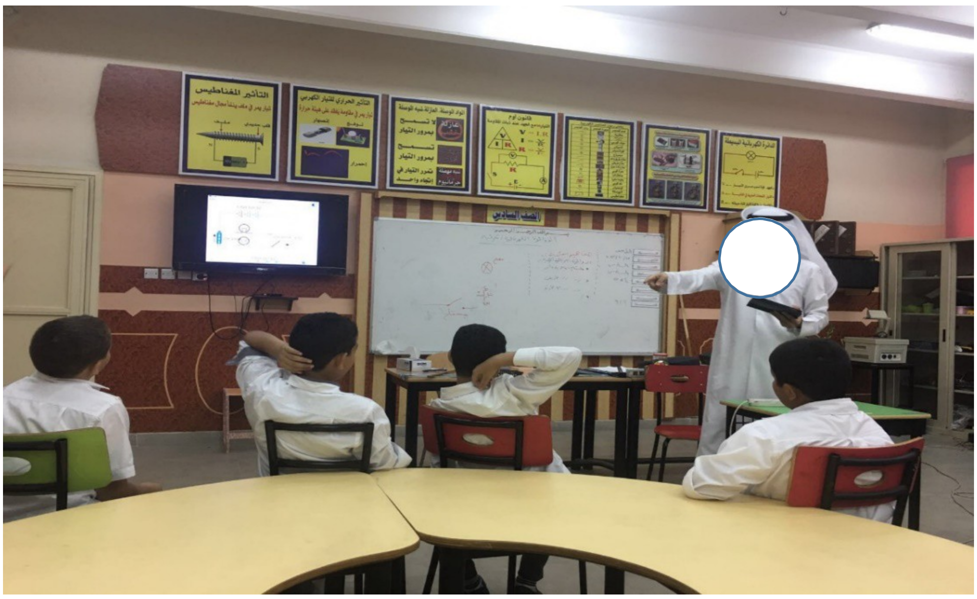


Figure 9: Teacher using tablet-computer in a classroom

It was evident from the remarks made by some teachers (field notes made in classrooms 1, 10, and 14) after the classroom sessions that they had integrated the tablet devices with the understanding that there was a shift in the way students learn. Most teachers seemed to have designed lessons that combined content knowledge, pedagogy, and educational *apps, for instance by planning and embedding lessons and materials* (Classroom 1 and 14) and *using apps for lesson planning* (Classroom 10). The teachers had therefore embraced and harnessed the technology- rich environments that tablet computers afford.

4.4.1.2 Lack of efficacy

Efficacy, for the purpose of this study, refers to the ability of teachers to produce a desired or intended result by integrating tablet computers. A key finding was that some teachers (Classroom 3, 4 and 9) exhibited lack of efficacy and displayed clear signs of negative self-concept, and reluctance to use the devices. Two major categories emerged from the coding and these were initially identified as factors affecting teachers' level of technology self-efficacy, namely digital disconnect and lack of self-efficacy.

Following are vignettes from field notes on teachers' lack of self-efficacy as observed by the researcher:

digital disconnect between teachers and students (Classroom 3, 4 and 9)

classroom full of students keen on using tablet computers (Classroom 3, 4 and 9)

students using tablet computers by hiding it from their teachers. One student holding the device under the desk (Classroom 3)

The observations that led to making the aforementioned field notes were that although it was easier for the teacher to prepare learning materials knowing that the students have access to tablets'(Classroom 3), the teachers did not come to the class with prepared lessons using any technology (Classroom 3 and 4). The teachers did not only use tablets but also did not indicate these devices as being influential components of classroom pedagogy. Instead, the teacher used a hardwired interactive whiteboard' although there was a tablet computer on the desk (Classroom 3).

T3 was a low technology self-efficacy participant as *text books were observed on the desk and made no attempt to check internet connectivity in the classroom* (Classroom 3). The teacher also had a tablet but did not use it. Although the resources such as lessons and materials were made available by the Ministry of Education through tablet computers the teacher held more value in using textbooks. This indicated T3's lack of available technological knowledge and experience with teaching with technology.

A preference for traditional paper and pencil tests, and extended responses, or use of essays, was observed in one classroom (Classroom 9). The teacher *did not move from paper-based methods to digital content' and used the tablets for only about 10 minutes* (Classroom 9). This lack of engagement with the tablet computers could suggest that the teacher may lack confidence.

T13 was not a very low technology self-efficacy participant but the teacher experienced difficulty in managing the class (Classroom 13). An excerpt from the researcher's *field notes indicated that the teacher was keen on using the devices, but classroom management was a difficult issue.* When asked to elaborate, the teacher claimed during the respondent validation process that more training was required to effectively use the tablet computers and better management in the classrooms.

In the observation schedule, the researcher recorded that three teachers (Classrooms, 3, 4, and 9) did not feel comfortable about being observed at the beginning. When member checking was employed, and teachers were requested to clarify why they were not at ease, they claimed that they lacked professional training to integrate tablet computers or develop appropriate classroom instructional activities. This suggests low technology self-efficacy to technology anxiety among teachers in adapting the new technology. This lack of confidence could have prompted the teachers to stay within their area of pedagogical comfort and implement only those strategies that they were familiar with. The combination of teachers' reluctance to use tablet computers in general and issues of self-efficacy with technological knowledge and pedagogical implementation of the technology may have contributed to negative perceptions about their ability to successfully integrate technology in the classroom.

4.4.1.3 Increased self-efficacy

Self-efficacy refers to teachers' confidence in their ability to integrate tablet computers and into teaching and learning. Another key theme that emerged was the higher levels of technology self-efficacy that some teachers (Classrooms, 3, 4, and 9) exhibited. The teachers demonstrated technology self-efficacy in the way they used tablet computers for planning lessons, for delivering content, in the way they focused on routine and procedures within their classroom, and in their interactions with the students. Teacher self-efficacy had a positive effect on the quality of classroom processes and the way the students were adjusting to learning in an environment as the instructors were committed to integrating tablet computers. The observations revealed that many teachers (12 out of 15) appeared to have the confidence in using the tablets.

Higher levels of technology self-efficacy were evident when teachers used the *materials embedded in the tablet 'to deliver content to the students* (Classroom 1, 6). They were well prepared and came to the classrooms with well-planned lessons. For instance, one teacher had a device with prepared lessons. The teacher seemed to have prepared all this before the class session. He announced that students can *'access it on Google Drive'* (Classroom 5). In another classroom, one teacher (T7) '*planned lessons using apps' and had sent the lesson and other materials the previous day to the students* (Classroom 7). The use of apps for lesson planning seemed to have a major positive impact on teaching. It helped them to create, share and manage their lesson plans.

Teachers who had higher levels of self-efficacy adopted more innovative methods of teaching. For instance, teachers (Classroom 7 and 8) used the tablet computers as clickers so that students could respond to questions. They also used social media to send messages and responses to the questions, for example via Facebook messenger (Classroom 7 and 8).

It was apparent that their self-efficacy beliefs motivated students. They achieved this by using tablet computers to *monitor the progress of students* (Classroom 11), allowing students to use *apps for drawing basic electrical circuits* (Classroom 6) and encouraging the students to make choices and decisions (Classroom 10).

Overall, the observations revealed that the teachers were more willing to experiment with the devices. The teachers' self-efficacy to use tablet computers for teaching was influenced by the overall value they assigned to technology. This sense of value placed on technology allowed the teachers to the use them effectively.

4.4.1.4 A traditional didactic approach

Didactic approaches to teaching are instructional methods in which teachers provide all the information directly to the students, controls instructional stimuli, seeks responses from the students, evaluates responses, and provides reinforcement. Thematic analysis of observational data and field notes yielded another significant theme, which was labelled as 'traditional didactic approach'. This finding related to teachers who were not willing to change their pedagogy, when integrating tablet computers. Teachers (from Classrooms 3, 4, 9 and to some extent 8) were seen talking, conveying information and not acting as resource persons. Some of the teacher-directed teaching methods observed were lecturing and teacher-led discussions, as the following notes/recordings suggest:

It was a very passive environment. I observed one-way delivery of content. Also observed the teacher at the front of the classroom instructing the students. Students were observed memorizing information. The teacher was observed clearly presenting the students with formulas for calculating conversions (for example watts, volts). (Classroom 3)

The teacher was trying to use the tablets but sometimes was seen trying to lecture. (Classroom 8)

A field note remark written in classroom 3 was significant as it demonstrates that the teachers held teacher-centred beliefs. For instance, the teacher asked one student to close his tablet computer, listen closely to the lecture and did not entertain any questions from the students.

It was apparent that the teachers' traditional didactic methods were being challenged by tablet computer integration. From the way the lessons were delivered, the researcher infers that the teachers lacked the willingness to develop a new digital didactic method. Vignettes from the field notes also suggest that note taking using paper was the strategy adopted by the teachers (Classrooms 3, 4, and 9). Paper based tests and feedback was also observed and noted:

Students appeared to be visibly unhappy with traditional paper-based feedback. (Classroom 3)

The teacher asked the students to use a specific app and asked them to learn electrical power conversions. He then gave them each a paper with questions and asked them to answer it. The students took 10 to 15 minutes and returned the answer sheets. The teacher announced that the results would be handed to them the next day. (Classroom 9)

Teacher distributes traditional paper handouts. (Classroom 4)

It was evident from the behaviour of a few students, for instance showing signs of being unhappy by frowning or rolling eyes, that the teacher was not providing them opportunities to engage in challenging tasks (Field note remark). The teachers were unable to stimulate student interest.

Teachers in three classrooms (3, 4 and 9) were observed not taking responsibility to provide for self-regulated learning. Recordings in the field notes indicated that the teachers were bound to the mandated curriculum.

> *Very limited use of tablets. The teacher wanted the students to only use the app that contained the curriculum developed by the Ministry. There was no effort to encourage the students to make choices and decisions.* (Classroom 9)
> They were using didactic approaches, did not interact through the technology or encourage students to collaborate and share ideas:
>
> *There were no discussions between students. Very few interactions observed between teacher and students.* (Classroom 4)
> *Interaction was face-to-face, and tablets were not used for communication.* (Classroom 9)

Overall, the thematic analysis of the data gleaned from observations and field notes show that some teachers (Classrooms 3, 4 and 9) were using traditional didactical practices as they seemed to believe that tablet computers to be an unnecessary appendage to the traditional classroom pedagogy. The three teachers (Classrooms 3, 4 and 9) also give the impression that they do not want to develop their didactic competence by using the technology for teaching. The students, on the other hand, appeared to have no control over learning and lacked the freedom to use tablet computers.

4.4.1.5 Student-centred

Student-centred learning is an instructional approach by which teachers shift the focus of instruction from the teacher to the student. This theme student-centred learning environments were observed in 12 out of the 15 classrooms (except for classrooms 3, 4 and 9). For most part of the classroom sessions, the teacher was not on lecture mode or transmitting information. On the other hand, they were facilitating learning by allowing the students to engage in the authentic activities and learn independently.

All students were present in the class and there were no absentees. They arrived on time but were seen not to be fidgeting with their mobile phones. When the lessons began, the teachers were relaxed. In most classes the teachers knew the students by name. They listened intently to the students.

There were instances of teachers giving students control over the technology they preferred. Students were encouraged to use their own tablets and not the ones distributed by the school for classroom use (Classroom 1, 2, 5, 6, and 7). In other words, students were allowed to make their own decisions when choosing devices, for instance the tablet computers distributed by the school or the students' personal devices. This can be considered as an attempt to empower students to make personal choices about their learning and was noted in the observation notes as:

The teacher allowed students to take part in decision making as well as to make choices. (Classroom 10)

Example of teachers in the role of facilitators was evident in the following observations:

The teacher used quizzes in between lessons. The use of tablets and Facebook messenger allowed the teacher to assess the students and identify areas where students are excelling and struggling. (Classroom 12)

The teacher used the tablet for implementing formative assessment. In the midst of a classroom session the teacher paused and used Kahoot to review students' knowledge. The students clicked the answers and the teacher made real-time assessment. (Classroom 13)

In another classroom observation, *students were working independently* and sharing ideas (Classroom 11). The teacher served in more of a facilitator role. Field notes made in this classroom signpost that the teacher *walked around the classroom, used a tablet computer to click through review slides and write things on the interactive digital whiteboard, at the front of the room.* The intention appeared to be to engage the students in whole class learning.

The teachers were observed using the tablet computer and engaging the whole class. The emphasis was on working together, in pairs, and in groups. The field notes showed that to support and extend whole-class teaching the teacher used a tablet computer which was connected to a data projector. (Classroom 12).

There was one occasion when a teacher offered individual support. An observation recorded in the researcher's field notes was about one scenario when a student had forgotten to bring the device (Classroom 12). The teacher asked the student to write down the unit conversions in a notebook and instructed another student to take pictures of the notes and store it in a cloud storage system so that it could be retrieved easily. Here, the teacher was not only trying to achieve the learning goals of the student but also taking advantages of the affordances of the device, for example the camera and cloud storage to assist students. This teacher was seen to exhibit a student-centred pedagogical style.

One of the assignments given by a teacher (Classroom 1) was to create images describing how a solar energy system works. Field notes made in this classroom indicate that the students used drawing apps for this exercise but could not connect the tablet computer with the interactive white board or television. The teacher helped the students connect the device so that all students in the class could see what their fellow classmates had done. Field notes made in all classrooms in general indicate that was a positive environment where students and teachers mutually respected each other and enjoyed good relationships.

4.4.1.6 Increased interaction and participation/collaboration

This theme refers to an instructional approach that the teachers used for teaching and learning by involving groups of students and encouraging them to work together to complete assigned tasks. Observations also involved a glance into collaborative practices, indicating that the teachers were harnessing the power of the tablet computers by permitting students to learn at their own pace in a collaborative environment.

The teachers (Classrooms 1, 2, 5, 7, 10, 11, 12, 14, and 15) were seen making attempts to improve student participation in the lessons by devoting time and thought to planning the class sessions. They interacted via WhatsApp and other social networking apps to communicate with the students and provide feedback. This suggests that they were embracing digital communication and social media, which are tools preferred by their students in their everyday lives. For instance, teachers spent little time on lecturing and were observed asking students to take part in group work by grouping and creating an active environment (Classroom 1, 5, 13 and 14). The way the teachers interacted with the students and were involved in the pupils' learning processes had increased learners' belief in their own capabilities and their motivation for learning. Examples of interaction were recorded in the field notes and included questions such as *"Why did this happen?"* or *"How else can you calculate this?"* These questions perked the students up.

Discussions between teacher and students and collaborative interactions were characterised by high degrees of negotiation, communication, and interdependence (Classroom 5, 8 and 12). The intention was to actively engage students and use tablet computers to articulate their ideas. In order to increase interaction as well as to facilitate collaboration and participation, the teachers allowed students to form small groups, move around the classroom regularly to discuss and share ideas (Classroom 6). As the tablet computers were small, lightweight and portable, students were seen *frequently moving from one group to another within the classroom to work with peers to complete drawing activities.*

A number of vignettes taken from the researcher's field notes produced more meaning and understanding of the classroom situations. The group activities allowed sharing of ideas which was key to successful completion tasks given by the teacher, for instance drawing how solar power systems work and how electricity is produced for powering homes (Classroom 7. 8, 12, 13, 14, and 15).

Sharing content and ideas was the predominant student-peer-teacher interaction:

'he teacher used interactive activities and asked the students to share ideas. (Classroom 15)

Student interaction was higher during scaffolded instruction. By permitting formative interactions in the classroom, the teachers developed a classroom culture of questioning which allowed the students to learn from shared discussions with the teacher and from fellow classmates. One field note reads:

Peer discussions were seen to significantly enhanced student participation. They listened to each other to others and raised questions. (Classroom 15)

The students were able to actively build common understanding through open interactions and learn from the perspective of the more knowledgeable other. There was a shift from the traditional classroom setting, where the student is seen as a passive consumer of knowledge, to a collaborative classroom in which learners were active participants.

Data from classroom observations and field notes revealed that teachers were taking more advantage of the prominent tablet computer features such as interaction and educational apps rather than simply using it like a traditional laptop or desktop. The teachers were taking advantage of their students' reliance on tablet computers to encourage collaborative learning. This may have been the reason why the classrooms were not structured, which is normally the case in traditional settings. There was cooperation and communication among students and teachers about the lessons that were reinforced by the integration of tablet computers which enabled the collaboration. The students also watched each other's diagrams and tasks, independently of teachers' supervision.

4.4.1.7 Feedback Immediacy

Feedback immediacy is the facilitation of positive, meaningful, and prompt responses to students' queries or completed tasks. One of the most interesting findings was that the use of tablets had resulted in significantly more academic feedback from the teachers, which involved interactions and discussions: The following notes recorded this.

> *The use of tablets helped stimulate more interactions through immediate feedback.* (Classroom 1)
>
> *In the beginning of the classroom the teacher provided some feedback for the assignment he had given students a day earlier. This was followed by discussions.* (Classroom 7)

Teachers were observed to assign tasks or activities to students, collect the answers from the students and respond to errors in a timely manner by providing suggestions and clarifying problems using social networking apps:

> *The teacher accessed Facebook using tablet to give immediate feedback. The tablet-based feedback was more a face-to-face like communication between teachers and students.* (Classroom 2)

Feedback was provided via WhatsApp and Facebook messenger in most classrooms (Classroom 10, 11, 12, 13, and 14). The reasons for using this mode of communication was that *the students were happy receiving the feedback in this manner* (Classroom 8), and the apps enabled teachers to engage in a *dialogue with the students to enable them to share information and work as a team* (Classroom 11). The researcher had the opportunity to look at three of the teachers' devices to understand why they were using social networking apps. The following comments made in the schedule are indicative of the rationale for using these apps:

> *posting questions and prompting responses* (Classroom 12)
>
> *to respond quickly to questions and ideas of the students* (Classroom 13)
>
> *so students can send in answers to questions for teacher feedback* (Classroom 14)

The teachers wanted to respond in a timely manner, to check for understanding and assist the students in the learning process. Therefore, they had chosen WhatsApp and Facebook messenger for chatting which allowed the students to flag concerns confidentially and the teacher to respond discreetly. This is also a case of using the technology for individualized learning or customising content and delivery strategies to suit the students. The field notes record that this strategy was welcomed by students:

> *The teacher wanted all students to use Facebook messenger and announced that he would send them feedback for the assignments they had done. Students were seen agreeing to this.* (Classroom 14)

Observational data from other classrooms showed that the teachers chose different strategies for responding to their students and providing solutions to the problems. The objective of such strategies was to assess learning and clarify errors. However, in some cases (for example in classrooms 11 and 14) teachers had to overcome challenges when providing immediate feedback, where the students were unable to complete the tasks during the lesson or during the 45-minute classroom period:

The teacher began by asking students to draw a battery. The teacher advised the students where to save their drawings. He announced he would assess the work at home and send the feedback. (Classroom 11)

Since the class was coming to an end, the teacher did not have time to assess the students. He informed the class that he would look at their work and then announce/discuss the results the next day. (Classroom 14)

In order to achieve this, feedback was provided after the class. This process can be interpreted as assessment communication between the teachers and students. However, in one classroom the teacher was able to assess students immediately:

The teacher had asked the students to watch a video at home relating to how a solar system works. This was the assignment he had given the students the previous day. During the classroom observation, the teacher wanted to know what the students had understood about solar energy. The students were then asked to use a sketchpad on their tablets to draw how a solar panel works. Assessments were made, and results announced in 45 minutes (class duration). (Classroom 15)

The students had completed the tasks well before the class ended and therefore the teacher and the students in question did not have to wait for the feedback. What was observed here was that feedback was timely and targeted.

Overall, tablet computers seemed to help improve feedback immediacy. All the observations related to this theme illustrate there was clearer communication and mutual understanding during the learning process.

4.4.2 Scaffolding student understanding

Scaffolding is one of the approaches used by the teachers to move students progressively towards better understanding of concepts. The researcher observed three types of teaching approaches when the teachers were using tablet computers to scaffold instruction: in-class activities, for example, drawing electrical circuits, solar power systems, collaboration, for example, group discussions and sharing ideas, and providing support through modelling, for example, giving suggestions showing examples and encouraging peer discussions.

Students worked in groups, on the tasks given by the teachers, using the devices. Students also worked independently on their projects within their groups and were seen communicating with other students and teachers via WhatsApp. However, teachers were facilitating the discussions and providing support. For instance, two teachers (Classroom 1 and 2) were observed giving suggestions and showing examples or models for the students on a few occasions, as the following observations indicate:

> *Observed the teacher looking at the nationally mandated curriculum which was embedded in the tablet. The teacher then asked the students to draw how solar systems produce energy using their tablets and suggested drawing apps. There was no set time period for this task, but students responded quickly and in about 15 minutes most students had completed the exercise using the tablet.* (Classroom 1)

Following is the sketch (see Figure 10) made by a student using SmartDraw showing how a solar system works:

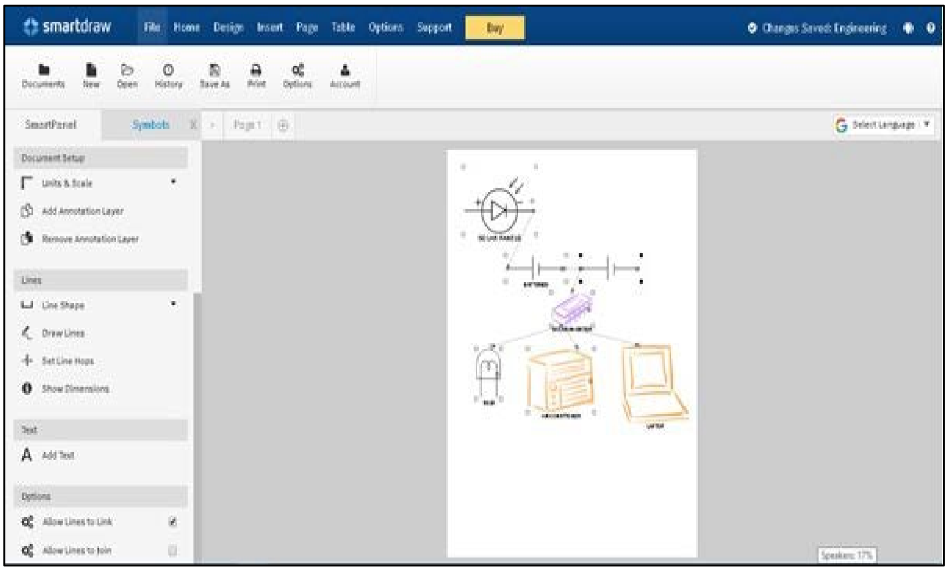


Figure 10: Student’s conception of how a solar system works using SmartDraw

Excerpts of field notes written in classroom 8 show that a student had used Adobe Photoshop Sketch downloaded from his tablet computer to draw a solar power system. However, the student had used images stored in a clipboard and did not connect the solar panels to the inverter or the fuse and the house in the drawing or name the components. The teacher asked the student to label the different components and used prompts to question if the system was wireless. The student realised the error and quickly named the different mechanisms and drew lines or cables to demonstrate understanding. Following are the copies of the drawing (Figure 11 and 12) which were downloaded from the student's device.

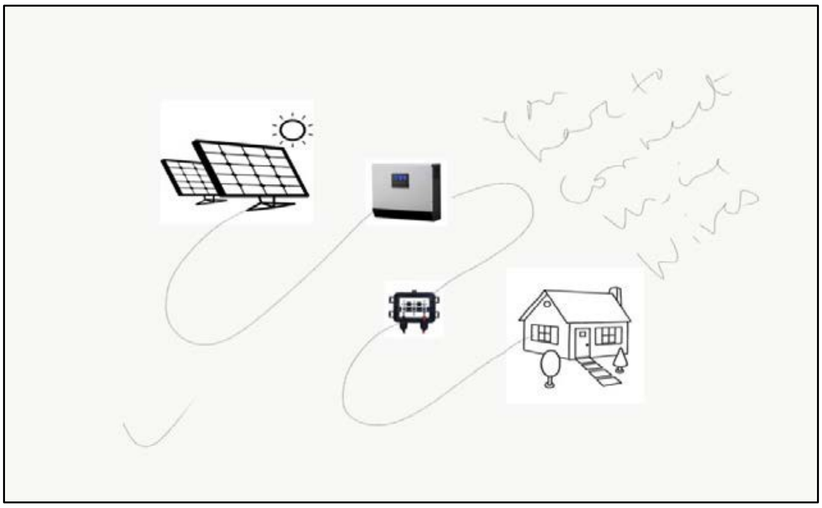


Figure 11: Adobe Photoshop Sketch with teacher's comments and initial correction made by student

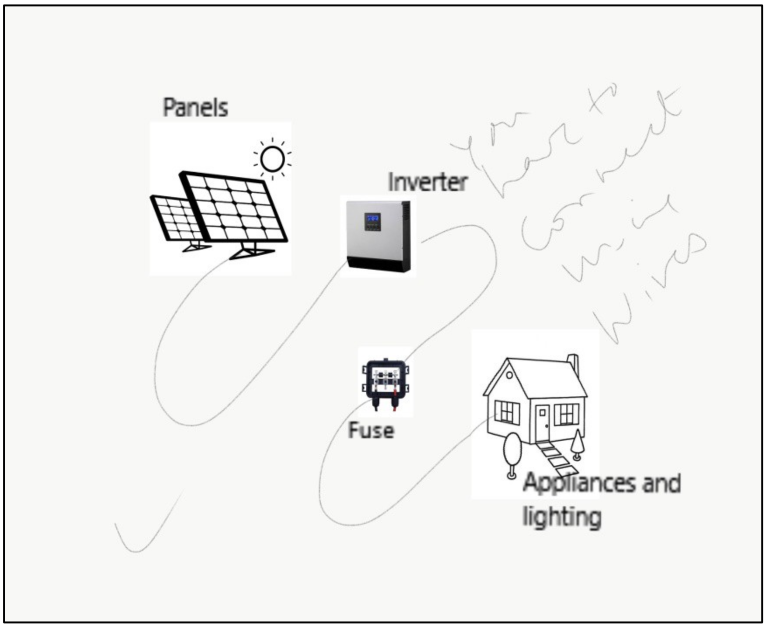


Figure 12: Adobe Photoshop Sketch with final corrections made by student based on teacher comments (translated from Arabic)

Another teacher not only *showed six students how to use an app* but also used examples that were prepared earlier to help students understand concepts (Classroom 2). The researcher also observed a teacher using a tablet computer to introduce *apps for conversion of electrical units* (Classroom 7). Later, the teacher used *inquiry-based learning,* a form of active *learning* to pose questions and elicit responses from the students. This form of instruction was not only witnessed in Classroom 7 but also in Classroom 14. For instance, in Classroom 7, the teacher:

> *asked questions related to the lesson which was part of the nationally mandated curriculum, and embedded in the tablet. [The teacher] used examples and displayed drawings on the interactive board via the tablets.* (Classroom 7)

While in Classroom 14, the teacher:

> *uses an app that allows students to understand how electricity flows. It was interactive. All students were immersed in the learning experience. All glued to their tablets. The teacher poses questions and asks the students to answer by using a Facebook page devoted for the class.* (Classroom 14)

The same teacher (T14) also used the tablet computers to assess students:

> *used lessons embedded in the devices. A quiz followed. Then the teacher showed students how to download Google Drive and save their work to this cloud platform. This allowed the teacher to check on the progress of students.* (Classroom 14)

T14 had incorporated instructional scaffolding within the assessment process as a means of monitoring the students and identifying their needs.

When scaffolding instruction, the teacher's role changed from an instruction-oriented role to a more guidance-oriented role:

> *The teacher chose an app for unit conversion and asked the student to convert volts and watts. The teacher waited and did not guide them immediately. [The teacher] wanted them to discuss. Some students found it difficult and approached the teacher. [The teacher] showed examples when explaining a concept.* (Classroom 12)

This observation shows that the scaffolding conversations the teachers had with the students was to ensure that they understood the concept. The teacher was strengthening understanding by holding back the answers.

These observations also indicate that the teachers were moving around the classroom, encouraging students to ask questions and taking the opportunity to provide quick comments or new ideas for them to think about. Then, they provided annotated exemplars as supplementary resources.

The teacher was sharing ideas about electric circuits. Then the teacher asked the students to draw an electric circuit. The students complied by drawing the circuit using a drawing app. (Classroom 8)

Teacher's pedagogy was to scaffold student's understanding through careful questioning, clarifying concepts and brainstorming ideas. In classrooms 5, the following observations were made:

> *The teacher used conversion apps such as Electrical Converter to make students understand electrical units.* (Classroom 5)

> *Teacher asks students a question on solar energy and they both discuss the answer* (Classroom 5)

Students were seen learning new concepts by discussing with fellow students. The teacher was encouraging peer discussion and making productive use of exemplars:

> *[The teacher] started marking the assignments of 3 students who had sent their work … via Google Drive an online cloud storage service. Then, [the teacher] asked the students to explain the concept to the other students*. (Classroom 6)

During a debriefing session after the observation, the teacher (T6) said that the peer discussions are useful for student learning as they can clarify concepts and also develop confidence. Peer discussion of key concepts was crucial as it allowed students to articulate their views about the concepts and the examples and to obtain support from their peers.

> *The teacher asked the students to suggest an app for conversion of electrical units. Only one student was able to do so. The teacher asked the rest of the class to applaud. Then the teacher uses the app to teach conversion of electrical units.* (Classroom 13)

Therefore, it can be seen that tablet computer integration involved an extensive use of scaffolded instruction where teachers could sometimes use the strategy when students were unable to grasp a concept. Overall, the teachers were aware of the importance of their role in facilitating or scaffolding student understanding.

4.4.3 Summary

Observation data and supplementary field notes demonstrate that most teachers (N=11) had technological, pedagogical and content knowledge. In other words, they were able to integrate the tablet computers into pedagogical practices and modelling a process that students can emulate. They were rethinking and redesigning the classroom processes. The teachers used tablet computers based on their perceptions and their trust in the way it can contribute to the teaching and the learning process.

One of the significant results of this observation process was that teachers demonstrated technology related self-efficacy beliefs. They had a positive outlook on their own use of tablet computers, adequate knowledge of how the technology relates to content. How the technology can add value to assessment and feedback and applying the technology in a way that best serves student learning.

However, there were a few teachers who lacked confidence in integrating tablet computers. Their lack of self-efficacy could be attributed to negative attitudes towards tablet computers and having a negative outlook on their own use of the devices for teaching. This suggests that these teachers did not see how the devices related to the lessons they were teaching and seemed to view the technology as being irrelevant for instruction.

A key finding was that scaffolded instruction was characterised by teacher-student social interaction and peer discussions. This strategy seemed to have supported independent student learning when they used tablet computers for authentic teacher assigned tasks. Apps, content resources and social media tools were used by teachers as additional scaffolds to provide content information to students. By showing exemplars and ways of using the devices and apps, the teachers transferred the responsibility of learning to the students.

Based on the results, it can be claimed that the integration of tablet computers had changed teachers' didactical practice. The findings show that the teachers who followed diverse and ingenuous methods were able to integrate the technology better from the didactic perspective. The teachers were supported by a potential transformative technology that not only afforded flexibility but also helped develop collaborative learning.

While there were instances of teacher-directed teaching, most teachers (N=12) were attempting to facilitate learning using the technology that students prefer. There was also a significant shift in the way students were being assigned tasks and assessed.

4.5 Findings from Methodological Triangulation

Methodological triangulation was used to enable mixing information from different data sources to produce convergent findings. The comparison of the results from the questionnaires, interviews and observations not only helped identify any overlap between the three data sets but also to unify findings of the quantitative and qualitative data sets. The most prominent themes and variables of the quantitative data and qualitative data, and the links between them, are presented in Tables 23, 24 and 25.

In relation to:

> Research Question 1: *What are teachers' beliefs and attitudes associated with the initial adoption of tablet computers for learning and instruction?*

the views expressed by the teachers, during the interviews, were coded into categories and then related to the questionnaire data.

Table 23: Research Question 1: Comparison of themes and variables through data transformation

Questionnaire data		Qualitative data -Interviews	
Factors	Variables (with frequency percentages)	Themes	Examples of teacher responses
F1 Teachers' occurrent beliefs	Item 14. I trust using tablet computers can expand (increase) and update (inform) or in other ways refresh my subject knowledge (Agree 16%/Strongly Agree 63%)	Teachers' dispositions	tablets inspire action (T1) and increased confidence (T6)
	Item 16: I believe that tablet computers can enhance a student's ability to acquire content knowledge (Agree 25%/Strongly Agree 45%)	Affordances	encourages students to become independent learners (T6), appeal to students who prefer touch screens (T14, T15), enhance "creativity" (T12)
	Item 17: I believe that tablet computers can help in bridging in and out of class contexts (Agree 16%/Strongly Agree 61%)		extend learning beyond classrooms (T7, T13)
F4 Integrating technology, skills, knowledge and attitude	Item 26: I have personal skills to use technology tools (for communicating, using word processor) (Agree 22%/Strongly Agree 32%/Neutral 33%)	Increased self-efficacy	I am using tablets far more than I used to. I acquired the skills on my own (T12);
	Item 32: I know how to use tablet applications or programmes (mobile apps) which support my teaching (Agree 30%/Strongly Agree 24%/Neutral 34.7%)		communicating and assessing students (T14)
	Item 33: I know how to use the internet to find information to support my teaching (Agree 28%/Strongly Agree 24.7%/Neutral 38%)		I am using tablets far more than I used to. I acquired the skills on my own (T12)
	Item 35: I have positive feelings towards using tablet computers for		taken our own initiatives and learnt how to use the tablets for teaching through trial and error (T1); use the

	teaching (Agree 15%/Strongly Agree 48.7%/Neutral 30%)		devices to work in partnership with the students (T15)
F5 Affordances and constraints	Item 20: Tablet computers are not versatile tools which are ideal for educating students (Strongly Disagree 20.7%/Disagree 20.7 %/Neutral 28.7%)	Teachers' dispositions	only a substitute for other existing technology (T4); not altered teaching style or practices (T3).
	Item 22.I believe that there is a lack of content (programmes and software) in Arabic (Strongly Disagree 30.7%/Disagree 23.3 %/Neutral 26%)	Lack of resources	most apps are in English (T10)
	Item 23: Tablet computers cannot improve teaching experience (Strongly Disagree 35%/Disagree 10 %/Neutral 35.3%)	Lack of self-efficacy	find it difficult to motivate students (T3); uncertain about their abilities to effectively teach students using the devices (T3), were afraid that they would make mistakes in front of their students (T4) and lose control over students (T4) did not want to change their style (T9)
F6 TPACK reasoning	Item 24: I know that I have the skills to prepare high quality lessons by using tablet computers (Agree 36.7%/Strongly Agree 18%/Neutral 32%)	Increased self-efficacy	using tablet computers for creating lessons (T13)
	Item 25: I know that I have the skills to prepare high quality lessons more quickly by using tablet computers or other technology tools (Agree 14%/Strongly Agree 17%/Neutral 39.3%)	Affordances	I can design lessons specifically for particular students (T8)
F2 Teachers' competencies and confidence-limiting beliefs'	Item 8: Tablet computers are a major source of distraction for the students (Agree 27%/Strongly Agree 45%)	Source of distraction	They are accessing social media, YouTube videos, instant messaging, and other non-academic content (T13);I have seen students stopping their classroom tasks and answering a personal message (T10)
		Collective efficacy	I have begun acquiring the skills to use it for creating lessons, teaching, monitoring and assessing students. My colleagues help me (T4); I sometimes face difficulty ... The kids help me in the classroom (T7)

In relation to:

Research Question 2: *How has the deployment of tablet computers influenced or changed teachers' pedagogical approaches in intermediate schools?*

the views expressed by the teachers, during the interviews were coded into categories and then related to the questionnaire data and observation data.

Table 24: Research Question 2: Comparison of themes and variables through data transformation

Questionnaire data		Qualitative data -Interviews		Qualitative data -Observation	
Factors	Variables (with frequency	Themes	Examples of teacher responses	Themes	Example of observations/fieldnotes
F1 Teachers' occurrent beliefs	Item 12: I am able to plan for the lessons when I use a tablet computer (Agree 25 %/Strongly Agree 52.7%/N			Technology rich; Increased self-efficacy	using apps to plan lessons (Classroom 7 & 10)
	Item 15: I believe that teachers who use tablet computers will be able to teach better by				
F2 Teachers' competencies and confidence-limiting beliefs'	Item 2: By using tablet computers I am able to interact with students and share information more effectively (Agree 24.7%/Strongly Agree 51%)	Increased communication and collaboration	Creating a Facebook page for the class and asking students to use their tablets to communicate via Messenger (T14); "connect" or "interact" with their students and learn together (T7, T11 and T14); the interactive devices gave them "greater freedom" to share ideas (T13) and offer feedback to students (T6 and T15).	Increased communication and participation	observed teachers asking students to take part in group work (Classroom 1, 5, 13 and 14); Discussions between teacher and students and collaborative interactions were characterised by high degrees of negotiation, communication, and interdependence (Classroom 5, 8 and 12); Peer discussions
		Technological and Pedagogical knowledge	Asking students to create drawings of how solar panels work and showing them how to do it so they can create content	Scaffolding student understanding	Showed students how to use an app (Classroom 2); used examples and displayed drawings on the interactive board

				via tablets (Classroom 7);
	Skills to teach self-regulation	Teachers did not interfere in student learning when using tablets….allowed students to search and find information on their own. Teachers had the skills to guide them (T1)	Student-centred	Students were working independently and sharing ideas (Classroom 11);
			Traditional didactic approach	In Classrooms 3.4, 9 and to some extent 8: observed teacher-directed teaching methods such as lecturing and teacher-led discussions; no discussions between students. Very few interactions observed between teacher and students (Classroom 4) ‘Interaction was face-to-face, and tablets were not used for communication (Classroom 9)
Item 1: I can upload educational apps and administer lesson materials and quizzes (Agree 24%/Strongly Agree 50%) Item 3: I use tablet computers to streamline (reorganise or restructure) the grading process (Agree 24.7%/Strongly Agree 47%)	Fosters authentic assessment	Prior to the introduction of tables, I used to take time to assess students. Now I do not use paper-based tests. I assess them whenever required immediately in the classrooms (T2); they can have instant access to	Feedback immediacy	The use of tablets helped stimulate more interactions through immediate feedback (Classroom 1) The teacher accessed Facebook using tablet to give immediate feedback. The tablet-based feedback was

	Item 4: I believe that I am able to provide prompt, timely and quick feedback (Agree 26.7%/Strongly Agree 31%/N 28%)		grades and feedback than via a laptop (T15)		more a face-to- face like communication between teachers and students (Classroom 2)
	Item 5: I have the necessary training and technical support to use tablet (Agree 22%/Strongly	Increased self-efficacy	confident in their abilities (T5)	Increased self-efficacy	teachers appeared to show confidence
	Item 6: I am able to use tablet computers or other technology tools in my teaching (Agree 28.7%/Strongly Agree 46%)	Technological and Pedagogical knowledge	I have the skills to teach the students how to log into our classroom cloud computing storage, retrieve lessons and use it in		
				Lack of self-efficacy	Reluctance to use the devices; teachers did not come to the class with prepared lessons using any technology (Classroom 3 and 4); preference for traditional paper and pencil tests, use of essays,
F3 Teachers' technology self-efficacy	Item 27: I have professional skills for using tablet computers in teaching (for time management, planning lessons) (Agree 18%/Strongly Agree 45%/Neutral	Increased self-efficacy	I have begun to feel that I am using tablets far more than I used to. I acquired the skills on my own (T12)	Increased self-efficacy	Many teachers (12 out of 15) appeared to have the confidence in using the tablets

Item 31: I know how to integrate tablet computers into education to increase the quality and effectiveness of teaching (for example managing		Increased self-efficacy	teachers used the materials embedded in the tablet to deliver content to the students (Classroom 1, 6); teachers (Classroom 7

and engaging students in collaborative activities) (Agree 22%/Strongly Agree 39%/Neutral 34.7%)				8) used the tablet computers as clickers so that students could respond to questions
Item 28: I have skills in using other technologies for example using PowerPoint, video projectors, Smartboard etc. (Agree 24%/Strongly Agree 38%/Neutral 32%)	Technological and Pedagogical knowledge	Many teachers expressed that they had skills (T8, T10, T11, T13)	Technology rich	the teachers also incorporated interactive whiteboards, data show projectors which were connected to the tablet computers (Classrooms 1, 2, 7, 8, 10, 12, 13, 14, and 15).

In relation to:

Research Question 3: *What are the challenges facing teachers who use tablet computers for teaching in intermediate school classrooms?*

the views expressed by the teachers, during the interviews, were coded into categories and then related to the questionnaire data.

Table 25: Research Question 3: Comparison of themes and variables through data transformation

Questionnaire data			Qualitative data -
Factors	Variables (with frequency percentages)	Themes	Examples of teacher responses
F1 Teachers' occurrent beliefs	Item 13: I am unable to deal with maintenance problems associated with integration of tablet computers (Agree 33%/Strongly Agree 34.7%/N 27.3%)	Lack of support	lack of support to implement the devices (T2); not distributed tablets to all teachers (T4, T5, T8 and T15)
	Item 18: I am of the opinion that there is a lack of pedagogy-based technology training programmes for teachers (Agree 29%/Strongly Agree 45%/N 22%)	Lack of adequate training	Inadequate teacher preparation programme (T1); Lack of training programmes (T9, T14; T15)

	Item 19: Lack of training hinders teachers from using tablet computers effectively in teaching (Agree 23%/Strongly Agree 54.7%/N 20.7%)	I need training to create courses in Arabic (T10)

F5 Affordances and constraints	Item 21: I believe that the lack of access to the internet is one of the difficulties faced by teachers (Agree 25%/Strongly Agree 30.7%/Neutral 33%)		
		Lack of support	The Ministry of Education does not focus on the pedagogical need for such technologies (T2)
F2 Teachers' competencies and confidence-limiting beliefs'	Item 7: I believe that it is difficult to integrate tablet computers into the curriculum (Agree 24%/Strongly Agree 50.7%)	Mandated curriculum	Standardised curriculum (T8); curriculum not suitable for tablet integration (T1); curriculum mandated by the government is rigid and does not allow teachers to adapt and
		Lack of autonomy	Ministry of Education is against involving schools or teachers in developing content or courses (T1) not
F6 TPACK reasoning	Item 34: I lack knowledge in using tablet computers for teaching all subjects (Agree 24%/Strongly Agree 11%/Neutral 38%)	Technological and Pedagogical knowledge	I still lack skills. Yet I use tablets as I think I have to keep current with the devices that children like (T4) I have skills. However, it is not skills in using

4.5.1 Convergence of Quantitative and Qualitative Results

Overall, the 6 factors and the 30 remaining valid items or variables from the questionnaires were compared with 17 themes (including sub-themes) derived from the interviews and with the 8 themes from the observations. (See Table 26)

Research Questions	Instances of agreement	Instances of partial agreement	Instances of silence	Instances of dissonance
1	2	4	1	3
2	6	1	4	0
3	4	0	3	0
Total	12	5	8	3

Table 26: Instances of agreement, partial agreement, silence and dissonance

Following convergent coding, there were 28 working codes comprising 12 codes for instances of agreement, 5 in partial agreement, 8 in silence, and 3 in dissonance (Table 26). The analysis demonstrated how the merging of the qualitative and quantitative data provided convergence of the findings for the important research questions (see Tables 27, 28 and 29 below). The tables provide an overview of key findings and how they triangulated across different methods.

Research Question 1

Table 27: Convergence of findings for Research Question 1

Convergence Coding

Research questions	Factors (Questionnaire)	Themes (Interview)	Pair-wise comparison of questionnaire and interview	Key finding
RQ1. What are teachers' beliefs and attitudes associated with the initial adoption of tablet computers for learning and instruction?	F1: Teachers' opinions of their dispositions (Item 14)	Teachers' dispositions	Partial Agreement	Positive disposition
	F1: Teachers' opinions of their dispositions (Item 16, 17)	Affordances	Agreement	
	F4: Opinions on skills, use and attitude(Items 26, 32, 33 & 35)	Increased self-efficacy	Partial Agreement	Increased self-efficacy
	F5: Affordances & constraints (Items 20, 22, 23)	Teachers' dispositions	Dissonance	Perceived constraints and its influence on teacher attitude and low-self efficacy
		Lack of resources	Dissonance	
		Lack of self-efficacy	Dissonance	
	F6: Opinions on professional skills (Item 24, 25)	Increased self-efficacy	Partial Agreement	Increased self-efficacy
		Affordances	Partial Agreement	
	F2: Opinions about technology & practice (Item 8)	Source of distraction	Agreement	Perceived constraints and its influence on teacher attitude and low-self efficacy
	x	Collective efficacy	Silence	Increased self-efficacy

Instances of agreement

The quantitative data from the questionnaires identified that the teachers had cultivated positive attitudes towards using tablet computers for teaching and learning. The two qualitative themes that emerged from the interview data, *teachers' dispositions* and teachers' perception of *'affordances'* of tablet computers, supported the findings of the quantitative data. The positive correlation of questionnaire and interview data indicates that the teachers had positive beliefs and attitudes as well as the confidence to use the technology that students prefer, in order to support student learning. For example, during the interviews the teachers reported that they used the devices to create personalized learning environments ("one-to-one" learning) in which students were taught self-regulatory skills so that they can learn independently and also helped them connect and extend their learning beyond the classrooms.

There was also agreement between the questionnaire and interview data sets with regard to the teachers' notions that tablet computers are a source of distraction and can create a barrier to the teaching and learning process. While this could be considered as one of the limitations of the technology, this finding also highlights the constraints faced by teachers in managing digital distractions in the classroom.

Instances of partial agreement

With regard to teachers' skills, knowledge and attitude towards the integration of tablet computers, the questionnaire results did not fully reflect the findings from the interviews. This was because there was a high percentage of neutral responses to four statements (Items 26, 32, 33, and 35). The teachers who were interviewed demonstrated increased self-efficacy, for example by taking initiatives to acquire skills to use the devices, using apps to communicate with students and provide formative feedback. Nevertheless, increased self-efficacy was a significant finding in spite of the partial agreement between the two data sets.

Another instance of partial agreement was once again associated with increased self-efficacy. Although the questionnaire and interview data complemented each other, there was a significant percentage of neutral responses (Items 24 and 25). Hence, this category was coded as an example of 'partial agreement'. However, this finding indicates that the teachers were demonstrating competence in exercising self-efficacy to use the devices to design and create lessons and to help students succeed.

Instances of dissonance

There were three statements (Items 20, 22, 23) associated with the factor F5 *'affordances and constraints'* that did not agree with the corresponding qualitative themes (e.g.

teachers' dispositions, lack of resources and lack of efficacy). While teachers agreed to the statements that tablet computers were versatile teaching tools and Arabic content was available, interview responses suggested otherwise. Although there was dissonance between the data sets, one key finding that emerged was related to teachers' difficulty in using tablet computers in the teaching and learning process. Teachers not only felt intimidated by the technology but were afraid of losing control over their teaching methods. The fear of failure while integrating the devices had reinforced negative attitude towards change. This suggests that tablet computer usage was negatively influenced by teachers' perceived constraints which in turn shaped their self-efficacy or their perception of their capabilities.

There was only one pair-wise comparison between the questionnaire and interview data sets which resulted in silence. The qualitative data indicated that tablet computers not only triggered collective efficacy but augmented it. However, the questionnaire did not provide relevant data for this specific finding.

Research Question 2

Table 28: Convergence of findings for Research Question 2

Convergence Coding

Research questions	Factors (Questionnaire)	Themes (Interview)	Themes (Observation)	Pair-wise comparison of questionnaire, interview & observation	Key Findings
RQ2. How has the deployment of tablet computers changed teachers' pedagogical approaches in intermediate schools?	F1: Teachers' opinions of their dispositions (Items 12 & 15)		Technology rich; Increased self-efficacy	Agreement	Increased self-efficacy
	F2: Opinions about technology & practice (Item 2)	Increased communication and collaboration	Increased communication and participation	Agreement	Student-centred scaffolding
		Technological and Pedagogical knowledge	Scaffolding student understanding	Silence	Student-centred scaffolding
		Skills to teach self-regulation	Student-centred	Silence	Student-centred scaffolding
			Traditional didactic approach	Silence	Traditional didactic approach
	F2: Opinions about technology & practice (Item 1,3,4)	Fosters authentic assessment	Feedback immediacy	Agreement	Enhances assessment feedback practices
	F2: Opinions about technology & practice (Item 5)	Increased self-efficacy	Increased self-efficacy	Partial Agreement	Increased self-efficacy
	F2: Opinions about technology & practice (Item 6)	Technological and Pedagogical knowledge	Increased self-efficacy	Agreement	Increased self-efficacy
			Lack of self-efficacy	Silence	Lack of self-efficacy
	F3: Teachers' technology self-efficacy (Item 27, 31)	Increased self-efficacy	Increased self-efficacy	Agreement	Increased self-efficacy
	F3: Teachers' technology self-efficacy (Item 28)	Technological and Pedagogical knowledge	Technology rich	Agreement	Increased self-efficacy

In the comparison of findings, there were nine themes in which there was agreement in meaning, importance and coverage: Increased self-efficacy, technology rich, increased communication and participation/collaboration, fosters authentic assessment, feedback immediacy, skills to teach self-regulation, technological and pedagogical knowledge, student-centred and scaffolding student understanding. Pairwise comparisons were made between these qualitative themes and quantitative data.

Instance of agreement

Increased self-efficacy is one of the overarching findings that particularly highlight teachers' increased self-confidence for using tablet computers. Observation data corroborated the results of the questionnaire data suggesting that the teachers were using apps to plan their lessons.

Responses to the items in the questionnaire (Items 12 and 15) indicated that the teachers had positive attitudes towards tablet computers and showed complete agreement with the observation data (e.g. themes *'technology rich' and 'increased self-efficacy'*).

There was also complete agreement across the data sets that teachers had high self-efficacy, or the belief that they had the required professional skills to teach using tablet computers. All the three data sets indicated that the teachers had personal and professional technological self- efficacy to manage content, evaluate students, and engage students in collaborative activities. Observation data confirmed that in order to effectively use their skills the teachers had created technology rich learning environments.

In another example of full agreement, the quantitative data suggested that the teachers perceived that tablet computers allowed them to interact with students and share information efficiently and the qualitative data helped to explain this. From the comments of the teachers who were interviewed and those who were observed in the classrooms, it was apparent that tablet computers served as a mobile platform for communication and collaboration.

There was also full agreement between the qualitative and quantitative (Items 1, 3, 4) data sets with regard to teachers' beliefs that tablet computers foster authentic assessment and provide immediate feedback. There was strong indication of a shift in the way the teachers were administering assessments and the awareness that paper-based assessments are time consuming. The intention of the teachers was to give students challenging tasks and also the opportunities to put the teachers' advice into practice. Tablet computers allowed the teachers to use social media including social networking (i.e. Facebook) in formal teaching, learning and assessment. Overall, the findings suggest that the teachers were using technology for real-time assessment to assess students' abilities to perform meaningful tasks.

Instance of partial agreement

There were instances of partial agreement especially with regard to the theme *'increased self- efficacy'* as qualitative data (especially from the interviews) did not fully support the questionnaire statement that teachers had the necessary training and technical support to use tablet computers. However, observation data corroborated the quantitative results that teachers were more confident in using the technology.

The themes *'traditional didactic approach'*, *'skills to teach self-regulation'*, *'student-centred'*, *'scaffolding student understanding'* and *'lack of self-efficacy'* which emerged from the qualitative data was silent in the quantitative data set. Although there were fewer areas of overlap, findings indicate that while most teachers supported student-centred scaffolding there were classrooms where the trend was towards traditional didactic, teacher-focused teaching approaches. The efficacy confidence of few teachers (classrooms 3, 4, and 9) were grounded in traditional goals, for instance two students were observed using tablet computers by hiding it from their teachers (Classroom 3) while the teachers were not using the devices. There were text books on the teachers' desk and the teachers had not transitioned from traditional paper evaluations to tablet computer-based assessments (Classroom 9).

Research Question 3

Table 29: Convergence of findings for Research Question 3

Convergence Coding

Research questions	**Factors (Questionnaire)**	**Themes (Interview)**	**Pair-wise comparison of questionnaire and interview**	**Key finding**
RQ3. What are the challenges facing teachers who use tablet computers for teaching in intermediate school classrooms?	F1: Teachers' opinions of their dispositions (Item 13)	Lack of support	Agreement	Inadequate policies
	F1: Teachers' opinions of their dispositions (Item 18 & 19)	Lack of adequate training	Agreement	Inadequate policies
	F5: Affordances & constraints (Item 21)		Silence	Inadequate policies
		Lack of support	Silence	Inadequate policies

	F2: Opinions about technology & practice (Item 7)	Mandated curriculum	Agreement	Inadequate policies
		Lack of autonomy	Silence	Inadequate policies
	F6: Opinions on professional skills (Item 34)	Technological and Pedagogical knowledge	Agreement	Lack of skills

The two key findings that emerged from the analysis were the inadequate policies of thepolicy makers and lack of teachers' skills in integrating the technology. Following are the keyissues identified and how they triangulated across the quantitative and qualitative datasets.

Instances of agreement

Statements which indicated agreement between the data sets were of most interest. Thefirst instance indicated agreement between the quantitative and qualitative data sets and wasrelated to teachers' occurrent beliefs, for example the belief that teachers did not have the skills to solve maintenance issues (Item 13), the lack of adequate training (Item 18), and importance oftraining for effectively using the devices (Item 19). Although there was a high percentage ofneutral responses, one cannot also ignore significant definitive responses ('agree' and 'stronglyagree') which corroborated the qualitative themes 'lack of support' and 'lack of adequate training'.

The remaining two instances of agreement between the quantitative and qualitative data were the mandated curriculum and lack of skills. Although the questionnaire data demonstratedthat the teachers were finding it difficult to integrate the tablet computers into the curriculum,the interviews broadened the quantitative results and helped in producing a betterinterpretation. Through interviews, the respondents made it clear that a highly mandated curriculum didnot permit meaningful technology integration. However, this would suggest that there areother factors which would have hindered the integration, and which may include teachers' lack of skills or lack of technological and pedagogical knowledge to use the tablet computers ineducational contexts.

Instances of silence

There were a significant number of pair-wise comparisons between the data sets which resulted in silence. Comparisons which were "not applicable" to or silent in the quantitative dataincluded *'lack of support'* and *'lack of autonomy'.* One of the results which emerged from thequestionnaire data was also absent in the qualitative data sets, for example the belief that lack of access tothe internet was one of the difficulties faced by teachers.

4.6 Conclusion

Triangulation of data was achieved by using information gained from teachers' responses inself- report questionnaires, views expressed in the interviews, and classroom observations. The analysis (convergent coding) demonstrated how the merging of the qualitative and quantitative data provided convergence of findings for the important research questions. Together, the data sets confirmed the central themes and contributed to a higher level of analysis and a broader understanding of the research questions. Furthermore, the use of triangulation in this study allowed for the cross verification of teachers' perspectives on tablet computer integration and their experiences. The triangulation of the qualitative and quantitative data corroborated the findings and offered insights into the previous single analyses conducted with the quantitative and qualitative data, which are presented in the results chapter.

Chapter 5 Discussion

5.1 Introduction

This study examined Kuwaiti intermediate school teachers' beliefs about the use of tablet computers as a pedagogical tool in teaching practical studies (Electricity and Electronics). The quantitative data collected in this study offered clear insights into teachers' use of tablet computers for teaching, and their attitudes and beliefs regarding the use of the devices. When triangulated, qualitative data and quantitative data informed each other. The findings revealed several themes.

Through interpretation of the findings, this chapter presents a discussion, within six key syntheses, which continuously interacts with the research questions, data, and theory. The findings are presented to confirm, disconfirm, or extend knowledge by comparing them with current and existing literature as identified in Chapter Two.

5.2 Synthesis 1: Teachers' dispositions and perceptions of affordances and constraints

In this study, the researcher found that teachers had positive attitudes towards using tablet computers for teaching and learning and that most teachers in this study had the essential skills to use tablet computers, as a pedagogical tool. Both quantitative and qualitative data revealed that most teachers' occurrent beliefs towards the use of technology in teaching was a key factor in their disposition towards integrating tablet computers. The terms 'attitude' and 'disposition' are considered synonymous in this study as literature describes attitude as a disposition (Eaton et al. 2008; Ajzen, 2005). Affordances and constraints of technologies refers to "the strengths and weaknesses of technologies with respect to the possibilities they offer the people that might use them (Gaver, 1991, p. 79)".

The teachers' dispositions and perceptions of affordances may have developed over time through the use of tablet computers in their classroom practices. The teachers perceived tablet computers as enablers for technology integration for a number of reasons. During the interviews, they referred to portability (T2); being user-centred and interactive (T2, T12); appealing to students who prefer touch screens (T14, T15); are ideal for designing bespoke lessons for particular students (T8); send content (T10) and because they aid in assessment of students (T11). All these uses of tablet computers promoted the teachers to believe that the tablet computers could be used for “one-to-one” learning or to create personalised learning environments in which students can learn independently and enable learning to extend and continue beyond the classroom (T2, T7, and T13). These results emerged from the analysis of the interview data, especially when the theme ‘affordances’ was identified. Furthermore, the teachers perceived the devices as enablers for change and supporting the implementation of novel teaching methods. The teachers were using the technology to support the kind of teaching practice they believed was appropriate. This study reveals how teachers’ attitudes and beliefs are associated with teachers’ pedagogical contexts and to the affordances of tablet computers they can identify for their own practices. The findings from this study suggest that the teachers had a measure of TPACK, since they were able to identify the affordances and constraints of tablet computer use. The teachers had knowledge of the pedagogical affordances and constraints of tablet computers and they considered that this technology and its apps were applicable for the content they were teaching and in line with their students’ potential intellectual and emotional engagement with the tablet computers. This understanding of the technology may have given the teachers the impetus to adopt the devices, plan their classroom activities and implement innovative practices. The rationale behind making content-appropriate technology selection is the need to extend students’ learning, however, the teachers in this study were also aware that students need guidance (T10). This was evident when a teacher was noticed offering guidance during classroom observations (Classroom 12). This is a significant finding because teachers should be personally convinced of the affordances of tablet computers but equally aware that students need support in order to understand concepts, although being practiced users of digital technology. Literature also suggests that when integrating new technologies, teachers should be knowledgeable about using them to guide students to investigate topics both within and outside the classroom (Bledsoe & Pilgrim, 2015; Berson et al., 2012).

Tondeur et al. (2016) consider that teachers "pedagogical beliefs are related to teachers’ technology use and suggest that technology use can lead to the creation of new, reconstructed, or reaffirmed beliefs" (p. 561). They suggest that technology should be perceived as an enabler for change and teachers' beliefs should be perceived as an enabler for technology integration. Based on the results from both data sets in this study, the main conclusion that can be drawn is that the use of technology depends on teachers' dispositions or attitudes. This study found that teachers' pedagogical beliefs and their use of tablet computers are co-dependent and should be considered as 'bi-directional' (Tondeur et al., 2016) with both influencing each other. This finding corroborates results from earlier studies (e.g. Bullock, 2004; Gibbone et al. 2010; Tamer, 2011; Yilmas & Bayraktar, 2014; Li et al., 2015) which have identified that teachers, with positive attitudes, have an improved ability to integrate new and emerging technologies in their classrooms to support and develop their teaching. The results also support the arguments made by researchers (for example Hashim, 2014; Ifenthaler & Schweinbenz, 2013; Blackwell, 2014; Ertmer and Ottenbreit-Leftwich, 2010) that if teachers can leverage the affordances of technology, they can improve teaching practices and enhance student learning.

With regard to constraints, the teachers reported in the questionnaires, as well as during the interviews, that tablet computers are a source of distraction and are a barrier to the teaching and learning process. The analysis of the questionnaire responses indicate that over 72% of the teachers agreed (Agree 27.3%; Strongly Agree 45.3%) that tablet computers were a major source of distraction for the students. The interview responses (e.g. teachers T2, T8, T9, T10, T11, and T13) also reveal that the devices disrupted teaching and learning. Literature provides evidence (for example Karsenti and Fievez, 2013; Kordaki, 2013; McCoy, 2013; Montrieux et al., 2015) of digital distraction arising from the use of mobile technology, notably in the area of tablet computers in the classroom. For instance, Karsenti and Fievez (2013) using surveys, found that students were unable to resist using the devices to chat with friends or play games, and that teachers were concerned that the distraction could affect the academic performance of students. McCoy (2013) also found that students used these devices for non-educational purposes during classroom sessions. The current study upholds these findings.

Some of the teachers in the current study addressed this risk (of distraction) by placing restrictions on students' use of tablet computers and ensuring that the students followed class rules. During interviews, the teachers claimed that were exercising some control (T10) by trying to limit access (T5), and by filtering online content (T2 & T15). This finding corroborates the results of Karsenti and Fievez (2013) who identified that teachers used policies and accountability strategies to deal with inconsiderate use of the devices in classrooms. Previous research (e.g. Culen & Gasparnini, 2012; Falloon, 2013a; Falloon, 2013b) has also suggested that as the distractions caused by technology can negatively affect learning, student interactions with the devices have to be strictly monitored.

However, the teachers in the current study were struggling to manage or control students' use of the devices and this situation raises the point of classroom management issues conflating with teachers' concerns about technology use in the classroom. This finding also questions teachers' competence in controlling disruptive behaviour, and therefore maintaining classroom order when the technology is in use, but also can expose teachers' lack of efficacy with the technology.

Overall, this finding suggests that by understanding the affordances and constraints of using tablet computers, most teachers were able to make appropriate decisions as to when and how to use the devices. As the teachers in this study perceived that tablet computers are useful for teaching practical studies, this study argues that 'perceived usefulness' is important in determining intention to use the devices. 'Perceived usefulness' is a variable of the TAM and in this study identified the affordances and constraints of tablet computer use are closely related to this variable.

5.3 Synthesis 2: Varied self-efficacy beliefs

One of the overarching findings of this study is increased self-efficacy which emphasises teachers' increased self-confidence with their use of tablet computers. Findings from the questionnaires, interviews and classroom observations revealed that when the teachers had increased self-efficacy beliefs about the technology they were more willing to integrate technology into their practice, for example by using apps to plan their lessons.

Increased self-efficacy

The results indicate that the perceived value the teachers placed on the use of the tablet computers, influenced their use the technology. The teachers perceived that the use of the tablet computers had improved their task efficiency and influenced increased self-efficacy. The teachers' self-efficacy had a positive effect on the quality of classroom practice and the way the students were adjusting to learning in an environment, as the teachers were committed to integrating tablet computers. For example, the analysis of the questionnaire data resulted in two factors, namely teachers' competencies and confidence-limiting beliefs (Factor 2) and teachers' technology self-efficacy (Factor 3) which suggest that the teachers had the confidence and the ability to use the devices and its apps to prepare and administer lessons.

Interview data shows that the teachers demonstrated technology self-efficacy in the way they used tablet computers for planning lessons, for delivering content, in the way they focused on routine and procedures within their classroom, and in their interactions with the students. For example. Six out of the fifteen teachers had higher self-efficacy (T1, T5, T12, T13, T14, T15) were confident in their abilities, and took own initiatives to use the technology to develop lessons.
The observations revealed that 12 out of the 15 teachers appeared to have the confidence in using the tablets, for example the teachers prepared lessons beforehand, stored it in their devices and delivered the content to the students (Classroom 1, 5, 6, 7).

The quantitative and qualitative results revealed that the teachers demonstrated technology self-efficacy in the way they used tablet computers for planning and delivering content, in the way they focused on routine and procedures within their classroom, and in their interactions with the students. This suggests that the teachers had personal and professional technological self- efficacy, or the required professional skills to teach using tablet computers. It was this sense of growth in efficacy that allowed the teachers to interact with students and share information efficiently.

These findings are consistent with those of others (e.g. Hashim, 2014; Ifenthaler & Schweinbenz, 2013; Blackwell, 2014) who also found that technology can be leveraged to engage and motivate students and for strengthening the learning environment. Furthermore, they also correspond with the views of Ertmer and Ottenbreit-Leftwich (2010) that teachers' knowledge of the use of the technology can enable them to integrate the devices. In the current study the teachers perceived that they had the skills and self-efficacy to acquire technological skills on their own (as evidenced by interview results) and use the devices to design and create lessons. The results also support the findings of Koehler et al. (2014) who had claimed that teachers, who have the required knowledge or the skills to use technology, may be able to integrate it successfully. In the current study it would seem that the teachers' TPACK fostered their skills and also helped in the integration of tablet computers for their educational practices. In this study it was evident that positive beliefs and attitudes towards tablet computers enabled use of the devices and embedded apps as the teachers reported an overall sense of growth in efficacy in using the tablet computers. In other words, they demonstrated higher levels of self-efficacy which had an impact on their teaching behaviours.

Collective efficacy

Previous research (e.g. Burden et al., 2012; Falloon & Khoo, 2014; Hashim, 2014) found that mobile devices encourage collaboration and information sharing. In line with this, the interview data in this study provided evidence that teachers used the tablet computers as means to communicate and collaborate, and it is the teachers who encouraged collaboration. For example, the teachers acquired knowledge from colleagues to use tablet computers (T4, T8), or were motivated and helped other teachers to use the devices for teaching (T12). The analysis of data also revealed several instances of collective efficacy where teachers, with low perceived technology competence, requested students to help them out (T4, T7, and T12). In each of these cases, the teachers acknowledged that they were not ashamed of their actions. This sense of collective classroom efficacy enabled the teachers to implement the device, regardless of their own personal efficacy.

Significantly, the teachers collaborating with the students and other teachers not only generated collective efficacy but increased it. Those who felt less efficacious about using tablet computers engaged with their students, which encouraged joint use of the tablet computers by the students and the teachers and in so doing, this working together contributed to finding solutions to problems that arose during their use. In the area of collaborative working the findings show

that tablet computers can foster collective efficacy and enable teachers and students to become collaborators. In other words, collaborative inquiry enhances collective efficacy.

Collective efficacy is defined as the judgment of teachers to 'organize and execute the courses of action required' that would have 'a positive effect on students' (Goddard, Hoy & Woolfolk Hoy, 2004, p.4). The teachers, in the current study, considered that together with students and their colleagues they share a sense of collective efficacy in that they want to influence student outcomes through such collective actions. This sense of collective efficacy can influence increasing use of tablet computers and encourage new innovative teaching practices and approaches.

Overall, collaborative learning gave the teacher the opportunity to better understand what the learners understood and so, better able to correct misunderstandings. The hybrid functionality of a mobile device, for instance its usefulness as a tool for collaboration and anytime/anywhere dialogue, helped to build a network of students and teachers. This concept of social learning, advocated by Vygotsky (1980), was demonstrated by the teachers who integrated the tablet computers to facilitated constant feedback, which enabled their students to learn through discussion, clarification of ideas and evaluation of others' ideas.

This is an interesting finding as it is not only a very positive attitude but also an approach for the future of teaching.

Lack of efficacy

Some teachers in this study, especially those observed in classrooms 3, 4, and 9, exhibited lack of efficacy and displayed clear signs of negative self-concept. They appeared to have difficulty in using tablet computers in the teaching and learning process and were reluctant to use the devices. Interview data also shows that the teachers (T3, T4 and T9) had very low perceived self- efficacy, as they were unable to motivate students, lacked skills and determination. They did not want to take the risk (T4) and were unable to change their teaching style (T9). These teachers may have had relatively low technology skills and consequently the tablet computers posed a challenge to their mindsets about using them. This finding suggests that teachers with low technology self-efficacy are likely to have unfavourable attitudes towards integrating technology.

The integration of tablet computers into traditional teacher pedagogy had not improved the technology self-efficacy of these teachers as they had low technology self-efficacy or lacked confidence (classrooms 3, 4, and 9). These teachers were of the belief that they wanted to lead

the class and have absolute power, as in a traditional classroom and considered that the devices did not allow them to exercise such control. They feared that students would no longer depend on the teacher or consider them as the source of all knowledge. The fear of failure, while integrating the devices, reinforced negative attitudes towards change. This suggests that low technology self-efficacy with technology can foster anxiety among teachers with regard to adopting new technology, such as tablet computers. The combination of the teachers' reluctance to use tablet computers, in general, and the issues of self-efficacy with technological knowledge and pedagogical implementation of the technology may have contributed to negative perceptions about their own ability to successfully integrate technology in the classroom. The views of these teachers focused on conventional teaching methods and alignment to the mandated curriculum. This finding matches the contentions of several researchers from Kuwait (e.g. Alfelaij, 2016; Alajmi & Al-Hadiah, 2016) who identified that rote memorisation, face-to-face delivery models and other traditional teacher-centred teaching methods are prevalent in schools. Others have suggested that teachers who are used to traditional teaching methods will not be able to adapt to new technologies because they have to rethink the teaching process (Guo et al., 2014) and therefore didactic approaches continue to be a significant part of the delivery of learning (Gorissen, 2013). Other research, however, has shown that students prefer facilitated learning over traditional approaches (Potts, Rodriguez, Livingston, & Brown, 2017). Teachers' lack of confidence, caused by confidence-limiting beliefs, can prompt teachers to stay within their area of pedagogical comfort and implement only those strategies that they are familiar with.

The findings suggest that some teachers (T3, T4 and T9) who were interviewed and observed in the classrooms, believed that they were not only intimidated by the technology but were afraid of losing control over their teaching methods. It indicates that tablet computer usage is negatively influenced by teachers' perceived constraints which in turn have shaped their self-efficacy or their perception of their capabilities. This finding corroborate Stacy & Cain (2015) who claimed that teachers with negative attitudes fear change and uncertainty and resist technology. Other researchers (e.g. Kim et al., 2013; Kordaki, 2013; Blackwell (2014; Montrieux et al., 2015) have suggested that fear of failure and/or lack of technological knowledge are contributory factors towards teachers exposing lack of confidence in adopting and integrating technology into their teaching.

Overall, the findings associated with teachers' self-efficacy beliefs reflect previous research, for example that by Mac Callum et al. (2014) who found that perceived usefulness, ease of use, fear of losing control and increased self-efficacy were critical factors in teachers' behavioural intentions to use technologies for learning. The results also validate the claims of Kurniawati et al. (2016) that teachers who have negative attitudes are those who lack the knowledge to develop and implement effective teaching strategies.

5.4 Synthesis 3: Fosters authentic assessment and provides immediate feedback

One of the benefits of integrating tablet computers was identified, by the teachers, as technology- assisted assessment and feedback. Both the quantitative and qualitative findings showed that tablet computers foster authentic assessment and provide immediate feedback. The teachers reported that they had moved away from using paper-based tests and were using tablet computers for administering assessments. This finding reinforces the importance of tablet computers as pedagogical tools for teaching and learning.

A key objective of the teachers, who were interviewed, was to use the technology for real-time assessment to assess students and provide prompt and timely feedback using social networking (i.e., Facebook) and using the devices as “clickers”, a classroom response system (T2, T6, T7, T8). Classroom observations also showed that the teachers used quizzes in between lessons and provided feedback via Facebook messenger (Classroom 12), or used Kahoot, a user friendly online formative assessment tool, to check students' understanding in real time (Classroom 13). During the interviews, the teachers also reported that they used tablet computers to assess and evaluate their students’ assignments or knowledge of subject matter and provide feedback immediately via social media platforms in the classrooms (T2, T6, T7, T8, T11, T12, T13, T14, and T15). This finding suggests that the teachers were able to assess what the students were doing during classroom sessions and track their learning, however there was no attempt made to use summative assessment to evaluate students' learning. Instead of using standardised tests, the teachers used the tablet computers and created opportunities to assess their students' performance in a nuanced and multi-faceted manner and provide feedback so that the students could revise and improve their work and deepen their understanding. For example, students were given the task of using the drawing sketchpad on their tablets to draw and show their understanding of the science behind solar panels for immediate assessment (Classroom 15). The teachers who were using interactive apps to draw diagrams were showing that the tablet computers allowed them to address visual and auditory modalities, as well as to engage the students. Interview data also shows that the teachers encouraged problem-solving skills, social skills, and attitudes (T11 T12) that are used in the real-world, or a simulation of a real-world situation. Questionnaire results also show that most over 57% of the teachers (Agree 26.7%/Strongly Agree 31%) were able to provide prompt, timely and quick feedback when using tablet computers. By using the devices for authentic assessment, the teachers allowed their students to demonstrate their ability to apply relevant knowledge and skills.

These findings corroborate the results of previous studies that have found that tablet computers

are useful tools especially for assessment (Ifenthaler & Schweinbenz, 2013; Fabian & MacLean, 2014), providing feedback (Salem, 2013), and more specifically for improving the quality and quantity of feedback as compared to paper-based marking (Denison et al., 2016). However, a study by Njogu (2012) suggests that interpersonal skills are a critical part of a teacher's skills set when providing meaningful and prompt feedback. Overall, the teachers demonstrated their capabilities to design, develop, and evaluate authentic learning experiences and assessments incorporating tablet computers. The results also demonstrated that the teachers seemed to be empowered, as the automation provided by the technology allowed them a reprieve from tedious grading.

5.5 Synthesis 4: Student-centred approaches

It was evident from the classroom observations that the teachers were promoting student-centred learning by using tablet computers, by understanding that the students valued mobility and portability, by letting students to make decisions (observed in classroom 10) and by allowing their students a measure of control of interaction and sharing (observed in classrooms 1, 2, 5, 6, and 7). The teachers used tablet computers to scaffold instruction by engaging in discussions, sharing ideas with students, providing support through modelling, and encouraging peer discussions. This was a significant finding in the sense that the teachers were harnessing the portability and mobility affordances of the tablet computers to support differentiated learning. They were also providing learning tasks that supported the different learning goals, styles, attitudes and abilities of their students. In order to integrate the technology effectively, but also be really involved, the teachers were willing to promote some degree of collaborative and social learning with their students. During interviews, the teachers reported that they were against using the devices in traditional 'drill and skill' ways and wanted to use it to support student-centred learning, for example by matching students’ learning styles (T11), meeting the needs of learners (T6, T7), showing students how to use conversion apps such as Electrical Converter (T5) with the intention of wanting the students to learn independently (T12). This finding emerged from the dominant theme ‘scaffolding student understanding’(classroom observation) and the sub-theme TPACK skills (Interviews). This finding is in line with a wide range of research studies (e.g. Burden et al. 2012; Rikala et al., 2013; Leinonen et al., 2014; McGuire, 2015) that have established that teachers who use student-centred approaches do so to accommodate the learning potential and interests of students.

The nature of the teachers’ practical studies-specific TPACK was of interest in relation to their use of tablet computers and interactive apps to scaffold students’ understanding of basic electrical and electronic concepts. The teachers, as facilitators, constructed activities and instigated reactions, using the tablet computers, while teaching basic electricity and electronics. These activities and reactions then changed based on the progress made by the students. The techers believed that the technology was available to them as a means of enhancing education and were intent on making it more authentic for the students. For example, the researcher observed teachers engaging students in group activities, encouraging them to work independently of the teacher and share ideas (Classroom 11). Teachers also reported, during interviews, that they guided students to become self-regulated learners (T1, T7, and T11). These teachers did so by planning more interactive and creative opportunities for their students. Instead of using the tablet computers in the traditional 'drill and skill' way, the teachers leveraged the unique potentials of the tablet computers to scaffold students' understanding and in the process supported student-centred learning. Many researchers (e.g. Blackwell, 2014 and Montrieux et al. 2016). Montrieux et al. (2016) have suggested that teachers who are confident and use the technology in a variety of ways, and when students experience higher levels of support, they learn more successfully. This finding from this study also echoes the findings of Kim et al. (2013) and Kordaki (2013). On the other hand, a study conducted by Alsahou (2015) in Kuwait found that student-centred practices were moderate and teacher-centred practices were prevalent. To change these teacher-centred practices, Koehler et al. (2014) advocate that if teachers are to achieve such student-centred learning environments they should have adequate knowledge and skills to integrate the technology. However, the findings of this study has revealed that teachers appeared to have student-centred beliefs and were therefore able to effectively integrate tablet computers for teaching and learning. This is in line with Ottenbreit-Leftwich et al. (2010) who claimed that technology may not support student-centred practices if it is not aligned with teachers' beliefs.

5.6 Synthesis 5: Teachers' knowledge and skills are crucial for ensuring quality of classroom practices

A major challenge identified was lack of knowledge and skills in creating content using tablet computers (T3) and teachers admitted that not having pedagogy-based technology training, to use the devices to teach practical subjects (T4), was a contributory factor. These qualitative results (interviews) complement quantitative data which had identified that the main challenge facing teachers was lack of knowledge and skills in using technology effectively in the classroom. As stated earlier, the questionnaire items generated a significant number of neutral responses, and therefore this study infers that the teachers were uncertain if they had the skills ($r=0.734$, $p<0.01$) or the knowledge to use tablet computers ($r=0.598$, $p<0.01$). Interview data provided diverse opinions and views that substantiated the questionnaire findings.

This study, therefore, considers that these teachers did not have an understanding of the pedagogical principles that govern the application of tablet computers in teaching and learning. In contrast, teachers also used the tablet computers in innovative ways, for instance to interact with students (T8, T10 & T11), personalise learning (T6) and by using interactive apps to teach basic electronics (T2, T13). This suggests that most of the teachers had technology-supported pedagogical knowledge; they had an understanding of the affordances and constraints of the

tablet computers. Koehler and Mishra (2009) indicate that teachers' knowledge of a particular technology helps them in choosing appropriate tools to represent or transform the content they teach. Although the teachers, in this study, lacked training, they had developed technological and pedagogical knowledge over time through trial and error (T1, T12). The teachers attributed this ability to their own attitudes and beliefs, as well as knowledge and skills (T1, T2, T5, T6 and T10). This finding agrees with a number of studies (e.g. Baumert et al., 2010; Sothayapetch et al., 2013; Hume & Berry, 2011; Mishra & Koehler, 2006) in that teachers' technological and pedagogical knowledge and the skills to access content develops as they engage in classroom practice. This finding also corresponds with literature (e.g. Mishra & Koehler, 2006; Borko et al., 2009; Kim & Hannafin, 2011) that considers that teachers will be able to integrate technology into their teaching practices, if they refine their knowledge and skills.

The teachers in this study (as evident from the interview responses of teachers T1, T2, T5, T6, T10 and T12) were not only competent in basic skills, but had developed new skill sets such as flexibility, confidence, communication, the ability to engage, an understanding of new and emerging technologies, and the ability to empower students. This finding also confirms the claims that teachers' knowledge is an essential prerequisite for good teaching and that their classroom practice depends on the knowledge they have acquired over time (Hao, 2016).

An important determinant of teachers' skills and knowledge in their use of tablet computers is their level of confidence in using these technologies in the classroom or in communicating with learners. This confidence must emerge from their competence to handle the devices for various purposes. In this study, although some of the teachers (T3, T4 and T9) lacked competence in using the devices, many reported positive attitudes towards using them for teaching and learning.

Those who lacked competence lacked knowledge and skills and therefore were not able to make informed decisions. This finding upholds the claims of Alayyar et al. (2012) that teachers' lack of technological, pedagogical and content knowledge can have an impact on their capacity to improve their pedagogic practices. This also adds to the growing concern that teachers who lack knowledge and skills to use technology for teaching will try to avoid it altogether, through evasion behaviours (Palak & Walls, 2009; Wright & Wilson, 2011).

Yet another theme associated with this finding is lack of adequate training. The significant definitive responses ('agree' and 'strongly agree') to questionnaire items about the importance of training, or the lack of it, corroborated the qualitative results. The teachers expressed that they did not have enough exposure to understand the possibilities of tablet computers or to utilise them to their fullest capabilities. The teachers admitted that they lacked adequate training, which raises concerns that they are not being given the support they need to utilise the tablet computers for teaching.

Effective teacher training is one of the most cited reasons for successful integration of technology into the curriculum and for connecting technological skills to subject area content and classroom practice (Kim et al. 2013; Avidov-Ungar & Eshet-Alkalai, 2014; Lehiste, 2015). The finding in this study is not consistent with results of previous research (e.g. Ottenbriet-Leftwich et al. 2010; Nishino, 2012; Blackwell, 2014) which found that teachers need training and support if they are to exploit the potential of emerging technologies and also to influence teachers' development of positive beliefs. Most importantly, training is crucial for balancing content, pedagogy, and technology (Rienties et al., 2015).

This finding also does not support other studies conducted in the area of technology integration, which concluded that the teacher training is essential for instilling a positive attitude into teachers and for increasing their confidence in incorporating technology for teaching (Hofer & Swan, 2011; Mac Callum et al., 2014). Researchers also claim that the training has to be continuous if they are to acquire the required skills to use the technology (Wright & Wilson, 2011; Avidov-Ungar & Eshet-Alkalai, 2014; Lehiste, 2015). Although deficiencies in knowledge can be corrected by training, this study acknowledges that the training, provided by the Kuwaiti Ministry of Education, does not either give teachers the opportunity to participate in professional development programmes or the support required to help teachers understand how to leverage tablet computers as education tools. Since the teachers in this study had clarified that they lacked training, this study strongly recommends that training programmes have to be developed with the aim of improving teachers' attitudes toward tablet computers and enhancing technological and pedagogical skills.

5.7 Synthesis 6: Lack of pedagogical clarity and inadequate policies

Formulating a policy on new and emerging technologies in education requires taking several factors into account such as purpose, the readiness of schools, making devices available to teachers and students, the relevance of applications and content, and teachers' capabilities. Although, policies can facilitate change, they may not guarantee technology implementation or impact. In this study, questionnaire findings revealed that over 70% of the teachers (Strongly Agree 50.7%, Agree 24%) were finding it difficult to integrate the use of tablet computers into the curriculum. The qualitative findings illuminated how policy makers and their policies have hindered rather than enabled tablet computer integration in schools. For instance, the teachers in this study expressed their disappointment with the mandated curriculum, which according to them was rigid (T6), did not meet the needs of students (T7, T8), and was not suitable for tablet computer integration (T1). This suggests that the policies are inadequate as they do not have explicit connections to teachers' classroom practices.

In this study, the teachers were against a one-size-fits-all curriculum. The curriculum does not typically emphasise either 'technological pedagogical content knowledge' or 'teachers' competence'. This lack of pedagogical clarity, on the part of the policy makers, can lead teachers to be cautious when implementing the technology. The problem is that tablet computer integration has been imposed via a 'top down' mechanism as the teachers are unable to use it to suit their own style, or the needs of their students. This finding supports the results of other studies from Kuwait (e.g. Alhashem & Al-jafar, 2015 and Mohammed, 2014) which found that the centrally mandated curriculum is not compatible with technology and therefore teachers are unable to use the technology for teaching. The teachers, in the current study, were calling for an adaptable curriculum that can be customised, and one which can be personalised to address students' diverse learning styles.

Another theme (interview) associated with this finding was the tension between the mandated curriculum and teacher autonomy. The teachers described, with genuine emotion, that their professional autonomy, judgement and expertise were denied by the government. They believed that the Kuwaiti government, which mandates the national curriculum, infringes upon teacher autonomy by undermining the professional status and expertise of teachers. They also considered that the education policies of the Kuwaiti Ministry of Education has tightened central control over schools which has resulted in restricting academic freedom (T13) and undermined the quality of education that teachers can deliver. In addition, they believed that teacher autonomy, within a rigid national curriculum, had prohibited teachers from creating content (T1, T14), making changes to the curriculum or in individualising the curriculum when integrating tablet computers. Overall, the teachers' experiences have shown that the use of tablet computers requires a degree of autonomy. Although the accountability systems in Kuwait are eliminating their independent decision-making, the teachers, in this study want to demonstrate resilience by exercising professional autonomy in an environment where demands are constantly placed upon them without consultation.

The results reveal that support and resources are needed when using tablet computers for teaching and learning. Interview data suggests that the teachers, in this study, were seeking increased encouragement, technical support, sufficient technology resources, sufficient professional learning opportunities, and that policy makers should provide more assistance so that Kuwaiti teachers, in general, can develop the capacity to integrate the tablet computers successfully (T2, T4, T5, T8, T10, T11 and T15). All these considerations indicate that the policy makers are not paying attention to teachers' technological and pedagogical needs and not providing support or resources.

The results support the claim that if teachers are provided support by policy makers it would have a profound impact on teacher confidence which is important for technology integration (Blackwell, Lauricella & Wartella, 2014). Teachers, in the current study, perceive support to include technical support, as well as ongoing support beyond the initial training, when integrating tablet computers. They believe that required support should not only be when they initially use a new technology resource but also when they practice using it and begin to integrate it in their classrooms. In other words, continuing support will build and increase teachers' confidence and consequently have a positive effect on teaching and learning.

These findings support that of Hassler, Major and Hennessy's (2015) critical review of literature which showed that lack of technical support can directly affect teachers' beliefs and can prevent them from using tablet computers for teaching, In their review the authors suggest that policy makers and institutions should support teachers by providing resources and ongoing professional development in order to change teachers' beliefs. These findings, in this study, corroborate the findings of Montrieux et al. (2015) who indicate that policy makers have to provide technical and pedagogical support to facilitate teachers' understanding of the full potential of tablet computers, for example adequate support for schools and assist in providing school infrastructure for incorporating the devices. This study considers that Kuwaiti teachers need technical and pedagogical support in order to improve their practices, a point substantiated by the work of Kordaki

(2013) in Greece, Kim et al. (2013) and Blackwell (2014) in the United States, which indicates that this is an international issue.

5.8 Conclusion

As a result of the findings, it appears that integration of tablet computers and higher self-perceived competency of teachers is positively associated with overall technology disposition or attitude. Although teachers in this study showed enthusiasm for using tablet computers, there were still efficacy issues and the pedagogical reasoning for integrating such technologies. Overall, their pedagogical beliefs about their knowledge and skills revealed a significant influence on their technology practices in their classrooms. Pedagogical beliefs were typically discussed in terms of a continuum between teachers' orientations towards traditional and student-centred approaches. The teachers, in this study, held occurrent beliefs and dispositions about the use of tablet computers for teaching and learning that did fit precisely into the dichotomy of traditional versus student-centred. A major gap that was uncovered is the disconnect between the policy makers, who make the key decisions on tablet computer integration, and the reality of the teachers who implement the technology in schools.

Chapter 6 Conclusion

6.1 Introduction

This mixed methods study was conducted to understand teachers' beliefs and attitudes toward integrating tablet computers and the knowledge and skills in applying those technologies in Kuwaiti schools. This chapter concludes the research and summarises the main findings in response to the research questions. It highlights the contributions made to knowledge on technology integration and use in schools, presents the theoretical and practical implications of findings for researchers, teachers and policymakers, discusses the limitations of the study and makes recommendations for future research, policy and practice.

Summarising from Chapter Two, the current literature shows that the integration of tablet computers in teaching, learning, and assessment can promote collaboration and information sharing (Burden et al. 2012; Ifenthaler & Schweinbenz, 2013; Hashim, 2014; Montrieux et al., 2015; Denison, Bate & Thompson, 2016). Moreover, it is claimed that the technology can essentially improve learning outcomes (Njogu, 2012; Mmasa, 2016), provide seamless learning spaces (Clark & Luckin, 2013; Wong & Loooi, 2011). It is also claimed that the technology supports student-centred learning practices (Blackwell, 2014).

However, although the literature lauds the affordances of tablet computers, there are certain scholars (e.g. Stacy & Cain, 2015; Montrieux et al. 2015; Gorissen, 2013).who refute such claims and argue that the educational setting can impose constraints which can prevent successful technology integration. For instance, teachers' negative attitudes, fear of change and uncertainty, fear of losing control over students, resistance to emerging technologies and new teaching approaches, and preference for traditional lectures

The literature reviewed also demonstrates that teachers' perceptions of technology use are driven by levels of confidence and self-efficacy beliefs (Huntington & Worrell, 2013; Mac Callum et al. 2014); their values and beliefs concerning its usefulness in their teaching (Nair & Das, 2012), in-service training (Nishino, 2012), beliefs about fitting the technology into their teaching and classroom practice (Ihmeideh, 2009; Kim et al., 2013), and attitudes to the use of technologies (Yilmas & Bayraktar, 2014; Li et al., 2015).

Literature from Kuwait showed that there were also cultural, technical and contextual challenges which inhibited tablet computer integration, for instance, the prevalence of conventional didactic methods of teaching such as rote-learning and teacher-centred approaches (Alfelaij, 2016).

Teachers were reluctant to use technology as they lacked skills as well as technological, pedagogical and content knowledge (Mohammad, 2014; Aldhafeeri et al. 2016; Al-Awidi & Aldhafeeri, 2017) and that centrally mandated curriculum was not compatible with technology integration (Alhashem & Al-jafar, 2015).

Important gaps identified in the literature reviewed relate to the fact that there is very little evidence contributing to our understanding of teachers' beliefs and practices and the factors that influence teachers to integrate tablet computers in classrooms. The current study helped in identifying the gap and how educators and policymakers can help shape or re-orient teachers' beliefs by supporting them to integrate the technology.

The following section reflects on the main findings of the research in terms of its contributions to existing knowledge.

6.2 Key findings and contribution to knowledge

In order to understand teachers thinking about using tablet computers in their teaching, it is necessary to understand the knowledge and beliefs that underpin these decisions. The results from the questionnaires, interviews, classroom observations show that most teachers had positive dispositions or attitudes towards using tablet computers. Together, they demonstrate how teachers were integrating the technology during classroom practices and it was concluded that the use of tablet computers depends on teachers' dispositions or attitudes. Teachers considered the technology to be of more importance or relevance and this perception could be seen to relate to teachers' beliefs about the affordances of tablet computers. The key findings with respect to the three research questions are presented below.

Key Findings

RQ1: What are teachers' beliefs and attitudes associated with the initial adoption of tablet computers for learning and instruction?

Quantitative and qualitative results indicate that the teachers in this study had positive beliefs and attitudes towards using tablet computers and that their self-efficacy may have influenced their choice of instructional strategies. Teachers with positive dispositions and attitudes were confident in their capabilities to integrate the technology while those who lacked self-efficacy were reluctant to use it for teaching. The findings suggest that the teaching practices met the affordances of tablet computers and therefore had allowed the teachers to successfully integrate the devices in schools. In other words, there was an intricate relation between the affordances of the devices and tablet-mediated teaching practices. This study has also identified that collective efficacy can affect teachers' attitudes through perceived usefulness and perceived ease of use, which are two variables of the TAM. This finding is unique as previous research has not been identified as demonstrating that tablet computers can have an impact on teachers' collective efficacy.

RQ2. How has the deployment of tablet computers influenced or changed teachers' pedagogical approaches in intermediate schools?

The deployment of tablet computers had created dynamic learning environments which foster student-teacher interaction. Most teachers had developed technological and pedagogical knowledge. In particular, the teachers had developed pedagogical knowledge related to practical studies and had created effective teaching and learning environments for all students by integrating tablet computers which fostered communication and collaboration. The integration of the devices also had altered their teaching practices as they were able to design and implement authentic assessments in order to provide a precise picture of what their students know and can do in the real world. The teachers had also developed skills to teach self-regulation in student-centred technology-rich environments. Although some teachers (three classrooms/teachers) were reluctant to use the technology and were using traditional didactic approaches, most participants scaffolded student understanding by providing prompt feedback.

RQ3. What are the challenges facing teachers who use tablet computers for teaching in intermediate school classrooms?

The challenges facing the teachers were lack of technological and pedagogical knowledge or lack of skills and knowledge in using the technology effectively for teaching. The respondents lacking confidence and identified technology training as a key component in a teacher's attitude and confidence when it comes to the integration of the devices into the curriculum. They attributed their shortcoming to the inadequate policies of the policy makers at the Ministry of Education in Kuwait who did not provide support, resources or adequate training for the teachers. On the other hand, the Ministry instigated measures that curtailed autonomy, for example coercing teachers to work with a mandated curriculum and hindering them from involving in making curriculum decision making,

One of the constraints reported by the teachers was that tablet computers are a source of distraction and are a barrier to the teaching and learning process. The findings indicate this belief may have been negatively influenced by teachers' beliefs and attituds. The study also found that most teachers, including those who were intimidated by tablet computers, presented a critical perspective on the technology rather than blindly accepting it. This brings into view important aspects of teachers' thinking that was not as apparent elsewhere.

Contribution to knowledge

This study contributes to developing an understanding of the factors which encourage to integrate tablet computers in support of student learning. The use of interviews gave ample

opportunity for the voices of the teachers to be heard. The results of the present study therefore fill the gap in the literature concerning how teachers use technology, by allowing them to narrate their own experiences. The teachers concerned presented their decisions regarding technology use as a matter of meeting students' learning needs and preferences and expressed a desire to use technology in ways that matched their personal teaching style.

By considering past accounts of the use of tablet computers, the interview data provided further evidence that cultural and contextual factors can influence teachers' attitudes to adopt and use technology, for instance face-to-face delivery models and teacher-centred teaching methods such as rote-learning and memorisation. The evidence in this study suggests that although didactic approaches are a significant part of the delivery of learning, context is more important and is strongly linked to the formation and shaping of a teachers' beliefs about technology. The study also identified that teachers believed tablet computers had unwelcome effects on their teaching. While teachers with low self-efficacy believed that their personal teaching styles shaped how they used technology, those teachers who had the ability to use tablet computers had shaped their teaching practices. Much of the literature is predominantly concerned with tablet computers and its application in classroom environments, while the findings of this study emphasise the role of group dynamics and collective efficacy in learning contexts. Therefore, it can be suggested that such themes illustrate key aspects of the original contribution of this thesis.

Literature identified that research into teachers' beliefs about technology had developed in some distinct areas with one group of researchers considering attitudes towards technology (e.g. using the TAM) and others focusing on conceptions of or approaches to teaching and the relationship between pedagogical beliefs, knowledge, skills and the use of technology (e.g. TPACK). The findings of this study suggest that TAM and TPACK are valuable in understanding teachers' beliefs about tablet computers and has contributed to each of them. However, it has also shown that to fully understand teachers' beliefs about their perceptions of tablet computers the beliefs have to be considered together rather than separately and that importance has to be given to the context in which the integration takes place.

In the area of tablet computer integration, the results of this study make a contribution to knowledge by helping policymakers to formulate technology related policies that are aligned with the needs of students and teachers. The findings can also improve school policymakers' understanding of how contextual factors promote or impede technology integration efforts. An awareness of these drivers and barriers can help them to make contingency plans. Policymakers will be able to understand that tablet computer integration is impossible without aligning it with teaching and learning and by considering contextual factors.

The findings from this study present strong evidence that technology is being used in Kuwaiti schools. This study therefore provides an important contribution to the Kuwaiti literature in demonstrating the greater understanding that can be achieved from adopting a mixed methods research design to study technology adoption and use in education. This study was therefore able to exploit the strengths of both quantitative and qualitative methods to enable a more comprehensive understanding of education technology and its application in Kuwaiti schools. In the quantitative phase of the study, the statistical analysis enabled the researcher to meet the research aim in identifying the factors influencing technology use. Then, in the qualitative phase of the study, thematic analysis of the data enabled the researcher to meet the research aim of exploring the contextual and explanatory factors perceived to technology adoption and use. The qualitative data therefore enabled the researcher to make more meaningful interpretations informed by the teachers' lived experiences.

Summary of contribution to knowledge

The literature review had exposed a gap in understanding why practical studies has not been the main focus for integrating tablet computers in an education system where traditional teaching approaches are still in vogue and where there is systemic resistance to technology enhanced learning. The findings of this study would be interesting as it will focus on a new content area which is associated with practical studies and has not been previously researched, especially in Kuwait.

Overall, this study has shown that teachers' beliefs that have been identified are important for understanding teachers' attitudes towards integrating tablet computers. Unfortunately, several limitations were identified in this study.

6.3 Reflections on the limitations of the study

The mixed methods research methodology adopted was complex and therefore the researcher had to spend considerable time and effort to collect and analyse data and publish results.

Although the research was carried out in an acceptable manner, it is still prone to flaws.

The sample for this study was selected from one school district in Kuwait and the findings cannot be generalised with limitations to other school districts in Kuwait, although a high level of validity was ensured through triangulation between the respective questionnaire data and qualitative responses. Therefore, the researcher acknowledges that this study has low external validity. This is because that it is not known how well the teachers involved in this study represent the wider population.

In addition, the present study has limitations associated with its reliability, as the research instruments were used only over a short period of time. In order to increase reliability, or the reproducibility of the findings, the researcher could have repeated the study, using the same methods and then comparing the results. This is because "…in interviewing there may be as many different interpretations of the qualitative data as there are researchers" (Cohen et al., 2011, p.202).

When formulating the research questions, the researcher expected that the questions would evolve and change during the study. The question "How has the deployment of tablet computers changed teachers' pedagogical approaches in intermediate schools?" was change to "How has the deployment of tablet computers changed or influenced teachers' pedagogical approaches in intermediate schools?" This was done in a manner consistent with the research design used in this study. As a mixed methods design was used, the question was under continual review and changed. It would have been challenging if the design was quantitative in which the research questions remains fixed throughout the study (Creswell, 2014).

This study used three different approaches to data collection: a questionnaire, interviews and classroom observations. A significant drawback of self-reporting questionnaires is that the respondents can potentially provide inaccurate information (Kormos & Gifford, 2014; Choi & Pak,

2005) or over-represent those who used and had positive attitudes towards tablet computers.

Therefore, the respondents might not be fully representative of all school teachers. Similarly, the questionnaires were distributed via school principals and there were inconsistencies in how willing they were in contacting potential teachers repeatedly and requesting them to complete the survey. Consequently, it was not possible to precisely indicate the response rate to the questionnaires. Furthermore, the qualitative results were interpreted only by the researcher. The involvement of more researchers or external investigators would have resulted in a new or different interpretation.

A different set of limitations were associated with the interviews and observations. In order to obtain in-depth information, the teachers were interviewed for approximately 40 minutes and this meant that only a relatively small qualitative sample was possible. However, as the sample of interviewees came from practical studies subjects, the small size of the sample was considered sufficient. Teachers were observed in one classroom each or for a duration of 45 minutes.

Observations over a period of 2 weeks would have provided better results.

Another limitation was language in the research context. Arabic was the first language of responents and therefore, the researcher had to translate the questionnaires and interview transcripts into English and back to Arabic during the process of data collection and data analysis. The interviews and surveys were conducted in Arabic and the translation took significant effort and time. Although attempts were made to be as accurate as possible when translating the data, the researcher acknowledges that biases or misinterpretations are possible.

Having acknowledged the limitations, the theoretical and practical implications resulting from the knowledge resulting from the study are discussed in the following section.

6.4 Implications and recommendations

Research implications suggest that the results of this study may be important for teachers, schools, policy and future research. Besides discussing the potential implications of the findings, recommendations were also made.

As mobile technologies, especially tablet computers, continue to form an integral part of classroom learning and teaching, both within and outside school campuses, and as it is increasingly integrated into curricula, research problems are also expected to evolve. The researcher had in the introductory chapter alluded to the scarcity of research in Kuwait and other Gulf Cooperation Council states concerning the use of technologies by teachers for teaching.

These previous studies have explored online tools, including social media, in teaching and learning contexts. On the other hand, there have been no studies to date, which have examined teachers' pedagogical and epistemological beliefs and its influence on their decisions to integrate tablet computers for teaching in schools.

6.4.1 Implications for teachers

When integrating tablet computers, teachers are required to develop technological skills so that could integrate the technology into the curriculum. The findings show that teachers with strong self-efficacy beliefs were able to integrate the devices. However, not all teachers were able to develop or apply knowledge and skills in the use of tablet computers. This suggests that practicing teachers did not have adequate professional development training.

Teachers in this study were sensitive to the ways in which tablet computers support or undermine learning tasks. Because technologies vary in terms of the affordances and constraints they offer, careful consideration is needed when using tablet computers to teach concepts.

Authentic learning may require significantly more planning and preparation, and teachers may need to acquire new and more sophisticated instructional techniques or substantially revise lesson plans they have used for years.

Findings indicate that tablet computers allowed the teachers in the study to design classrooms to create authentic learning environments. This suggests that teachers who choose to incorporate tablet computers should have positive attitudes and the skills to design tasks to support their instructional goals. The data indicates that teachers used more than one successful approach to design classroom instruction around tasks related to practical studies and provided opportunities for authentic learning. The activities allowed students to apply subject-specific knowledge and skills to a real, complex problem.

6.4.1.1 Recommendations for teachers

While teachers' technological skills development could be accommodated through special training sessions, which can influence their perceived self-efficacy positively and enhance overall teacher effectiveness, teachers have to be committed and change their attitudes. However, it is not certain if teachers with low-self efficacy would welcome opportunities to share and discuss their teaching practices more frequently. Those who develop collective efficacy can learn from their colleagues how to use the technology in ways that complement or express their personality or teaching style.

6.4.2 Implications for Schools

The findings of this study have implications for school principals, teachers and department heads who are responsible for identifying, selecting and using technologies for learning and teaching. This study provides early insight into how tablet computers can help teachers, specifically those who teach practical studies, to engage and enhance student learning. It also provides an understanding of the challenges that schools, and teachers face when implementing these devices. The findings of this study also revealed the teachers' belief of the importance of professional development that is necessary for the successful integration of tablet computers in classrooms.

6.4.2.1 Recommendations for schools

Schools need to ensure that when integrating these devices into curricula, it is developed on the basis of learners' needs. Schools should consider implementing at tablet computers as a differentiation instruction strategy. The findings indicate that schools have to apply student- centred learning, whereby teachers can use tablet computers to allow self-regulated learning and scaffolded learning. Teachers should develop positive attitudes when implementing the technology for learning purposes so that it will positively impact their instructional planning and delivery. However, if teachers are to use tablet computers effectively, they have to be prepared to employ teaching strategies that actively engage students and use the technology develop students' critical thinking and problem-solving skills. In order to accomplish this, schools have to put in place change management strategies, for example focusing on providing feedback, scaffolding, interactivity, and quizzes, to orient teachers on the positives associated with embracing emerging technologies.

6.4.3 Implications for policymakers

The study raises questions about policymakers' lack of pedagogical clarity and inadequate policies which hinder tablet computer integration, for instance, the 'one-size-fits-all' curriculum mandated and rigidly enforced by the government, strategies that do not meet the learning needs of students, approaches that restrict teachers' academic freedom. While the Ministry of Education can mandate the use of technology, in particular tablet computers, this may be counter- productive. Coercive tactics had forced teachers to use technology in ways that they perceived to have a negative impact on their teaching. Teachers' negative dispositions had resulted in adverse reactions, for instance resistance to and avoidance of technology.

The findings presented in this study demonstrate that significant problems exist which hinder successful integration of tablet computers in Kuwaiti schools. At the wider policy level, there appears to be a lack of coordination between policymakers and schools and the problems that exist make it impossible to integrate tablet computers effectively. This evidence has significant implications for the targeting of policies that seek to encourage and support the use of tablet computers in education.

There are issues specific to teachers in the Kuwaiti school system. The qualitative data (interviews and observations) found that teachers were disempowered and frustrated because they lacked support which they attributed to inattentiveness of policymakers and lack of training. The findings of this study could influence the Ministry of Higher Education to inform integration of tablet computers and other emerging technologies, for example, allocating adequate technology resources, providing support to teachers, and developing quality professional development programmes to continuously support teacher development.

6.4.3.1 Recommendations for policymakers

The implications provide direction for future teacher and technology policy decisions. To effectively integrate technology in schools, policymakers must understand that there is a need for realistic policies. The Kuwaiti Ministry of Education should take steps for tablet computers to make a positive difference, for instance by planning for such technology use and including school leaders especially teachers in their planning right from the very outset and not just after implementation. Policymakers have to realise that they have a vital role to play in helping teachers understand how policies apply to a rapidly changing, technology-dependent world. They have to ensure that teachers have opportunities to reflect on and discuss how tablet computers align with their preferred teaching styles and approaches. In other words, policymakers should recognise teacher autonomy and include them in curriculum development.

The Ministry of Education should give more importance to developing teachers' technology-supported pedagogical knowledge and skills which are crucial for increasing teachers' confidence levels and more importantly for developing and delivering content and ensuring quality of classroom practices. Supervisors nominated by the Ministry of Education have to ensure that tablet computes should be used for creating course content and that such integration has to be modelled on constructivist theories.

Another implication is that the findings of this study can be used for helping policymakers to make decisions, particularly those in similar circumstances to the research context. For example, to support technology enhanced teaching and learning, policymakers should recognise the undisputed importance of teachers in realising educational goals. The study also suggests that teachers' previous experiences with technology can affect how they respond to tablet computers. Therefore, policymakers need to be aware of the varied self-efficacy beliefs and experiences of teachers and consider these when introducing innovative technologies.

Traditional teacher training and professional development practices pose a barrier to adoption of tablet computers as it is not aligned with the technology. Under such circumstances, teachers are unable to use skills or taking on innovative and flexible teacher roles. The results of this study indicate that training is a vital aspect in effective implementation of technology. Policymakers should educate teachers on the importance of technology related training and clearly communicate the relevant policies to schools. When organising professional development opportunities for tablet computers, the training programmes should focus on the subject-specific needs and contexts for using technology. The programmes should be developed to build capacity of teachers for using tablet computers and content development. Most importantly, policymakers should consider the context rather than the 'one-size-fits-all' directives that the teachers in this study identified. The Ministry of Education should offer professional development courses on a continuum that specifically addresses teacher efficacy in integrating tablet computers.

Teachers may benefit from entirely new forms of professional development which would focus on cooperative learning techniques. Additionally, findings indicate that assessment strategies employed in the schools do not serve the needs of tablet computer enhanced instruction. Results also indicate that authentic assessment and feedback immediacy are popular forms of assessing students' knowledge of concepts related to a particular subject. Subsequently, policymakers should train teachers and encourage schools to assess students' ability to solve problems or collaborate. They should also refrain from using standardised exams to test students' ability to memorise.

Teacher preparation has to be enhanced by creating opportunities for teachers in training to see and experience the positive effects of tablet computers on teaching and learning. This study suggests that it is important that pre-service teachers' experiences have to be increased through exposure to the mechanics of tablet computers and how the technology can be integrated into the curriculum and classroom. Content for vocational teacher training education programmes/ courses should also be developed from the existing curriculum.

Overall, the Ministry of Education's technology implementation strategy should be developed and linked to the overall strategy and goals. Work plans and training plans should be developed and aligned to strategic plans. Funds should also be allocated for efficient and effective integration of tablet computers. These policy changes are complex, and in order to make choices policymakers should use solid evidence to guide those decisions.

6.4.4 Implications for future research

Although earlier research has explored the impact of technology on academic performance, the effectiveness of tablet computers, and teachers' attitudes towards technology integration, the relevant research findings do not address how technology is used in its entirety. This study has shown that teachers' pedagogical beliefs about tablet computers encompasses their perceptions of technology, and their knowledge and skills which are crucial for ensuring quality of classroom practices. It has also shown that the adoption and use of tablet computers encapsulates teachers' dispositions and perceptions of technology, and its affordances and constraints. It is hoped that this study will encourage future researchers and contribute to the growing body of literature exploring how tablet computers can become a practical medium for instructional strategies to enhance learning. The methodological implication of this study is that quantitative and qualitative methods can be used and then interpreted interdependently. This leads to a thorough understanding of teachers' beliefs about tablet computer integration in schools for different subjects.

6.4.4.1 Recommendations for future research

The findings and issues raised by this study demonstrate that there are more possible avenues for future research. The study was carried out in schools from only one district in Kuwait. Future research could consider involving students and teachers from both state and private sector schools covering all the six school districts Kuwait and even in its neighbouring countries.

Another suggestion is that researchers can use mixed methods to focus on teachers' dispositions and perceptions of technology. This methodology also offers the opportunity to influence a broader audience consisting of academics who are experts in their field, and the Ministry of Education, policymakers, and the government. Future studies can also increase the sample size, widen the scope by investigating the beliefs and perceptions of school principals and policymakers, and including variables, like teachers' age, work experience, qualification and gender to gain better understanding of this phenomenon.

One area of research that could be considered by future researchers is context. This study was carried out in Kuwait and it would be interesting to discover the extent to which similar aspects of context and culture are relevant to school teachers in other countries and school systems. It is therefore suggested that future research should develop theoretical models for understanding the implementation of tablet computers by focusing on context, for instance school and national culture, rather than those proposed by the Technology Acceptance Model.

6.5 Summary

This thesis has shown how teachers' beliefs and attitudes about integration of tablet computers is related to their knowledge and skills. This study focused on teachers' dispositions and perceptions of affordances and constraints, self-efficacy beliefs, authentic assessment and feedback immediacy, student-centred approaches, teachers' knowledge and skills, and policymakers' lack of pedagogical clarity and inadequate policies as they relate to technology integration.

As this chapter has demonstrated, this study not only makes contributions to existing knowledge but also has implications for researchers investigating the implementation and use of tablet computers in school classrooms, for teachers' understanding of the factors that influence their beliefs and attitudes towards the use of the technology, for schools that are incorporating such devices, and for policy makers who are responsible for training teachers.

The quantitative results show that teachers' occurrent beliefs, attitudes, knowledge, technological skills, perceptions of the affordances and constraints of tablet computers, TPACK reasoning and teachers' competencies and confidence-limiting beliefs were key factors that either influenced or hindered the implementation of technology.

On the other hand, the qualitative findings show that teachers' potential use of tablet computers was influenced by their dispositions towards the devices and its affordances (for e.g. fosters authentic assessment), self-efficacy beliefs (e.g. increased self-efficacy and collective efficacy), TPACK, and student centred beliefs (e.g. scaffolding instruction), while lack of self-efficacy and inadequate policies hindered technology use. The results of the interviews suggest that although the policymakers had a strategic intent to enhance teaching and learning through tablet computer implementation, there were many instances where the gap between policy and practice was considerable. Teachers, who were responsible for implementing the devices, had little or no previous experience in integrating technology. Nearly all teachers perceived that they lacked professional development and training for integrating the technology.

The findings also demonstrate that a major challenge was the existence of a centralized education system which hampered technology integration by mandating curriculum and disempowering teachers. Therefore, integration and use of the devices had become difficult as the policymakers were focused on maintaining the educational system instead of developing it.

The findings presented in this study addressed the key research questions which motivated the investigation into teachers' beliefs and attitudes towards tablet computer integration in Kuwaiti schools. In essence, the study has provided teachers, schools, researchers, and policymakers with empirical insights into teachers' beliefs and how the teachers think, feel, and act when integrating new and emerging technologies. These findings provide a sound foundation for future research in this area and the implications they may have on pedagogy and technology alike.

6.6 Personal reflections

The main strength of the current research is that it adopts a mixed methods approach to handle a wider range of research questions. Some of the methods which added value to this study were the use of methodological triangulation and convergence coding. Most importantly, a research of this kind which is methodologically sound and focuses on tablet computer integration in Kuwait, has not yet been attempted to my knowledge in any of the states within the Gulf cooperation Council.

When I embarked on my PhD journey and began searching for literature from Kuwait or countries which are members of the Gulf Cooperation Council, I found it difficult identifying methodologically sound research. On personal and professional levels, I lacked time management skills but eventually I learnt how to extensively prepare and plan for this research. I also faced considerable challenges in developing the research instruments. Following my pilot study, and the study progressed, I gained confidence. There were moments when I was an/ uncertain how to proceed with analysing and integrating the data, but over a period of time I was able to overcome this sense of insecurity and complete the study

On reflection, there were a number of limitations identified in the study and these include the problem of its generalisability, the type of sample used, validity and reliability, and the interpretation of the qualitative results. Some suggestions have been made (section 6.3) how to deal with them in future research wherever possible.

The finding of this study will help schools and policymakers to make the connection between teachers and technology and motivate them to make future investments in educational technology and teacher professional development. The future of education technology will be all about the cloud and anywhere access and I anticipate that the world will be our classroom.

Emerging technologies will change teaching and learning, enable students to learn from anywhere while teachers with progressive and constructive attitudes will be able to teach from anywhere.

However, the schools of tomorrow will have to embrace these technologies and be ready for the future of technology. A future in which students will be more involved in forming their own education. Students who will be more than willing to incorporate emerging technologies, but teachers will remain information facilitators.

Appendix A Ethical Approval

Reply Reply All Forward

Your Ethics Submission (Ethics ID:24234) has been reviewed and approved

ERGO [ergo@soton.ac.uk]

To: Alenezi E.G.H.A.

Submission Number: 24234
Submission Name: An investigation of teachers' beliefs about using tablet as a pedagogical tool for teaching in government-run intermediate Kuwaiti schools.
This is email is to let you know your submission was approved by the Ethics Committee.

You can begin your research unless you are still awaiting specific Health and Safety approval (e.g. for a Genetic or Biological Materials Risk Assessment)

Comments
None
Click here to view your submission
Coordinator: Ebrahim Alenezi

ERGO : Ethics and Research Governance Online
http://www.ergo.soton.ac.uk

DO NOT REPLY TO THIS EMAIL

Appendix B Letter for Data Collection

UNIVERSITY OF Southampton
Southampton Education School

PRIVATE and CONFIDENTIAL
Embassy of the State of Kuwait, Cultural Office,
Hyde Park House, 60A Knightsbridge, London SW1X 7JX

Tahani Jarar, Academic Advisor tahani@kcouk.org

Date: December 2016

Reference: Ebrahim G.H.A. Alenezi <egha1e15@soton.ac.uk>
Start date: 24th Sept. 2015 Projected: Finish 23rd Sept. 2019
Nationality: Kuwaiti
Supervisors: Dr John Woollard, Dr Christian Bokhove
University ID: 26494671

This letter confirms that is a full-time research student within the Southampton Education School in the University of Southampton.

Mr Ebrahim Alenezi's proposed study is:

"An investigation of teachers' beliefs about using tablet as a pedagogical tool for teaching in government-run intermediate Kuwaiti schools"

I am writing on behalf of Ebrahim Alenezi to confirm his plans to return to Kuwait to carry out research activities for piloting the instruments. Ebrahim also plans to visit some intermediate schools in Kuwait where they are using technology such as tablet computers in the teaching in the classroom. In order to complete the piloting, he plans to travel to Kuwait on Saturday 17th December 2016 and return to the UK on Sunday 8th January 2017.

Ebrahim has been making good progress. He has drafted his literature review, designed his methodology and gained ethical approval. He has drafted 15,000 words of his thesis.

Ebrahim attends tutorials on a regular basis and contributes to the research environment being an active member of the Postgraduate E-learning Group (PEGasus).

Should you require further information, please do not hesitate to contact me.

I thank you beforehand for your kind consideration of the above.

Yours faithfully,

John Woollard

Dr John Woollard
Doctorate supervisor
Senior Teaching Fellow
J.Woollard@southampton.ac.uk

University of Southampton, Southampton SO17 1BJ 02380 593475

Appendix C Approval from Ministry of Education in Kuwait to Collect Data from Schools

MINISTRY OF EDUCATION
Educational Research and
Curricula Sector
EDUCATIONAL RESEARCH ADMINISTRATION

وزارة التربية
قطاع البحوث التربوية والمناهج
إدارة البحوث التربوية

الرقم : وت / ٥٥
مرفقات /

التاريخ / / 14 هـ
الموافق ١٢ / ٤ / ٧ 201 م

السيد المحترم / أ.وليد العومي

مدير عام منطقة الأحمدي التعليمية

تحية طيبة وبعد،،،

<u>الموضوع / تسهيل مهمة</u>

يقوم الباحث / إبراهيم غازي عايد العنزى المسجل على درجه الدكتوراه في جامعه ساوث هامبتن في المملكة المتحدة البريطانية باجراء بحث بعنوان : التحقيق في معتقدات المعلمين في المرحلة المتوسطة حول استخدام الكمبيوتر اللوحى كاداه تعليمية داخل الصف الدراسي .

فيرجى تسهيل مهمة الباحث أعلاه من خلال تطبيق (الاستبانه و بطاقة ملاحظه بطاقة ومقابله) المختومة صفحاتها من إدارة البحوث التربوية على معلمي ومعلمات مدراس المرحلة المتوسطة التابعة لمنطقتكم التعليمية خلال الفصل الدراسي ٢٠١٦/٢٠١٧.

مع خالص الشكر والتقدير

مدير إدارة البحوث التربوية

د. تهاني صالح العنزي
مدير إدارة البحوث التربوية بالإنابة

نسخة للملف
athari

Al -Qurain -Block (1) - Street No (1)
Tel.: 25417942 - Fax: 25417694 -25417943
Email: behooth@hotmail.com

القرين - قطعة (١) - شارع رقم (١)
تلفون: ٢٥٤١٧٩٤٢ - فاكس: ٢٥٤١٧٦٩٤ - ٢٥٤١٧٩٤٣

Appendix D Certification for Accurate Translation of Quantitative Data Collection Instrument (Questionnaire)

International Science Company
Authorized Translation

شركة العلوم الدولية
للترجمة

إقرار

نقر نحن شركة العلوم الدولية للترجمة المعتمدة بأن مضمون ما جاء بهذه الأوراق باللغة الإنجليزية مطابق للمرفق باللغة العربية . وأن عدد المستندات هو ست ورقات باللغة الإنجليزية و ثمان ورقات باللغة العربية .

We ,the International Science company for authorized translation certifies that the content of what was written in the English copy is identical to what was written in the Arabic copy .The number of pages are : six pages in English and eight pages in Arabic。

General manager / MR. Mohamed El Rashidi

شركة العلوم الدولية
المعتمدة
للترجمة
ISC
International Science CO.
AUTHORISED
TRANSLATION

مجمع الحوطي – الفحيحيل – قطعة ٩ – شارع المستوصف القديم – ميزانين – مكتب رقم ١٣ – ت ٥١٠٣٥٢٥٩

Alhoti Complex – Fahaheel – Block 9 – Mezzanine – Office 13 – Phone : ٥١٠٣٥٢٥٩

D.1 Data Collection Instrument - Questionnaire (in English)

Questionnaire

Section I: Technologies and resources used

Do you use the following technologies/resources when you are teaching?

Please tick and indicate your response to each statement.

Sources	Always	Sometimes	Never
Tablet computer (example iPad, Galaxy)			
Microsoft PowerPoint			
Interactive whiteboard (example smart board)			
Video projector			
E-mail			
Skype			
Internet			
Data base programmes (example Excel)			
Word processing			

Section II: Use of tablets as pedagogical tools

What are your reasons for using tablet computers as instructional tools in classrooms?

The statements listed below describe beliefs/attitudes which you might hold and the skills/knowledge that you might have. For each item, indicate the extent to which you agree or disagree with that statement. Please tick and indicate your response to each statement.

	Statements	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
1	I can upload educational apps and administer lesson materials and quizzes					
2	By using tablet computers, I am able to interact with students and share information more effectively					
3	I use tablet computers to streamline (reorganise or restructure) the grading process					
4	I believe that I am able to provide prompt, timely and quick feedback by using tablet computers					
5	I have the necessary training and technical support to use tablet computers for instructional purposes					
6	I am able to use tablet computers or other technology tools in my teaching.					
7	I believe that it is difficult to integrate tablet computers into the curriculum					

8	Tablet computers are a major source of distraction for the students.					
9	Working with tablet computers is fun and interesting					
10	I like using tablet computers in my teaching					
11	I am able to effectively deliver presentations by using a tablet computer					
12	I am able to plan for the lessons when I use a tablet computer					
13	I am unable to deal with maintenance problems associated with integration of tablet computers					
`14	I trust using tablet computers can expand (increase) and update (inform) or in other ways refresh my subject knowledge					
15	I believe that teachers who use tablet computers will be able to teach better by finding online information					
16	I believe that tablet computers can enhance a student's ability to acquire content knowledge					
17	I believe that tablet computers can help in bridging in and out of class contexts					
18	I am of the opinion that there is a lack of pedagogy-based technology training programmes for teachers					
19	Lack of training hinders teachers from using tablet computers effectively in teaching					
20	Tablet computers are not versatile tools which are ideal for educating students					
21	I believe that the lack of access to the internet is one of the difficulties faced by teachers.					
22	I believe that there is a lack of content (programmes and software) in Arabic					
23	Tablet computers cannot improve teaching experience					
24	I know that I have the skills to prepare high quality lessons by using tablet computers or other technology tools					
25	I know that I have the skills to prepare high quality lessons more quickly by using tablet computers or other technology tools					

26	I have personal skills to use technology tools (for communicating, using word processor)					
27	I have professional skills for using tablet computers in teaching (for time management, planning lessons)					
28	I have skills in using other technologies for example using PowerPoint, video projectors, Smartboard etc.					
29	I do not have high skills to use tablet computers for teaching.					
30	I know how to prepare lessons by using tablet computers or other technology tools					
31	I know how to integrate tablet computers into education to increase the quality and effectiveness of teaching (for example managing content, evaluating students, and engaging students in collaborative activities)					
32	I know how to use tablet applications or programmes (mobile apps) which support my teaching					
33	I know how to use the internet to find information to support my teaching					
34	I lack knowledge in using tablet computers for teaching all subjects.					
35	I have positive feelings towards using tablet computers for teaching					

D.2 Data Collection Instrument - Questionnaire (in Arabic)

الإستبانه

القسم الأول: مصادر التكنولوجيا المستخدمة

هل تستخدم مصادر التكنولوجيا التالية اثناء التدريس؟

فضلا استخدم علامة(✓) للإجابة عل السؤال في الفراغ المقابل

المصادر	دائما	احيانا	ابدا
الكمبيوتر اللوحي (الأيباد او التابلت)			
بوربوينت			
السبورة الذكية			
جهاز العرض			
الايميل			
برنامج سكايب			
الانترنت			
برنامج الاكسل			
الوورد			

القسم الثاني: وجهة نظر حول استخدام الكمبيوتر اللوحي كوسيلة تعليمية

ما هو رأيك حول استخدام الكمبيوتر اللوحي كوسيلة تعليمية داخل الصف الدراسي

الجمل أدناه وصف لوجهة النظر التي يمكن ان توافقها الرأي مقابل كل جملة هناك اختيار الى اي مدى توافق او لا توافق مع الجملة فضلا اقرأ الجملة ثم ضع (✓) في المكان المقابل لها

	الجملة	اوافق بشدة	موافق الى حد ما	محايد	غير اوافق الى حد ما	لا اوافق بشدة
1	أنا قمت بتحميل تطبيقات تعليمية تساعد في إدارة الدرس والاختبارات القصيرة.					
2	لدي الثقة الكافية لاستخدام الكمبيوتر اللوحي لتوسيع وتحديث وتجديد المعرفة.					
3	باستخدام الكمبيوتر اللوحي انا قادر على تبادل المعلومات والتفاعل مع الطلاب بشكل اكثر فعالية.					
4	انا استخدم الكمبيوتر اللوحي لتبسيط عملية التقييم (الدرجات).					
5	اعتقد ان المعلمين الذين يستخدمون الكمبيوتر اللوحي قادرين عل التدريس بشكل افضل من خلال إيجاد معلومات على شبكة الانترنت.					

Appendix D

	الجملة	اوافق بشدة	موافق الى حد ما	محايد	غير اوافق الى حد ما	لا اوافق بشدة
6	اعتقد ان الكمبيوتر اللوحي يساعد على تعزيز قدرة الطالب على التعلم.					
7	انا قادر على تقديم مراجعة ما سبق دراسته بشكل سريع باستخدام الكمبيوتر اللوحي.					
8	أعتقد ان الكمبيوتر اللوحي يساعد في بناء وصل داخل وخارج محتوى الفصل الدراسي.					
9	أنا قادر على اعداد الدرس باستخدام الكمبيوتر اللوحي او اي اجهزة تكنولوجية أخرى.					
10	أعرف انني امتلك المهارات اللازمة لإعداد الدروس عالية الجودة باستخدام الكمبيوتر اللوحي او أي اجهة تكنولوجية اخرى.					
11	أعرف انني امتلك المهارات اللازمة لإعداد الدروس عالية الجودة وبسرعة اكبر باستخدام الكمبيوتر اللوحي او أي اجهة تكنولوجية اخرى.					
12	امتلك المهارات الشخصية لاستخدام الاجهزة التكنولوجية.					
13	امتلك مهارات احترافية لاستخدام الكمبيوتر اللوحي في التدريس.					
14	امتلك المهارات التي من خلالها استخدام البرامج التالية: الوورد، بوربوينت.					
15	أنا أعرف كيفية دمج واستخدام الكمبيوتر اللوحي في التعليم لزيادة جودة وفعالية التدريس.					
16	أعرف كيفية استخدام تطبيقات وبرامج الكمبيوتر اللوحي التي تدعم تدريسي داخل الفصل.					
17	أعرف كيف استخدم الانترنت في عمليات البحث على المعلومات التي تدعم تدريسي داخل الفصل.					
18	لدي المهارات والتدريب اللازم لاستخدام الكمبيوتر اللوحي للغرض التعليمي.					
19	أنا قادر على استخدام الكمبيوتر اللوحي او أي اجهزة تكنولوجية أخرى كوسيلة تعليمية داخل الصف الدراسي.					
20	اعتقد ان من الصعب دمج الكمبيوتر اللوحي في المناهج الدراسية.					

	الجملة	اوافق بشدة	موافق الى حد ما	محايد	غير اوافق الى حد ما	لا اوافق بشدة
21	ارى أن هناك عدم وجود دورات تدريبية للمعلمين قائمة على المحتوى والسياق التربوي.					
22	قلة معرفتي في استخدام الكمبيوتر اللوحي في التدريس.					
23	لا امتلك شعور إيجابي اتجاه استخدام الكمبيوتر اللوحي في التدريس.					
24	لا امتلك مهارات عالية لاستخدام الكمبيوتر اللوحي في التدريس.					
25	الكمبيوتر اللوحي مصدر رئيس لإلهاء الطلبة.					
26	نقص التدريب يعوق المعلمين عن استخدام الكمبيوتر اللوحي بشكل فعال في التدريس.					
27	العمل باستخدام الكمبيوتر اللوحي ممتع وشيق.					
28	أفضل استخدام الكمبيوتر اللوحي في التدريس.					
29	أنا قادر على شرح الدرس بشكل فعال باستخدام الكمبيوتر اللوحي.					
30	أنا قادر على التخطيط للدروس باستخدام الكمبيوتر اللوحي.					
31	الكمبيوتر اللوحي متعدد الاستخدامات حيث تكون مثالية في التربية.					
32	اعتقد ان عدم الوصول الى الانترنت احد الصعوبات التي تواجه المعلمين.					
33	اعتقد ان هناك قلة المحتوى (البرامج والتطبيقات) في اللغة العربية.					
34	أنا غير قادر على التعامل مع مشاكل الصيانة المرتبطة في دمج واستخدام الكمبيوتر اللوحي.					
35	شبكة الانترنت في المدارس ضعيفة وغير فعالة لأنها لا تدعم استخدام الكمبيوتر.					

D.3 Participant Information Sheet for Questionnaire

UNIVERSITY OF
Southampton

Participant Information Sheet for the Questionnaire

Study Title: An investigation of teachers' beliefs about using tablet as a pedagogical tool for teaching in government-run intermediate Kuwaiti schools.

Researcher: Alenezi, Ebrahim G H A B. **Ethics number**: 24234

Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to sign a consent form.

What is the research about?

I am a PhD student. I am doing this research to obtain PhD degree. I want to investigate on teachers' beliefs about using tablet computers in their teaching in the classroom. Also, I am trying to obtain a better understanding of factors that could affect the use of tablet computers in the classroom, such as knowledge, skills and attitudes. My research is funded by the public authority for applied education and training.

Why have I been chosen?

You are participating in this study because you are a teacher and you are probably using technology sources such as tablet in your teaching in the classroom. You have been chosen because you have an understanding of the use of tablet computers in the classroom teaching and therefore your thoughts are important.

What will happen to me if I take part?

You will have a table and pen to fill in the questionnaire about using tablet in teaching into classroom for about 20 minutes approximately. The questions are about using tablet in your teaching. You will choose from the options given whether you agree or disagree to each statement.

At the end of the questionnaire, there is a question if you like to take part in interview and observation for about half an hour in each of them. If you are happy, tick the box, type in your name and email address and you will be informed later if you are selected for the interview and observation.

Are there any benefits in my taking part?

There may be no benefit to the individual, but a benefit to others perhaps in the case they like using tablet in their teaching - we will have a better understanding of using tablet as a pedagogical tool in teaching in the classroom.

Are there any risks involved?

All risks are those related to normal professional practice in school - all risks have been considered. I will be taking good care to keep all information anonymised and secure.

Will my participation be confidential?

Yes, of course. All participants' information will be saved in a password protected laptop, and hard documents will be locked in a safe place.

What happens if I change my mind?

You have the right to withdraw at any time. Simply tell me or email me that you do not want your comments or responses included in the research.

What happens if something goes wrong?

You can Contact Head of Research Governance
02380 595058
rgoinfo@soton.ac.uk

Where can I get more information?

You can contact me on either my mobile or email address.
0096566526404 (Kuwait) - 00447462630360 (UK)
E.G.H.Alenezi@soton.ac.uk
OR you can contact my supervisor: Dr John Woollard
Telephone: 00447879808694
Email: J.Woollard@soton.ac.uk

Version number 1.2 Date November 29th 2016

D.4 Consent Form to Participate in the Research: Questionnaire

UNIVERSITY OF
Southampton

CONSENT FORM for the Questionnaire

Study title: An investigation of teachers' beliefs about using tablet as a pedagogical tool for teaching in government-run intermediate Kuwaiti schools.

Researcher name: Alenezi, Ebrahim G H A B.

Ethics reference: **24234**

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet (Version number 1.2, Date November 29th 2016) and have had the opportunity to ask questions about the study. ☐

I agree to take part in this research project and agree for my data to be recorded and used for the purpose of this study. ☐

I understand that my responses will be anonymised in reports of the research. ☐

I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected. ☐

Data Protection

I understand that information collected about me during my participation in this study will be stored on a password protected computer and that this information will only be used for the purpose of this study.

Name of participant (print name)..

Signature of participant..

Date..

Version number 1.2 Date November 29th 2016

D.5 Participant Information Sheet for Questionnaire (in Arabic)

ورقة معلومات المشاركة في الأستبانة

عنوان الدراسة: التحقيق في معتقدات المعلمين في استخدام الكمبيوتر اللوحي كأداة تعليمية في التدريس في المدارس الحكومية في المرحلة المتوسطة في دولة الكويت.

فضلا إقرأ هذه المعلومات قبل أن تقرر المشاركة في هذا البحث، إذا قررت المشاركة سيطلب منك التوقيع على نموذج الموافقة المرفق.

ما هو البحث عنة ؟

أنا طالب دكتوراه وأقوم ببحث للحصول على درجة الدكتوراه من جامعة ساوثهامبتون في بريطانيا. تتمحور فكره البحث حول التحقيق في معتقدات المعلمين في استخدام الكمبيوتر الرقمي كأداة تعليمية في التدريس في الفصول الدراسية. وأيضا المحاولة في فهم العناصر التي تؤثر على استخدام الكمبيوتر الرقمي داخل الفصل الدراسي ومثال على هذه العناصر المعرفة والمهارة والواجبات. الباحث مبتعث من الهيئة العامة للتعليم التطبيقي والتدريب.

لماذا تم اختياري ؟

تم اختيارك لانك قد تكون من المعلمين الذين يستخدمون التكنولوجيا ومثال عل ذلك الكمبيوتر الرقمي في التدريس داخل الفصول الدراسية. وايضا عندك المقدرة لفهم كيفية استخدام الكمبيوتر الرقمي في التدريس مما يجعل رأيك ومعتقداتك مهمة للبحث.

ماذا سيحدث لي إذا كنت جزءا في هذا البحث ؟

سيقوم الباحث في توفير طاولة وقلم لتعبئة الاستبانه حول استخدام الكمبيوتر الرقمي في التدريس داخل الفصل الدراسي ومدة الاستبانه 20 دقيقة تقريبا. سوف تكون هناك اختيارات وسوف تختار الاجابة المناسبة ان كنت توافق او لا توافق. في نهاية الاستبانة هناك اختيار ان كنت ترغب بأن تكون جزء من المقابلة الشخصية والملاحظة داخل الفصل رجاءا اكتب بيانات التواصل معك.

هل هناك اي فوائد لي عندما اكون جزءا في هذا البحث ؟

قد لا تكون هناك اي فوائد لك شخصيا، لكن هناك فوائد اخرى ومثال على ذلك الفهم بشكل افضل لاستخدام الكمبيوتر الرقمي كأداة في التدريس داخل الفصل الدراسي.

هل هناك أي مخاطر تنطوي عليها مشاركتي ؟

جميع المخاطر هي تلك المتعلقة في الممارسة المهنية العادية في المدرسة، وتم النظر في جميع المخاطر المحتملة. وسوف يقوم الباحث في الحفاظ على المعلومات كمجهولة المصدر في مكان آمن.

هل ستكون مشاركتي سرية ؟

نعم بالطبع. جميع البيانات سوف تكون محمية في كمبيوتر مع كلمة سر والمستندات سوف تكون في خزنة مقفلة.

ماذا يحدث لي إذا قمت بتغيير رأيي ؟

لك الحق في الانسحاب من مشروع الدراسة في أي وقت تشاء وببساطة قم بتبليغ الباحث او ارسل ايميل واطلب الانسحاب.

ماذا يحدث اذا حدث خطأ ما ؟

قم في الاتصال المباشر مع رئيس إدارة البحوث على البنايات التالية:

الرقم 0044380595058

الايميل rgoinfo@soton.ac.uk

من أين يمكنني الحصول على مزيد من المعلومات ؟

يمكنك التواصل معي مباشرة على الرقم 009656656404 او 0044746630360

ايميلي E.G.H.Alenezi@soton.ac.uk

او التواصل مع مشرفي على الرقم 0044787980869 او ايميل J.Woollard@soton.ac.uk

D.6 Consent Form to Participate in the Research: Questionnaire (in Arabic)

نموذج إقرار بالمشاركة في
الأستبانة

عنوان الدراسة: التحقيق في معتقدات المعلمين في استخدام الكمبيوتر اللوحي كأداة تعليمية في التدريس في المدارس الحكومية في المرحلة المتوسطة في دولة الكويت.

الباحث: إبراهيم غازي العنزي

رقم كود موافقة لجنة أخلاقيات البحث:

بعد قراءة ورقة معلومات المشاركة في البحث أرجوا التكرم بتعبئة هذا النموذج والتوقيع علية في حالة الموافقة عل البنود المرفقة في شاكرين لكم تعاونكم

لقد قرأت وفهمت ورقة معلومات المشاركة في البحث وحصلت عل الفرصة الكافية لطرح أسئلتي واستفساراتي عن الدراسة ☐

أوافق على المشاركة في مشروع البحث هذا عن طريق المشاركة في تعبئة الأستبانة ☐

أتفهم أن تكون بياناتي في هذا البحث مجهولة المصدر ☐

أتفهم أن مشاركتي في هذا البحث هي تطوعية ولي الحق في الانسحاب في أي وقت دون أن يترتب على ذلك أي حقوق أو متطلبات قانونية ☐

اسم المشارك:

توقيع المشارك:

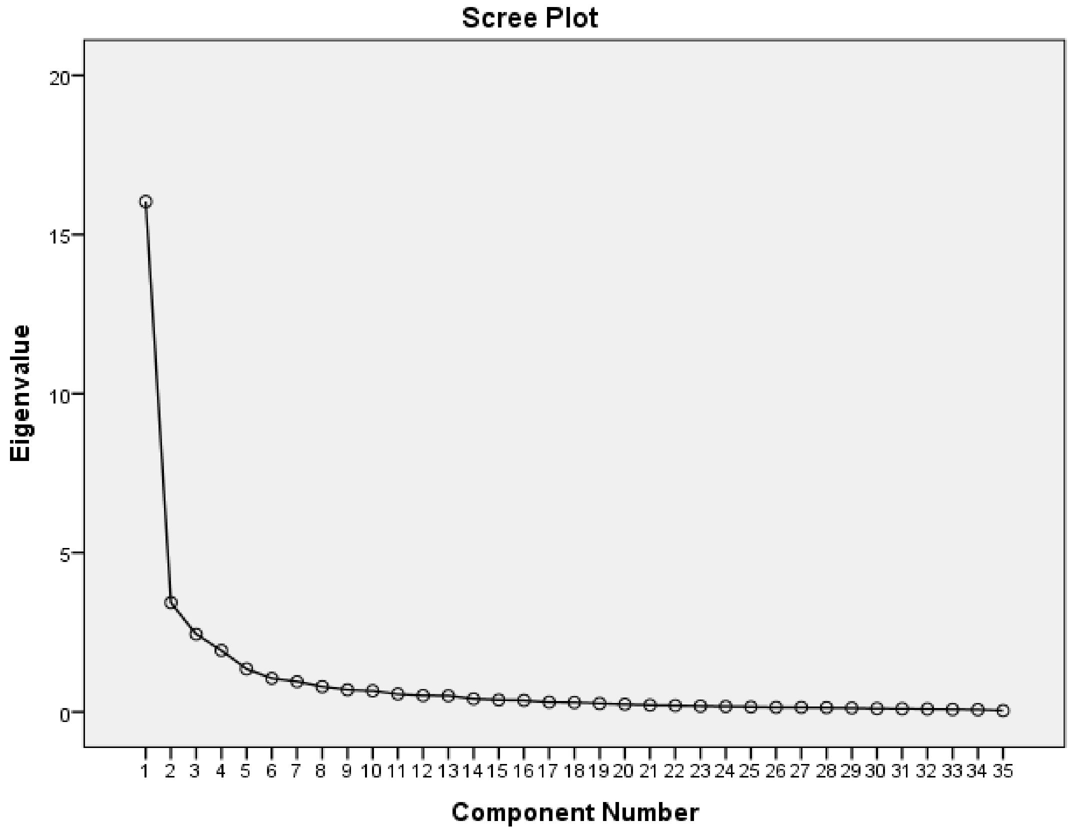
التاريخ:

D.7 Quantitative Data Analysis – Correlation Matrix

	Variables	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15	a16	a17	a18	a19	a20	a21	a22	a23	a24	a25	a26	a27	a28	a29	a30	a31	a32	a33	a34	a35
Correlation	a1	1.000	.845	.809	.639	.711	.733	.772	.765	.674	.626	.607	.526	.609	.391	.626	.637	.560	.644	.574	-.358	.060	-.295	-.418	-.429	-.175	.161	.603	.632	.588	.493	.637	.149	.082	-.194	.17
	a2	.845	1.000	.793	.597	.693	.734	.754	.760	.683	.655	.646	.570	.593	.414	.590	.557	.585	.589	.603	-.327	.089	-.273	-.446	-.391	-.152	.207	.586	.663	.571	.491	.627	.142	.145	-.165	.17
	a3	.809	.793	1.000	.635	.748	.801	.747	.818	.612	.609	.614	.477	.517	.337	.553	.523	.502	.527	.512	-.351	.029	-.233	-.458	-.298	-.124	.180	.623	.614	.507	.428	.627	.116	.083	-.192	.10
	a4	.639	.597	.635	1.000	.566	.612	.651	.599	.512	.457	.447	.338	.523	.242	.446	.432	.362	.436	.411	-.174	.068	-.095	-.196	-.250	-.134	.109	.434	.431	.411	.382	.496	.112	.146	-.181	-.099
	a5	.711	.693	.748	.566	1.000	.838	.738	.767	.514	.489	.460	.375	.497	.302	.496	.520	.496	.548	.507	-.399	-.008	-.207	-.439	-.322	-.175	.180	.663	.644	.519	.425	.622	.130	.105	-.131	.08
	a6	.733	.734	.801	.612	.838	1.000	.771	.859	.544	.538	.550	.432	.562	.387	.593	.576	.578	.551	.553	-.350	.017	-.174	-.392	-.319	-.096	.244	.705	.679	.584	.519	.678	.209	.159	-.137	.13
	a7	.772	.754	.747	.651	.738	.771	1.000	.766	.701	.599	.540	.471	.562	.464	.598	.618	.566	.619	.606	-.334	.030	-.214	-.393	-.347	-.118	.239	.639	.674	.591	.597	.638	.220	.147	-.126	.13
	a8	.765	.760	.818	.599	.767	.859	.766	1.000	.598	.590	.554	.443	.509	.368	.575	.536	.508	.533	.525	-.278	.030	-.161	-.394	-.300	-.084	.166	.625	.643	.520	.487	.629	.280	.240	-.113	.20
	a9	.674	.683	.612	.512	.514	.544	.701	.598	1.000	.836	.739	.632	.514	.484	.593	.642	.628	.659	.651	-.265	.047	-.343	-.337	-.379	-.079	.120	.515	.465	.528	.545	.436	.139	.157	-.152	.17
	a10	.626	.655	.609	.457	.489	.538	.599	.590	.836	1.000	.850	.632	.528	.483	.581	.595	.606	.590	.634	-.235	.121	-.348	-.311	-.367	-.090	.122	.449	.438	.499	.489	.357	.138	.168	-.173	.19
	a11	.607	.646	.614	.447	.460	.550	.540	.554	.739	.850	1.000	.661	.510	.393	.575	.581	.576	.569	.536	-.256	.085	-.331	-.314	-.310	-.053	.099	.437	.391	.461	.402	.382	.095	.089	-.185	.10
	a12	.526	.570	.477	.338	.375	.432	.471	.443	.632	.632	.661	1.000	.693	.604	.750	.746	.796	.736	.808	-.177	.185	-.404	-.312	-.459	.015	.167	.562	.529	.608	.561	.531	.149	.225	-.236	.30
	a13	.609	.593	.517	.523	.497	.562	.562	.509	.514	.528	.510	.693	1.000	.475	.777	.692	.688	.742	.690	-.196	.122	-.314	-.319	-.544	-.056	.260	.585	.604	.669	.571	.634	.162	.229	-.324	.22
	a14	.391	.414	.337	.242	.302	.387	.464	.368	.484	.483	.393	.604	.475	1.000	.595	.602	.693	.602	.663	-.132	.289	-.274	-.166	-.326	.015	.317	.458	.446	.479	.571	.372	.226	.255	-.021	.36
	a15	.626	.590	.553	.446	.496	.593	.598	.575	.593	.581	.575	.750	.777	.595	1.000	.831	.803	.771	.768	-.241	.076	-.336	-.313	-.468	-.032	.193	.652	.655	.752	.656	.646	.200	.217	-.192	.31
	a16	.637	.557	.523	.432	.520	.576	.618	.536	.642	.595	.581	.746	.692	.602	.831	1.000	.798	.855	.789	-.272	.074	-.389	-.353	-.498	-.104	.076	.656	.607	.716	.685	.590	.140	.160	-.229	.24
	a17	.560	.585	.502	.362	.496	.578	.566	.508	.628	.606	.576	.796	.688	.693	.803	.798	1.000	.768	.867	-.238	.181	-.350	-.300	-.444	.047	.273	.644	.532	.642	.610	.525	.161	.232	-.100	.30
	a18	.644	.589	.527	.436	.548	.551	.619	.533	.659	.590	.569	.736	.742	.602	.771	.855	.768	1.000	.761	-.251	.102	-.372	-.337	-.536	-.090	.123	.629	.590	.649	.603	.559	.148	.138	-.257	.28
	a19	.574	.603	.512	.411	.507	.553	.606	.525	.651	.634	.536	.808	.690	.663	.768	.789	.867	.761	1.000	-.193	.225	-.379	-.314	-.461	-.016	.220	.650	.604	.677	.671	.554	.228	.270	-.176	.27
	a20	-.358	-.327	-.351	-.174	-.399	-.350	-.334	-.278	-.265	-.235	-.256	-.177	-.196	-.132	-.241	-.272	-.238	-.251	-.193	1.000	.294	.559	.565	.476	.384	-.015	-.390	-.388	-.293	-.220	-.322	.045	.207	.142	.01
	a21	.060	.089	.029	.068	-.008	.017	.030	.030	.047	.121	.085	.185	.122	.289	.076	.074	.181	.102	.225	.294	1.000	.162	.159	-.004	.136	.195	.045	.061	.030	.091	.060	.127	.200	.040	.16
	a22	-.295	-.273	-.233	-.095	-.207	-.174	-.214	-.161	-.343	-.348	-.331	-.404	-.314	-.274	-.336	-.389	-.350	-.372	-.379	.559	.162	1.000	.596	.682	.294	.103	-.300	-.306	-.380	-.347	-.250	.030	.129	.406	-.050
	a23	-.418	-.446	-.458	-.196	-.439	-.392	-.393	-.394	-.337	-.311	-.314	-.312	-.319	-.166	-.313	-.353	-.300	-.337	-.314	.565	.159	.596	1.000	.566	.362	.012	-.413	-.451	-.384	-.219	-.419	.054	.187	.394	-.011
	a24	-.429	-.391	-.298	-.250	-.322	-.319	-.347	-.300	-.379	-.367	-.310	-.459	-.544	-.326	-.468	-.498	-.444	-.536	-.461	.476	-.004	.682	.566	1.000	.311	.041	-.488	-.505	-.590	-.519	-.471	-.010	-.027	.459	-.149
	a25	-.175	-.152	-.124	-.134	-.175	-.096	-.118	-.084	-.079	-.090	-.053	.015	-.056	.015	-.032	-.104	.047	-.090	-.016	.384	.136	.294	.362	.311	1.000	.212	-.115	-.196	-.125	-.075	-.122	.083	.083	.317	.23
	a26	.161	.207	.180	.109	.180	.244	.239	.166	.120	.122	.099	.167	.260	.317	.193	.076	.273	.123	.220	-.015	.195	.103	.012	.041	.212	1.000	.308	.268	.194	.222	.304	.428	.288	.283	.43
	a27	.603	.586	.623	.434	.663	.705	.639	.625	.515	.449	.437	.562	.585	.458	.652	.656	.644	.629	.650	-.390	.045	-.300	-.413	-.488	-.115	.308	1.000	.873	.792	.705	.821	.237	.229	-.150	.31
	a28	.632	.663	.614	.431	.644	.679	.674	.643	.465	.438	.391	.529	.604	.446	.655	.607	.532	.590	.604	-.388	.061	-.306	-.451	-.505	-.196	.268	.873	1.000	.828	.737	.870	.206	.248	-.182	.25
	a29	.588	.571	.507	.411	.519	.584	.591	.520	.528	.499	.461	.608	.669	.479	.752	.716	.642	.649	.677	-.293	.030	-.380	-.384	-.590	-.125	.194	.792	.828	1.000	.805	.795	.143	.192	-.244	.27
	a30	.493	.491	.428	.382	.425	.519	.597	.487	.545	.489	.402	.561	.571	.571	.656	.685	.610	.603	.671	-.220	.091	-.347	-.219	-.519	-.075	.222	.705	.737	.805	1.000	.689	.254	.282	-.145	.27
	a31	.637	.627	.627	.496	.622	.678	.638	.629	.436	.357	.382	.531	.634	.372	.646	.590	.525	.559	.554	-.322	.060	-.250	-.419	-.471	-.122	.304	.821	.870	.795	.689	1.000	.220	.194	-.203	.26
	a32	.149	.142	.116	.112	.130	.209	.220	.280	.139	.138	.095	.149	.162	.226	.200	.140	.161	.148	.228	.045	.127	.030	.054	-.010	.083	.428	.237	.206	.143	.254	.220	1.000	.610	.264	.49
	a33	.082	.145	.083	.146	.105	.159	.147	.240	.157	.168	.089	.225	.229	.255	.217	.160	.232	.138	.270	.207	.200	.129	.187	-.027	.083	.288	.229	.248	.192	.282	.194	.610	1.000	.313	.44
	a34	-.194	-.165	-.192	-.181	-.131	-.137	-.126	-.113	-.152	-.173	-.185	-.236	-.324	-.021	-.192	-.229	-.100	-.257	-.176	.142	.040	.406	.394	.459	.317	.283	-.150	-.182	-.244	-.145	-.203	.264	.313	1.000	.24
	a35	.171	.170	.105	-.099	.086	.132	.138	.200	.176	.190	.106	.307	.224	.365	.315	.246	.300	.286	.276	.012	.161	-.050	-.011	-.149	.237	.430	.318	.255	.279	.270	.267	.495	.446	.249	1.000
Sig. (1-tailed)	a1		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.231	.000	.000	.000	.016	.025	.000	.000	.000	.000	.000	.035	.160	.009	.01
	a2	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.139	.000	.000	.000	.031	.006	.000	.000	.000	.000	.000	.041	.038	.022	.01
	a3	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.363	.002	.000	.000	.066	.014	.000	.000	.000	.000	.000	.078	.156	.009	.10
	a4	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.016	.204	.123	.008	.001	.051	.091	.000	.000	.000	.000	.000	.087	.038	.013	.11
	a5	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.459	.006	.000	.000	.016	.014	.000	.000	.000	.000	.000	.056	.101	.055	.14
	a6	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.419	.016	.000	.000	.121	.001	.000	.000	.000	.000	.000	.005	.026	.048	.05
	a7	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.358	.004	.000	.000	.075	.002	.000	.000	.000	.000	.000	.003	.036	.062	.04
	a8	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.359	.024	.000	.000	.153	.021	.000	.000	.000	.000	.000	.000	.002	.085	.00
	a9	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.286	.000	.000	.000	.168	.072	.000	.000	.000	.000	.000	.044	.027	.032	.01
	a10	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.071	.000	.000	.000	.136	.068	.000	.000	.000	.000	.000	.047	.020	.017	.01
	a11	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.001	.151	.000	.000	.000	.259	.115	.000	.000	.000	.000	.000	.124	.140	.012	.09
	a12	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.015	.012	.000	.000	.000	.427	.021	.000	.000	.000	.000	.000	.035	.003	.002	.00
	a13	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.008	.069	.000	.000	.000	.248	.001	.000	.000	.000	.000	.000	.024	.002	.000	.00
	a14	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.053	.000	.000	.021	.000	.429	.000	.000	.000	.000	.000	.000	.003	.001	.400	.00
	a15	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.001	.179	.000	.000	.000	.347	.009	.000	.000	.000	.000	.000	.007	.004	.009	.00
	a16	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.183	.000	.000	.000	.102	.179	.000	.000	.000	.000	.000	.044	.025	.002	.00
	a17	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.002	.013	.000	.000	.000	.285	.000	.000	.000	.000	.000	.000	.024	.002	.111	.00
	a18	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.001	.106	.000	.000	.000	.136	.067	.000	.000	.000	.000	.000	.035	.046	.001	.00
	a19	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.009	.003	.000	.000	.000	.421	.003	.000	.000	.000	.000	.000	.003	.000	.016	.00
	a20	.000	.000	.000	.016	.000	.000	.000	.000	.001	.002	.001	.015	.008	.053	.001	.000	.002	.001	.009		.000	.000	.000	.000	.000	.425	.000	.000	.000	.003	.000	.291	.006	.041	.44
	a21	.231	.139	.363	.204	.459	.419	.358	.359	.286	.071	.151	.012	.069	.000	.179	.183	.013	.106	.003	.000		.024	.026	.480	.048	.008	.292	.231	.356	.135	.234	.061	.007	.315	.02
	a22	.000	.000	.002	.123	.006	.016	.004	.024	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.024		.000	.000	.000	.105	.000	.000	.000	.000	.001	.357	.058	.000	.27
	a23	.000	.000	.000	.008	.000	.000	.000	.000	.000	.000	.000	.000	.000	.021	.000	.000	.000	.000	.000	.000	.026	.000		.000	.000	.443	.000	.000	.000	.004	.000	.254	.011	.000	.44
	a24	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.480	.000	.000		.000	.310	.000	.000	.000	.000	.000	.454	.371	.000	.03
	a25	.016	.031	.066	.051	.016	.121	.075	.153	.168	.136	.259	.427	.248	.429	.347	.102	.285	.136	.421	.000	.048	.000	.000	.000		.005	.081	.008	.064	.180	.069	.155	.157	.000	.00
	a26	.025	.006	.014	.091	.014	.001	.002	.021	.072	.068	.115	.021	.001	.000	.009	.179	.000	.067	.003	.425	.008	.105	.443	.310	.005		.000	.000	.009	.003	.000	.000	.000	.000	.00
	a27	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.292	.000	.000	.000	.081	.000		.000	.000	.000	.000	.002	.002	.033	.00
	a28	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.231	.000	.000	.000	.008	.000	.000		.000	.000	.000	.006	.001	.013	.00
	a29	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.356	.000	.000	.000	.064	.009	.000	.000		.000	.000	.040	.009	.001	.00
	a30	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.003	.135	.000	.004	.000	.180	.003	.000	.000	.000		.000	.001	.000	.039	.00
	a31	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.234	.001	.000	.000	.069	.000	.000	.000	.000	.000		.003	.009	.006	.00
	a32	.035	.041	.078	.087	.056	.005	.003	.000	.044	.047	.124	.035	.024	.003	.007	.044	.024	.035	.003	.291	.061	.357	.254	.454	.155	.000	.002	.006	.040	.001	.003		.000	.001	.00
	a33	.160	.038	.156	.038	.101	.026	.036	.002	.027	.020	.140	.003	.002	.001	.004	.025	.002	.046	.000	.006	.007	.058	.011	.371	.157	.000	.002	.001	.009	.000	.009	.000		.000	.00
	a34	.009	.022	.009	.013	.055	.048	.062	.085	.032	.017	.012	.002	.000	.400	.009	.002	.111	.001	.016	.041	.315	.000	.000	.000	.000	.000	.033	.013	.001	.039	.006	.001	.000		.00
	a35	.018	.019	.101	.114	.147	.053	.046	.007	.016	.010	.098	.000	.003	.000	.000	.001	.000	.000	.000	.442	.024	.272	.445	.034	.002	.000	.000	.001	.000	.000	.000	.000	.000	.001	

a. Determinant = 4.849E-17

D.8 Quantitative Data Analysis – Scree Plot



Appendix E Certification for Accurate Translation of Qualitative Data Collection Instrument (Interview Schedule)

International Science Company
Authorized Translation

شركة العلوم الدولية
للترجمة

إقرار

نقر نحن شركة العلوم الدولية للترجمة المعتمدة بأن مضمون ما جاء بهذه الأوراق باللغة الإنجليزية مطابق للمرفق باللغة العربية . وأن عدد المستندات هو ست ورقات باللغة الإنجليزية و ثمان ورقات باللغة العربية .

We ,the International Science company for authorized translation certifies that the content of what was written in the English copy is identical to what was written in the Arabic copy .The number of pages are : six pages in English and eight pages in Arabic.

General manager / MR. Mohamed El Rashidi

مجمع الحوطي – الفحيحيل – قطعة ٩ – شارع المستوصف القديم – ميزانين – مكتب رقم ١٣ – ت ٥١٠٣٥٢٥٩

Alhoti Complex – Fahaheel – Block 9 – Mezzanine – Office 13 – Phone : ٥١٠٣٥٢٥٩

E.1 Data Collection Instrument - Interview Schedule (in English)

Interview Schedule

Use of tablet computers in teaching

1. Why do you use tablet computers in the classroom? What are your primary reasons for using tablet computers?
2. How do you describe your experiences in using tablet computers? Are there dissimilar aspects between your use of tablet computers and other technologies?
3. How different is it when using tablet computers as compared to traditional teaching approaches commonly used in most public schools in Kuwait?
4. How would you describe your teaching style? Why do you prefer this approach?

Teachers' skills in using tablet computers for teaching

5. Do you think you have sufficient skills in using tablet computers for teaching? How did you acquire the skills?
6. What do you think are the reasons for your lack of competence and skills in using tablet computers in classrooms?
7. Are there training programmes for using tablet computers in classrooms? What are they? Who provides the programmes?

Facilitators and barriers to the adoption of tablet computers for teaching

8. Could you please identify the potential facilitators to adoption and use of tablet computers in classrooms?
9. What do you think are the negative effects of using tablet computers in teaching?

E.2 Data Collection Instrument - Interview Schedule (in Arabic)

اسئلة المقابلة

ان استخدام التكنولوجيا الحديثة في التعليم والتعلم له أهمية كبيرة في تطوير العملية التعليمية في المدارس والجامعات.

القسم الأول: ستخدام أجهزة الكمبيوتر اللوحية في التدريس

1. لماذا تستخدم أجهزة الكمبيوتر اللوحية في الفصل؟ ما هي أسبابك الأساسية لاستخدام أجهزة الكمبيوتر اللوحية؟
2. كيف تصف تجاربك في استخدام أجهزة الكمبيوتر اللوحية؟ هل هناك أوجه متباينة بين استخدامك لأجهزة الكمبيوتر اللوحية وغيرها من التقنيات؟
3. ما الفرق في استخدام أجهزة الكمبيوتر اللوحية مقارنةً بمناهج التعليم التقليدية الشائعة في معظم المدارس الحكومية في الكويت؟
4. كيف تصف أسلوبك في التدريس؟ لماذا تفضل هذه الطريقة؟

القسم الثاني: هارات المعلمين في استخدام أجهزة الكمبيوتر اللوحية للتدريس

5. هل تعتقد أن لديك مهارات كافية في استخدام أجهزة الكمبيوتر اللوحية للتدريس؟ كيف اكتسبت المهارات؟
6. ما هي في رأيك أسباب عدم كفاءتك ومهاراتك في استخدام أجهزة الكمبيوتر اللوحية في الفصول الدراسية؟
7. هل هناك برامج تدريب لاستخدام أجهزة الكمبيوتر اللوحية في الفصول الدراسية؟ ما هي؟ من الذي يوفر البرامج؟

القسم الثالث: التسهيلات والحواجز أمام اعتماد أجهزة الكمبيوتر اللوحية للتدريس

8. هل يمكنك تحديد التسهيلات المحتملة لاعتماد واستخدام أجهزة الكمبيوتر اللوحية في الفصول الدراسية؟
9. ما هي في رأيك التأثيرات السلبية لاستخدام أجهزة الكمبيوتر اللوحية في التدريس؟

E.3 Participant Information Sheet for Interview Schedule

UNIVERSITY OF Southampton

Participant Information Sheet for the Interview

Study Title: An investigation of teachers' beliefs about using tablet as a pedagogical tool for teaching in government-run intermediate Kuwaiti schools.

Researcher: Alenezi, Ebrahim G H A B. **Ethics number**: 24234

Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to sign a consent form.

What is the research about?
I am a PhD student. I am doing this research to obtain PhD degree. I want to investigate on teachers' beliefs about using tablet computers in their teaching in the classroom. Also, I am trying to obtain a better understanding of factors that could affect the use of tablet computers in the classroom, such as knowledge, skills and attitudes. My research is funded by the public authority for applied education and training.

Why have I been chosen?
You are participating in this study because you are a teacher and you are probably using technology sources such as tablet computers in your teaching in the classroom. You have been chosen because you have an understanding of the use of tablet computers in the classroom teaching and therefore your thoughts are important.

What will happen to me if I take part?
You will be interviewed for half an hour approximately. You will be asked some questions about using tablet in your teaching. Also, you can withdraw from the research at any time. There are no right or wrong answers.

Are there any benefits in my taking part?
There may be no benefit to the individual, but a benefit to others perhaps in the case you like using tablet in their teaching - we will have a better understanding of using tablet as a pedagogical tool in teaching in the classroom.

Are there any risks involved?
All risks are those related to normal professional practice in school - all risks have been considered. I will be taking good care to keep all information anonymised and secure.

Will my participation be confidential?
Yes, of course. All participants' information will be saved in a password protected laptop, and hard documents will be locked in a safe place.

What happens if I change my mind?
You have the right to withdraw at any time. Simply tell me or email me that you do not want your comments or responses included in the research.

What happens if something goes wrong?
You can Contact Head of Research Governance
02380 595058
rgoinfo@soton.ac.uk

Where can I get more information?
You can contact me on either my mobile or email address.
0096566526404 (Kuwait) - 00447462630360 (UK)
E.G.H.Alenezi@soton.ac.uk
OR you can contact my supervisor: Dr John Woollard
Telephone: 00447879808694
Email: J.Woollard@soton.ac.uk

Version number 1.2 Date November 29th 2016

E.4 Consent Form to Participate in the Research: Interview Schedule

UNIVERSITY OF Southampton

CONSENT FORM for the Interview

Study title: An investigation of teachers' beliefs about using tablet as a pedagogical tool for teaching in government-run intermediate Kuwaiti schools.

Researcher name: Alenezi, Ebrahim G H A B.

Ethics reference: 24234

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet (Version number 1.2, Date November 29th 2016) and have had the opportunity to ask questions about the study. ☐

I agree to take part in this research project and agree for my data to be recorded and used for the purpose of this study. ☐

I understand that my data will be anonymised in reports of the research. ☐

I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected. ☐

Data Protection

I understand that information collected about me during my participation in this study will be stored on a password protected computer and that this information will only be used for the purpose of this study.

Name of participant (print name)..

Signature of participant..

Date..

Version number 1.2 Date November 29th 2016

E.5 Participant Information Sheet for Interview Schedule (in Arabic)

ورقة معلومات المشاركة في المقابلة الشخصية

عنوان الدراسة: التحقيق في معتقدات المعلمين في استخدام الكمبيوتر اللوحي كأداة تعليمية في التدريس في المدارس الحكومية في المرحلة المتوسطة في دولة الكويت.

فضلا إقرأ هذه المعلومات قبل أن تقرر المشاركة في هذا البحث، إذا قررت المشاركة سيطلب منك التوقيع على نموذج الموافقة المرفق.

ما هو البحث عنة ؟

أنا طالب دكتوراه وأقوم ببحث للحصول على درجة الدكتوراه من جامعة ساوثهامبتون في بريطانيا. تتمحور فكره البحث حول التحقيق في معتقدات المعلمين في استخدام الكمبيوتر الرقمي كأداة تعليمية في التدريس في الفصول الدراسية. وأيضا المحاولة في فهم العناصر التي تؤثر على استخدام الكمبيوتر الرقمي داخل الفصل الدراسي ومثال على هذه العناصر المعرفة والمهارة والواجبات. الباحث مبتعث من الهيئة العامة للتعليم التطبيقي والتدريب.

لماذا تم اختياري ؟

تم اختيارك لانك قد تكون من المعلمين الذين يستخدمون التكنولوجيا ومثال عل ذلك الكمبيوتر الرقمي في التدريس داخل الفصول الدراسية. وايضا عندك المقدرة لفهم كيفية استخدام الكمبيوتر الرقمي في التدريس مما يجعل رأيك ومعتقداتك مهمة للبحث.

ماذا سيحدث لي إذا كنت جزءا في هذا البحث ؟

سيقوم الباحث في اجراء مقابلة شخصية ومدة المقابلة ستكون حوالي 30 دقيقة. أسئلة المقابلة ستكون حول استخدام الكمبيوتر الرقمي في التدريس داخل الفصل الدراسي. مع العلم بأنة لا توجد اجابة صحيحة وأخرى خاطئة. وتستطيع الانسحاب من الدراسة في وقت تشاء.

هل هناك اي فوائد لي عندما اكون جزءا في هذا البحث ؟

قد لا تكون هناك اي فوائد لك شخصيا، لكن هناك فوائد اخرى ومثال على ذلك الفهم بشكل افضل لاستخدام الكمبيوتر الرقمي كأداة في التدريس داخل الفصل الدراسي.

هل هناك أي مخاطر تنطوي عليها مشاركتي ؟

جميع المخاطر هي تلك المتعلقة في الممارسة المهنية العادية في المدرسة، وتم النظر في جميع المخاطر المحتملة. وسوف يقوم الباحث في الحفاظ على المعلومات كمجهولة المصدر في مكان أمن.

هل ستكون مشاركتي سرية ؟

نعم بالطبع. جميع البيانات سوف تكون محمية في كمبيوتر مع كلمة سر والمستندات سوف تكون في خزنة مقفلة.

ماذا يحدث لي إذا قمت بتغيير رأيي ؟

لك الحق في الانسحاب من مشروع الدراسة في أي وقت تشاء وببساطة قم بتبليغ الباحث او ارسل ايميل واطلب الانسحاب.

ماذا يحدث اذا حدث خطأ ما ؟

قم في الاتصال المباشر مع رئيس إدارة البحوث على البنايات التالية:

الرقم 0044380595058

الايميل rgoinfo@soton.ac.uk

من أين يمكنني الحصول على مزيد من المعلومات ؟

يمكنك التواصل معي مباشرة على الرقم 009656656404 او 0044746630360

ايميلي E.G.H.Alenezi@soton.ac.uk

او التواصل مع مشرفي على الرقم 00447879808694 او ايميل J.Woollard@soton.ac.uk

E.6 Consent Form to Participate in the Research: Interview Schedule (in Arabic)

نموذج إقرار بالمشاركة في
المقابلات الشخصية

عنوان الدراسة: التحقيق في معتقدات المعلمين في استخدام الكمبيوتر اللوحي كأداة تعليمية في التدريس في المدارس الحكومية في المرحلة المتوسطة في دولة الكويت.

الباحث: إبراهيم غازي العنزي

رقم كود موافقة لجنة أخلاقيات البحث:

بعد قراءة ورقة معلومات المشاركة في البحث أرجوا التكرم بتعبئة هذا النموذج والتوقيع علية في حالة الموافقة عل البنود المرفقة في شاكرين لكم تعاونكم

لقد قرأت وفهمت ورقة معلومات المشاركة في البحث وحصلت عل الفرصة الكافية لطرح أسئلتي واستفساراتي عن الدراسة ☐

أوافق على المشاركة في مشروع البحث هذا عن طريق المشاركة في مقابلات مسجلة ☐

أتفهم أن تكون بياناتي في هذا البحث مجهولة المصدر ☐

أتفهم أن مشاركتي في هذا البحث هي تطوعية ولي الحق في الانسحاب في أي وقت دون أن يترتب على ذلك أي حقوق أو متطلبات قانونية ☐

اسم المشارك:

توقيع المشارك:

التاريخ:

E.7 Thematic Analysis of Interview Data (sample)

Question 1: Why do you use tablet computers in the classroom? What are your primary reasons for using tablet computers?

	Responses of the 15 teachers to question 1	Category	Theme
TD T_1 ok AA T_1	T1- Yes I use tablets. I am very positive that tablets inspire action. I am now able to make students more attentive. Initially, I thought that tablets cannot replace paper-based text books. Recently e-textbooks have been introduced for students. The Ministry of Education along with a software development firm called ReDSOFT have created a very appealing and remarkable app available on Apple devices. It allows students and teachers to download all the books for all grades.	Attitude Beliefs	**Theme 1:** Teachers' dispositions **Theme 2:** Actual and envisioned affordances
TD T_2	T2- Of course. I am very positive about using emerging technologies and I have been using tablets for almost 2 years now. Whenever I give students some homework it stimulates personal interest.	Attitude	**Theme 1:** Teachers' dispositions
TD T_3	T3- I do not use tablets for seriously browsing the Internet [hesitates]……Maybe it is only good for casual browsing. However, I use it in classrooms as some of the e-books are easily available through accessing apps.	Attitude Beliefs	**Theme 1:** Teachers' dispositions **Theme 2:** Actual and envisioned affordances
TD T_4	T4- Although I use tablets I do not think they are as functional as compared to laptops. But students find it convenient. So I am willing t use it although I am a novice in using this technology for teaching.	Attitude	**Theme 1:** Teachers' dispositions
TD T_5	T5- Yes. I incorporate tablets because I want to deliver lessons to students incorporating interesting and stimulating tasks.	Attitude	**Theme 1:** Teachers' dispositions
TD T_6	T6- I used the device provided to me by the school. It has increased my confidence in using mobile technology for teaching and learning.	Attitude	**Theme 1:** Teachers' dispositions
	T7- Yes I use tablets. They are portable…can be easily carried around by..and students prefer it…It enables students to take work home, complete work on their own. In other words it connects learning within and outside classrooms.	Beliefs	**Theme 2:** Actual and envisioned affordances
AA T_8	T8- I use these devices. Who doesn't these days. Students say that tablet devices are easy to carry. I on the other hand believe that these devices are interactive, rich in media, and exciting…Tablets also are flexible as I can design lessons specifically for one particular student.	Beliefs	**Theme 2:** Actual and envisioned affordances
	T9- Yes. I am responsible for my students. Although I am not fully trained in using tablets for teaching, I have the desire to improve them using technologies they normally use in their daily lives.	Attitude	**Theme 1:** Teachers' dispositions

AFF T_{10}

AFF T_{11}

T10- Yes, of course. I am open to change and have welcomed technology from the day the Ministry made it mandatory that schools should integrate technology; I feel that tablets are one of new technologies. It allows me to send content and other resources including PowerPoint presentations to the student's tablets at the end of every class.	Attitude Beliefs	**Theme 1:** Teachers' dispositions **Theme 2:** Actual and envisioned affordances
T11- Certainly. I find it fun to teach with tablets although I am learning how to teach with these devices. Yet it is interesting and is easier. These devices are useful and impact teaching and learning. I use it for information storage, such as lessons and course materials, data about students, and for assessment.	Attitude Beliefs	**Theme 1:** Teachers' dispositions **Theme 2:** Actual and envisioned affordances
T12- Yes. Tablets are convenient as they enhance creativity. For instance, I ask students to draw or make short films about a topic. Complicated software is not required. They are not inly using the device but doing things in a creative way.	Beliefs	**Theme 2:** Actual and envisioned affordances
T13- I do. I use it because it connects teaching and learning inside and outside of the classroom. It encourages learning. I am in favour of anything that encourages learning.	Attitude	**Theme 1:** Teachers' dispositions
T14- I use tablets. I created a Facebook page for the class and asked all students to use their tablets to communicate via Messenger [hesitates].........This is because I believe that the device has an impact on students as they can engage in social and class-related conversations, and also chat with me.	Beliefs	**Theme 3:** Increased communication and collaboration
T15- I use tablets for both personal or social use and instructional use as they allow users to easily communicate. I offer feedback to my students even during the weekend and on holidays.	Attitude Beliefs Beliefs	**Theme 1:** Teachers' dispositions **Theme 2:** Actual and envisioned affordances **Theme 3:** Increased communication and collaboration

Question 2: How do you describe your experiences in using tablet computers? Are there dissimilar aspects between your use of tablet computers and other technologies?

Responses of the 15 teachers to question 2	Category	Theme
T1- I prefer using tablet computers as they are very convenient for teaching. Unlike laptops or desktop computers these devices come with specific software	Beliefs	**Theme 2:** Actual and envisioned affordances

Category	Theme
Attitude	Theme 1: Teachers' dispositions
Beliefs	Theme 2: Affordances and constraints
Attitude	Theme 3: Increased communication and collaboration
Beliefs	Theme 4: Fosters authentic assessment
Beliefs	Theme 5: Alters teaching practices
Skills / Knowledge Beliefs	Theme 6: TPACK Sub-Theme A: Technological & pedagogical Knowledge Sub-Theme B: Skills to teach self-regulation.
Beliefs	Theme 7: Self-efficacy beliefs Sub-Theme A: Lack of self-efficacy. Sub-Theme B: Collective efficacy. Sub-Theme C: Increased self-efficacy.
Skills / Knowledge Beliefs	support ~~Theme 8: inadequate policies~~ ~~Sub-Theme A: Lack of adequate training.~~ ~~Sub-Theme B: Lack of Support.~~ technical support ~~Sub-Theme C: Mandated Curriculum.~~ ~~Sub-Theme D: Lack of autonomy.~~ E
Attitude / Beliefs Beliefs	Theme 9: Actual and envisioned barriers Sub-Theme A: Lack of resources. Sub-Theme B: Sources of distraction.

Appendix F Certification for Accurate Translation of Qualitative Data Collection Instrument(Observation Protocol)

International Science Company
Authorized Translation

شركة العلوم الدولية
للترجمة

إقرار

نقر نحن شركة العلوم الدولية للترجمة المعتمدة بأن مضمون ما جاء بهذه الأوراق باللغة الإنجليزية مطابق للمرفق باللغة العربية . وأن عدد المستندات هو ست ورقات باللغة الإنجليزية و ثمان ورقات باللغة العربية .

We ,the International Science company for authorized translation certifies that the content of what was written in the English copy is identical to what was written in the Arabic copy .The number of pages are : six pages in English and eight pages in Arabic.

General manager / MR. Mohamed El Rashidi

شركة العلوم الدولية المعتمدة للترجمة
ISC
International Science CO.
AUTHORISED
TRANSLATION

مجمع الحوطي – الفحيحيل – قطعة ٩ – شارع المستوصف القديم – ميزانين – مكتب رقم ١٣ – ت ٥١٠٣٥٢٥٩

Alhoti Complex – Fahaheel – Block 9 – Mezzanine – Office 13 – Phone : ٥١٠٣٥٢٥٩

F.1 Observation Protocol (in English)

Observation Protocol

Date: .... **School name:** ....

Time: .... **Teacher code:** ....

Classroom environment

1- Classroom environment:

2- The way the teacher starts using the technology tool in the classroom:

3- Types of technology sources (other than tablet computers) available for use by the teacher in the classroom:

Instructional orientation/strategies

1- The technology tools are integrated into the lesson by teachers (to observe: teacher behaviour, knowledge, skills, challenges and difficulties):

1

2- Software programs and applications used by teacher in the classroom:

3- Instructional strategy used (for example: individual or group activities, independent learning, student-centred):

4- Teacher-student interaction in a tablet-supported dynamic learning environment:

2

F.2 Observation Protocol (in Arabic)

جدول ملاحظة الصف

التاريخ:.............................. اسم المدرسة:..........................

الوقت:.............................. كـود المعلم:............................

بيئة الفصل الدراسي:

1- بيئة الفصل الدراسي (استعداد المعلم، إيجابية او سلبية "جودة او صلاحية" البيئة التعليمية)

2- طريقة استخدام المعلم لأداة التكنولوجيا في الفصل الدراسي:

3- انواع مصادر التكنولوجيا المتاحة للاستخدام من قبل المعلم في الفصل الدراسي:

التوجه التعليمي:

1- يتم دمج أدوات التكنولوجيا في الدرس من قبل المعلم (لملاحظه سلوك المعلم، المعرفة، المهارات، التحديات والصعوبات).

2- البرامج والتطبيقات التي يستخدمها المعلم داخل الفصل الدراسي:

3- إستراتيجية التعليم المستخدمة (الأنشطة الفردية والجماعية، التعليم الذاتي او التعاوني، الطالب):

F.3 Participant Information Sheet for Observation

UNIVERSITY OF Southampton

Participant Information Sheet for Observation

Study Title: An investigation of teachers' beliefs about using tablet as a pedagogical tool for teaching in government-run intermediate Kuwaiti schools.

Researcher: Alenezi, Ebrahim G H A B. **Ethics number**: **24234**

Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to sign a consent form.

What is the research about?
I am a PhD student. I am doing this research to obtain PhD degree. I want to investigate on teachers' beliefs about using tablet in their teaching in the classroom.
For the observation the researcher will sit down in the corner or at the back to write notes about the teacher behaviour of using tablet in their teaching into classroom. My research is funded by public authority for applied education and training.

Why have I been chosen?
You are participating in this study because you are a teacher and you are probably using technology sources such as tablet computers in your teaching in the classroom. You have been chosen because you have an understanding of the use of tablet computers in the classroom teaching and therefore your thoughts are important.

What will happen to me if I take part?
You will be observed in the classroom for about 30 minutes approximately. The researcher will observe the use of the tablet in the classroom, and if there are any challenges and difficulties of using technology into classroom.

Are there any benefits in my taking part?
There may be no benefit to the individual, but a benefit to others perhaps in the case they like using tablet in their teaching - we will have a better understanding of using tablet as a pedagogical tool in teaching in the classroom.

Are there any risks involved?
None.

Will my participation be confidential?
Yes, of course. The participants' information will be saved in a password protected laptop, and hard documents will be locked in a safe place.

What happens if I change my mind?
You have the right to withdraw at any time. Simply tell me or email me that you do not want your comments or responses included in the research.

What happens if something goes wrong?
You can Contact Head of Research Governance
02380 595058
rgoinfo@soton.ac.uk

Where can I get more information?
You can contact me on either my mobile or email address.
0096566526404 (Kuwait) - 00447462630360 (UK)
E.G.H.Alenezi@soton.ac.uk
OR you can contact my supervisor: Dr John Woollard
Telephone: 00447879808694
Email: J.Woollard@soton.ac.uk

Version number 1.2 Date November 29th 2016

F.4 Consent Form to Participate in the Research - Observation

UNIVERSITY OF Southampton

CONSENT FORM for the Observation

Study title: An investigation of teachers' beliefs about using tablet as a pedagogical tool for teaching in government-run intermediate Kuwaiti schools.

Researcher name: Alenezi, Ebrahim G H A B.

Ethics reference: 24234

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet (Version number 1.2, Date November 29th 2016) and have had the opportunity to ask questions about the study.	☐
I agree to take part in this research project and agree for my data to be recorded and used for the purpose of this study.	☐
I understand that all data will be anonymised in reports of the research.	☐
I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected.	☐

Data Protection

I understand that information collected about me during my participation in this study will be stored on a password protected computer and that this information will only be used for the purpose of this study.

Name of participant (print name)...

Signature of participant...

Date..

Version number 1.2 Date November 29th 2016

F.5 Participant Information Sheet for Observation (in Arabic)

ورقة معلومات المشاركة في الملاحظة

عنوان الدراسة: التحقيق في معتقدات المعلمين في استخدام الكمبيوتر اللوحي كأداة تعليمية في التدريس في المدارس الحكومية في المرحلة المتوسطة في دولة الكويت.

فضلا إقرأ هذه المعلومات قبل أن تقرر المشاركة في هذا البحث، إذا قررت المشاركة سيطلب منك التوقيع على نموذج الموافقة المرفق.

ما هو البحث عنة ؟

أنا طالب دكتوراه وأقوم ببحث للحصول على درجة الدكتوراه من جامعة ساوثهامبتون في بريطانيا. تتمحور فكره البحث حول التحقيق في معتقدات المعلمين في استخدام الكمبيوتر الرقمي كأداة تعليمية في التدريس في الفصول الدراسية. وأيضا المحاولة في فهم العناصر التي تؤثر على استخدام الكمبيوتر الرقمي داخل الفصل الدراسي ومثال على هذه العناصر المعرفة والمهارة والواجبات. الباحث مبتعث من الهيئة العامة للتعليم التطبيقي والتدريب.

لماذا تم اختياري ؟

تم اختيارك لانك قد تكون من المعلمين الذين يستخدمون التكنولوجيا ومثال عل ذلك الكمبيوتر الرقمي في التدريس داخل الفصول الدراسية. وايضا عندك المقدرة لفهم كيفية استخدام الكمبيوتر الرقمي في التدريس مما يجعل رأيك ومعتقداتك مهمة للبحث.

ماذا سيحدث لي إذا كنت جزءا في هذا البحث ؟

سيقوم الباحث في ملاحظتك داخل الفصل الدراسي حوالي 30 دقيقة. سوف الباحث في ملاحظة استخدام الكمبيوتر الرقمي داخل الفصل الدراسي وكذلك ان كانت هناك في صعوبات وتحديات في استخدام التكنولوجيا في التدريس داخل الفصل الدراسي.

هل هناك اي فوائد لي عندما اكون جزءا في هذا البحث ؟

قد لا تكون هناك اي فوائد لك شخصيا، لكن هناك فوائد اخرى ومثال على ذلك الفهم بشكل افضل لاستخدام الكمبيوتر الرقمي كأداة في التدريس داخل الفصل الدراسي.

هل هناك أي مخاطر تنطوي عليها مشاركتي ؟

ليس هناك اي مخاطر إطلاقا.

هل ستكون مشاركتي سرية ؟

نعم بالطبع. جميع البيانات سوف تكون محمية في كمبيوتر مع كلمة سر والمستندات سوف تكون في خزنة مقفلة.

ماذا يحدث لي إذا قمت بتغيير رأيي ؟

لك الحق في الانسحاب من مشروع الدراسة في أي وقت تشاء وببساطة قم بتبليغ الباحث او ارسل ايميل واطلب الانسحاب.

ماذا يحدث اذا حدث خطأ ما ؟

قم في الاتصال المباشر مع رئيس إدارة البحوث على البنايات التالية:

الرقم 0044380595058 الايميل rgoinfo@soton.ac.uk

من أين يمكنني الحصول على مزيد من المعلومات ؟

يمكنك التواصل معي مباشرة على الرقم 009656656404 او 0044746630360

ايميلي E.G.H.Alenezi@soton.ac.uk

او التواصل مع مشرفي على الرقم 0044787980869‏4 او ايميل J.Woollard@soton.ac.uk

F.6 Consent Form to Participate in the Research - Observation (in Arabic)

نموذج إقرار بالمشاركة في الملاحظة

عنوان الدراسة: التحقيق في معتقدات المعلمين في استخدام الكمبيوتر اللوحي كأداة تعليمية في التدريس في المدارس الحكومية في المرحلة المتوسطة في دولة الكويت.

الباحث: إبراهيم غازي العنزي

رقم كود موافقة لجنة أخلاقيات البحث:

بعد قراءة ورقة معلومات المشاركة في البحث أرجوا التكرم بتعبئة هذا النموذج والتوقيع علية في حالة الموافقة عل البنود المرفقة في شاكرين لكم تعاونكم

لقد قرأت وفهمت ورقة معلومات المشاركة في البحث وحصلت عل الفرصة الكافية لطرح أسئلتي واستفساراتي عن الدراسة ☐

أوافق على المشاركة في مشروع البحث هذا عن طريق ملاحظتي داخل الفصل وتسجلين البيانات التي تخدم مشروع البحث ☐

أتفهم أن تكون بياناتي في هذا البحث مجهولة المصدر ☐

أتفهم أن مشاركتي في هذا البحث هي تطوعية ولي الحق في الانسحاب في أي وقت دون أن يترتب على ذلك أي حقوق أو متطلبات قانونية ☐

اسم المشارك:

توقيع المشارك:

التاريخ:

F.7 Sample of Observation Data Analysis

Teacher code	Theme
T_1	- Technology-rich. - Scaffolding student understanding. - Increased self-efficacy. - Student-centred. - Increased student collaboration. - Feedback immediacy.
T_2	- Technology-rich. - Scaffolding student understanding. - Increased self-efficacy. - Student centred. - Feedback immediacy.
T_3	- Digital disconnect. - Lack of self-efficacy. - Teacher-centred.
T_4	- Digital disconnect. - Lack of self-efficacy. - Teacher-centred.
T_5	- Technology-rich. - Scaffolding student understanding. - Increased self-efficacy. - Increased student collaboration. - Student-centred.
T_6	- Technology-rich. - Scaffolding student understanding. - Increased self-efficacy. - Student-centred. - Increased student collaboration.

Teacher Code	Theme
T_7	- Technology-rich. - Scaffolding student understanding. - Increased self-efficacy. - Student-centred. - Increased student collaboration. - Feedback immediacy.
T_8	- Technology-rich. - Scaffolding student understanding. - Increased self-efficacy. - Increased student collaboration. - Feedback immediacy.
T_9	- Digital disconnect. - Teacher-centred. - Lack of self-efficacy.
T_{10}	- Technology-rich. - Scaffolding student understanding. - Increased self-efficacy. - student-centred. - Feedback immediacy.
T_{11}	- Technology-rich. - Feedback immediacy. - Increased self-efficacy. - Increased student collaboration.
T_{12}	- Technology-rich. - Scaffolding student understanding. - Student-centred. - Increased student collaboration. - Feedback immediacy.

Appendix F

Teacher code	Theme
T_{13}	- Technology-rich. - Scaffolding student understanding. - Student-centred. - Increased student collaboration. - Feedback immediacy.
T_{14}	- Technology-rich - Scaffolding student understanding. - Feedback immediacy. - Increased student collaboration. - Lack of self-efficacy
T_{15}	- Technology-rich. - Scaffolding student understanding. - Increased student collaboration - Feedback immediacy.

Date:…………………… **School name:………………………School A……………**

Time:………………….. **Teacher code:…………………………T6……………..**

Classroom environment

1- Classroom environment:

Technology-rich

> The apps that were being used required Internet access in order to run. The teacher had labelled the tablets which allowed students to quickly identify their tablets. Appeared to be an active learning environment.

2- The way the teacher uses the technology tool in the classroom:

> scaffolding student understanding
>
> The teacher tended to use the device in laptop mode, and had an external keyboard. Observed the teacher looking at the nationally mandated curriculum which was embedded in the tablet. However, he used it without the external keyboard when he started marking the assignments of 3 students who had sent their work to him via Google Drive an online cloud storage service. Then, he asked the students to explain the concept to the other students.

3- Types of technology sources (other than tablet computers) available for use by the teacher in the classroom:

> Laptop Technology-rich

Instructional orientation/strategies

1- The technology tools are integrated into the lesson by teachers (to observe: teacher behaviour, knowledge, skills, challenges and difficulties):

Increased self-efficacy

> Has the skills to use digital materials and apps. Motivated students to use the apps for drawing basic electrical circuits. Students were encouraged to use their own tablets and not the ones distributed by the school for classroom use se.

student-centred

2- Software programs and applications used by teacher in the classroom:

Technology-rich

> Learning-oriented drawing for drawing basic electrical circuits

Date:……………………. School name:…………………………………….

Time:………………….. Teacher code:…………………………T2………………

Classroom environment

1- Classroom environment:

Technology -rich

There was internet connectivity in the classroom. Teacher allocated tablets to students the moment he walked into the classroom. It was an active environment. The classroom layout was different. No rows of desks.

2- The way the teacher uses the technology tool in the classroom:

Teacher used tablets with a wireless data projector. It appeared to provide a better solution than a desktop or laptop and hardwired interactive whiteboard. Used examples which he had prepared to make students understand the concept.

.

scaffolding student understanding

3- Types of technology sources (other than tablet computers) available for use by the teacher in the classroom:

Laptop and interactive whiteboard. Technology -rich

Instructional orientation/strategies

1- The technology tools are integrated into the lesson by teachers (to observe: teacher behaviour, knowledge, skills, challenges and difficulties):

increased self-efficacy

Lesson was planned and used tablet for that purpose. Used learning-oriented drawing apps. Students were encouraged to use their own tablets and not the ones distributed by the school for classroom use.

student centred

2- Software programs and applications used by teacher in the classroom:

Learning-oriented drawing apps.

Date:……………………. **School name:………………………School A…………….**

Time:………………….. **Teacher code:…………………………T1………………**

Classroom environment

1- Classroom environment:

Technology-rich

Students and teacher have access to the Internet and so were able to use the tablet computers. There were tablet computer charging stations in 3 locations within the classroom. An active learning environment.

2- The way the teacher uses the technology tool in the classroom:

scaffolding student understanding

Observed the teacher looking at the nationally mandated curriculum which was embedded in the tablet. The teacher then asked the students to draw how solar systems produce energy using their tablets and suggested drawing apps. There was no set time period for this task, but students responded quickly and in about 15 minutes most students had completed the exercise using the tablet.

3- Types of technology sources (other than tablet computers) available for use by the teacher in the classroom:

In the classroom there are tablet computers, SmartBoard, and a laptop. The teacher had access to an interactive whiteboard or an interactive projector.

Technology-rich

Instructional orientation/strategies

1- The technology tools are integrated into the lesson by teachers (to observe: teacher behaviour, knowledge, skills, challenges and difficulties):

Increased self-efficacy

The teacher used the text books and materials embedded in the tablet which eased delivery of content to the students. Students were encouraged to use their own tablets and not the ones distributed by the school for classroom use.

student-centred

Appendix G List of Publications

Alenezi, E., and Woollard, J. (2018). Teachers' beliefs and attitudes regarding the use of tablet computers as a pedagogical tool for teaching: a Kuwaiti experience. Technology, Pedagogy and Education. (Submitted)

Alenezi, E., and Woollard, J. (2018). Poster about 'Teachers' Beliefs and Tablet Computers: Gathering Empirical Data from Kuwaiti Schools'. Southampton University, the UK: Doctoral Research Showcase. (Presented)

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