TEACHERS' ATTITUDES TOWARDS USE OF INFORMATION COMMUNICATION TECHNOLOGY WITH STUDENTS WITH INTELLECTUAL DISABILITY IN SAUDI ARABIAN SCHOOLS

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Statement of Original Authorship

I hereby certify that the work embodied in the thesis is my own work, conducted under normal supervision. The thesis contains no material which has been accepted, or is being examined, for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to the final version of my thesis being made available worldwide when deposited in the University's Digital Repository, subject to the provisions of the Copyright Act 1968 and any approved embargo.

Ibraheem Mohammed N Alsawalem

Dedication

To my mother 'Munerah', who believed that a learning disability cannot prevent a person like me becoming a doctor.

This work is dedicated for you

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Abstract

This exploratory study investigated teachers' attitudes to the use of Information Communication Technology (ICT) with students with an intellectual disability in Saudi Arabian schools. Although the use of ICT has the potential instruments to deliver, support and prepare students with an intellectual disability to receive information from multiple platforms, limited research has focused on teachers' use of ICT and their attitudes in special education settings. Therefore, this study was pursued to (1) examine the use of ICT and attitudes towards ICT by Saudi Arabian teachers of students with an intellectual disability, (2) explore the relationship between these variables in relation to teachers' beliefs about Perceived Usefulness and Perceived Ease of Use; Professional Development; and demographic information, by testing an adapted Technology Acceptance Model, and (3) investigate the barriers that impede teachers from using ICT in schools.

The study used a sequential mixed methods design with two phases: Phase One consisted of a questionnaire, and Phase Two a purposefully selected sample of respondents to participate in an interview. The participants in the study were special education teachers who were qualified to teach students with an intellectual disability in the Riyadh region in the Kingdom of Saudi Arabia. In Phase One, 394 special education teachers completed the questionnaire, while in Phase Two thirteen teachers participated in a semi-structured interview.

Findings from the mixed method study revealed that Saudi special education teachers demonstrated a low level of ICT usage with their students with an intellectual disability. However, they appeared to hold a positive attitude and perceived that ICT was useful and easy to use with these students. Multiple regression analysis indicated that the teachers' gender, the number of lessons they taught each week and how useful they perceived ICT were significant predictors of their use of ICT. The perceived usefulness of the ICT by the teachers significantly predicted their attitude to using of ICT. Where teachers reported limited use of ICT in their classes, this lack of use was linked to a number of barriers. These barriers included a lack of funding for ICT by the school and the government; difficulties with access and infrastructure around ICT; and lack of technical support for teachers in using ICT. In addition, it was perceived by the respondents that there was a lack of professional development and training around using ICT in the special education field.

The findings have implications for the Ministry of Education in Saudi Arabia regarding the use of ICT in special education classes, with a recommendation to review both policy surrounding resourcing of special education and the provision of focused projects for supporting teachers' use of ICT in schools. The findings also emphasised the need for more supportive learning environments within schools for special education, including clearer polices to enhance the use of ICT by special education teachers and provision of specialist ICT devices specifically designed to assist students with an intellectual disability. In Saudi Arabia, the Ministry, researchers, school leaders and teachers all need to work together to overcome the identified barriers for teachers to improve attitudes towards using ICT more easily and effectively in special education classes.

Abbreviations

A	Attitude to use of ICT (scale)
B	Barriers to use of ICT (scale)
CT	Communication technology
DGSE	General Directorate for Special Education
EFA	Exploratory Factor Analysis
EFL	English as a Foreign Language
EM	Expectation Maximization
ICT	Information and Communication Technology
ID	Intellectual disability
IT	Information technology
KMO	Kaiser-Meyer-Olkin test
K-S	Kolmogorov-Smirnov test
KSA	Kingdom of Saudi Arabia
MCAR	Missing Completely at Random
MI	Multiple Imputation
MLR	Multiple Linear Regression
PD	Professional Development
PEU	Perceived Ease of Use (scale)
PU	Perceived Usefulness (scale)
QTAMID	The adapted TAM questionnaire
SPSS	Statistical Package for Social Sciences
TAM	Technology Acceptance Model
Tatweer	King Abdullah’s Education Development Project
TRA	Theory of Reasoned Action
U.K.	United Kingdom
U.S.	United States
UICT	Use of ICT (scale)
VIF	Variance Inflation Factor

Keywords

Information Communication Technology, ICT, technology, Saudi Arabian schools, use of ICT, Technology Acceptance Model, attitude, barriers, special education, Saudi teachers, disability, intellectual disability

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Chapter 1 INTRODUCTION

Information and Communication Technology (ICT) has different meanings in different fields, including business, health and education. Although ICT is commonly associated with computer devices (Al Sulaimani, 2010), Ghasemi and Hashemi (2011) define ICT as a "diverse set of technological tools and resources which are used to communicate, and to create, disseminate, store, and manage information" (p. 3098). Broadly speaking, ICT assists in improving the quality and effectiveness of the economy, social interactions and education. ICT plays a major role in the sharing of knowledge, experience and culture through the use of different kinds of devices, such as computers, that can easily distribute information. In this study which focuses on the field of education, ICT has become an increasingly popular system in learning and teaching since the beginning of the 21st century because of easy access to ICT devices and the educational advantages of having ready access to information through the internet. This has changed the nature of schooling and has resulted in different perceptions of the role of the teacher.

In the special education field, the advent of ICT has provided new opportunities in teaching students with special needs (Stendal, 2012) and has played a key role in improving the skills and shaping the access to knowledge for students with various disabilities (Adam & Tatnall, 2008). There has been increased attention in the literature on how specific uses of ICT can assist students with special needs, particularly in the areas of autism and intellectual disability (ID). ID refers to "significant limitations both in intellectual functioning and in adaptive behaviour, which covers many everyday social and practical skills. This disability originates before the age of 18" (American Association on Intellectual and Developmental Disabilities, 2010, p. 1). The advantages of the use of ICT for students who have ID include the enhancing of skills in communication, leisure, functional math, time management, mobility and employment, academic skills, and in transition services (Achmadi et al., 2012; Alnahdi, 2014; Burton, Anderson, Prater, & Dyches, 2013; Chan, Lambdin, Graham, Fragale, & Davis, 2014; Green, Hughes, & Ryan, 2011). In addition, ICT serves as a type of cognitive prosthesis to overcome the differences between students with and without disabilities by improving the development competencies (Florian & Hegarty, 2004; Martí & Mon, 2018).

Consequently, with the potential that it offers, it is important that all students with a disability, including ID, have the opportunities to be assisted by ICT. According to the United States (US) Individuals with Disabilities Education Act 2004, technology or technological devices are a necessary component for all students, regardless of the extent of their disabilities (Smith & Syal, 2004). Based on that, a close look at how ICT is used in special education classes to assist students with disabilities is needed, so that all students have the benefit of access to ICT. Of equal importance is the role of the teacher in providing both access to, and implementation of, the use of ICT within the learning environment. In this context, teachers' attitudes and their beliefs are vital for using ICT in special education environments. This is because the teacher's attitude is considered to be a significant factor for increased technology implementation into classroom instruction (McKinley, 2014). Furthermore, Judson (2006) found that the reasons for using technology by teachers in schools commonly relate to their beliefs that technology can address important teaching and learning needs. Therefore, identifying and influencing teachers' attitudes is more important than improving skills alone due to the fact that successful ICT implementation in schools depends strongly on teachers' attitudes (Buabeng-Andoh, 2012; Knezek & Christensen, 2002).

The issue of using ICT in general and within special education is not only related to these aspects, but also to a variety of factors and barriers associated with ICT use and teachers' attitudes. Research is needed to better understand the broad range of factors associated with the use of ICT including teacher attitude, gender, professional development (PD), availability of educational tools and support, and the characteristics of students with ID (Albugarni & Ahmed, 2015; Gershberg, Meneses, & Wiener, 2013; Singh & Agarwal, 2013; Teo, Fan, & Du, 2015). Moreover, teachers' characteristics such as gender and age have been taken into account regarding teachers' attitudes to use of ICT (McKinley, 2014; Meeplat, 2015; Steinberg, 2012). These characteristics are significant predictors of teacher's attitude. For example, in a comparative study between the U.S. and Japan regarding teachers' attitude, young U.S teachers had significantly higher positive attitudes than older teachers. Among the Japanese teachers in this study, gender significantly predicted positive attitude (Kusano et al., 2013).

Teachers' PD in the use of ICT is a valuable factor, that is, the training and support that teacher's access to improve their skills, knowledge and management in their pedagogy of ICT practices. In developed countries such as the U.S., the importance of teachers' PD is well recognised (Al Sulaimani, 2010). Also, in Victoria, Australia the successful implementation of ICT in the curriculum demands appropriate PD for teachers (Hubber, Chittleborough, Campbell, Jobling, & Tytler, 2010). However, lack of PD in ICT is one of the most frequently identified reasons for students with special needs not benefitting from the potential of ICT (Marsters, 2011; Ribeiro & Moreira, 2010). Other barriers in the use of ICT also play an important role on decreasing the use of ICT. For example, Gulbahar and Guven (2008) highlighted the use of ICT tools in primary schools in the social studies subject area and investigated selected variables which affect the success of the implementation of ICT. They found that although teachers were willing to use ICT tools and were aware of its potential, they faced barriers such as a lack of access to ICT.

In the case of the Kingdom of Saudi Arabia (KSA), ICT infrastructure is not used to its full extent in special education and consequently, access to ICT is limited for students with special needs (Rana, Fakrudeen, Miraz, Yousef, & Torqi, 2011). In addition, there is no legislation to support the use of ICT or general technology with these students as well as no specific statistics on the use of ICT by teachers or students in schools or institutions with students with ID. As emphasised earlier, the use of ICT by teachers is influenced by different factors and barriers. A study by Alfaraj and Kuyini (2014) showed that, although the use of technology by Saudi teachers had the potential to support learning of students with Down Syndrome, the teachers faced barriers such as lack of PD and technical support. Further, Rana et al. (2011) reported that the limited availability of ICT infrastructure impacted on the teaching of science, mathematics and learning Arabic in special education classrooms. According to Almalki and Williams (2012), KSA does not have as advanced technological infrastructure, as do developed countries.

Even though several Saudi studies have attempted to explain teachers' use of ICT and their attitude towards use of ICT, most derive from general education (Al Sulaimani, 2010; Albugarni & Ahmed, 2015; Alenezi, 2017; Alharbi, 2013a, 2013b; Bingimlas, 2010; Oyaid, 2009). Further, the few Saudi studies in the special education field do not analyse teachers' attitudes and which factors are associated with teachers' attitudes and their use of ICT (Alfaraj & Kuyini, 2014; Alnahdi, 2014). In addition, these studies do not provide insights into how ICT is being used in special education teachers' classrooms (Alotaibi & Almalki, 2016). This is because the research has focused on the implementation, improvement of and barriers to the use of ICT. Therefore, this study seeks to consider the important role of teacher attitude in the effective use of ICT in special education settings and factors associated with teacher attitude and their use of ICT.

1.1 Aims of the Study

The present study was pursued to:

1. examine the use of ICT and attitudes towards ICT by Saudi Arabian teachers of students with ID;

2. explore the relationships between these variables and teachers' beliefs about Perceived Usefulness (PU), Perceived Ease of Use (PEU), PD, and demographic information (age, gender, highest academic qualification, type of school, years of experience, number of class periods per week, numbers of classes in the school, region of school, and number of students in teachers' the classes); and

3. investigate the barriers that impede teachers from using ICT in schools.

The current study used a sequential mixed methods design with two phases, comprising a questionnaire of all the teachers who teach students with ID in the Riyadh region in KSA followed by an interview phase with selected respondents on the basis of their attitudes towards the use of ICT. The main aim in the present study was to identify the variables which predict teacher's use of ICT and their attitudes towards the use of ICT. To do so, an adapted Technology Acceptance Model (TAM), which is an information systems model that explains how users come to accept and use a technology (Davis, 1989), was tested.

1.2 Research Questions

1. To what extent do KSA teachers of students with ID use ICT in the school environment?
2. What are the attitudes to the educational use of ICT by KSA teachers of students with ID?
3. What are the beliefs about the educational use of ICT by KSA teachers of students with ID?
4. What factors are predictors of educational use of ICT and attitudes to use of ICT by KSA teachers of students with ID?
5. What are the barriers to the educational use of ICT by KSA teachers of students with ID?

1.3 Statement of the Problem

A high-quality education is essential for all students, but is particularly important for students with disabilities. The use of ICT in the special education field enables the delivery of information from multiple platforms and supports teachers in differentiating the content to specific students to enable an individualised educational environment. In this way, the use of ICT makes the general education curriculum accessible for students in inclusive classrooms (Knighton, 2013). Teachers in KSA have been found to use ICT with their students but at a low rate due to multiple barriers including: lack of ICT availability, lack of PD courses and lack of support (Al Harbi, 2014; Alkahtani, 2013; Almaghlouth, 2008; Bingimlas, 2010; Oyaid, 2009; Al-Rashed, 2002). Generally, the Ministry of Education in KSA has been providing programs that emphasise increasing the use of ICT within schools (Al Muljim, 2014b). ~~Nonetheless, there has still been a lack of engagement in these programs among special education teachers in using ICT (Rana et al., 2011).~~ Alotaibi and Almalki (2016) emphasised the lack of Saudi studies that explored the use of ICT in special education classes. In particular, special education teachers in KSA may not use ICT to deliver their lessons, meaning that the potential benefits are limited (Rana et al., 2011). A clear understanding of why teachers of students with ID are not using ICT is needed for improving the quality of education in this field.

Students with ID have reduced ability to acquire skills and knowledge, and some live with multiple disabilities, such as hearing or visual impairment. Consequently, these students face far more challenges in learning than others. Developmental materials, educational software and electronic devices have been shown to successfully facilitate learning in people with ID (Bardhan, 2009; Ribeiro, Moreira, & Almeida, 2009; Turner-Cmuchal & Aitken, 2016). Al Redwan (2013) also found that ID is one of the special education categories that may benefit from ICT in order to gain basic academic skills. Therefore, focusing on ID is an important need in KSA where there is a lack of comprehensive information regarding the right of students with disability to benefit from technology (Al-Rubiyea, 2010). In addition, there is no specific information about the use of ICT in educating students with ID as well as what barriers impede the teachers from using this technology with the students in their classrooms.

Given the paucity of research that explores the acceptance of using ICT in KSA education (Alharbi, 2013a), there is a growing need to study Saudi teachers' attitudes towards the use of ICT in their classrooms. An investigation of this area is an important step, and equally it is important to identify which factors are associated with teacher attitude and their use of ICT in ID classes (Al Sulaimani, 2010; Rogers, 1995). Despite the fact that personal and motivating factors, such as attitude and beliefs, have been globally studied, the review of the literature showed a lack of studies that investigate them in special education in KSA. Due to the strong relationship between both attitude and beliefs and users' acceptance of new technology (Davis, 1989), it is very important to examine this relationship, especially when the issue has received little attention in Middle Eastern countries (Albirini, 2006; Alharbi, 2013a; Alharbi, 2012; Oyaid, 2009).

An effective model which captures the relationship between both attitude and beliefs to users' acceptance of new technology, is the adapted TAM (Davis, 1985), which identifies the level of users' acceptance of ICT by measuring different elements such as attitude, beliefs and intention to use. No research has tested the TAM model regarding the use of ICT in the ID field in KSA, nor has there been any discussion around the challenges and barriers that hinder teachers' use of ICT in this particular field. Therefore, the findings of this study will provide insights on how ICT is used by qualified special education teachers with their students with ID and also provide an understanding of the teachers' attitudes, beliefs and other factors. The research will also interrogate whether these teachers are using ICT in their classrooms, drawing on the research about barriers to using ICT in schools and classrooms. Ultimately this study has the potential to change practice within the special education field in KSA by enabling the demonstrated benefits of ICT for people with ID to be utilised by teachers in the classroom. This research will inform policies and practices of the Ministry of Education in KSA, who support this research.

1.4 Country Profile and Background to the Education System

This section will present the background to the study which was conducted in the KSA. The KSA was formed after Ibn Saud united the country and is characterised by its strategic location between three continents: Asia, Europe and Africa. KSA is the largest country in the Middle East and covers approximately four-fifths of the Arabian Peninsula. It is bordered by Yemen and Oman on the South, by the Red Sea on the West, Jordan, Iraq and Kuwait on the North, and the Arabian Gulf and the United Arab Emirates and Qatar on the East (Royal Embassy of Saudi Arabia, 2018). According to the General Authority for Statistics in KSA (2018), the population of Saudi nationals is 20.8 million, and the total population including non-nationals is 33.4 million. More than 58% of the population is under 30 years old. The official language of the KSA is Arabic and the official religion is Islam. Economically, KSA is considered as one of the wealthiest countries in the world due to its investment in oil. The country contains one quarter of the world oil reserves (Al-Rasheed, 2010).

The present King of KSA is King Salman bin Abdul Aziz Al Saud, who is the son of the first king of the country, King Abdul Aziz Al Saud. The KSA is a monarchy which means the country is ruled by the royal family. The entire regulatory system is based on the teachings of the Quran and governed by the Shari'a based Islamic principles. The majority of the population follows the religion of Islam under which particular rights such as life, dignity and education are allowed to every individual of the state (Al-Rasheed, 2010; Elyas & Picard, 2013). The capital city of KSA is Riyadh district, which includes 11 suburbs, Shaqraa, Afif, Al Zulfi, Hafar Al-Batin, Dawadmi, Wadi ad-Dawasir, Alkharj, Al-Hota and Al-Hariq, Al Majma'ah, Al-Quway'iyah, and Al-Ghat. According to the Central Department of Statistics and Information of KSA (2018), this region constitutes 23% of the country's population and has the second highest population after the Makkah region.

Given the size of the country there is a need to have further understanding of the education system. The Ministry of Education in KSA, which was founded in 1954, is responsible for providing free education to all students in general and special education from preschool to high school as well as government universities. It is estimated that across the 13 districts, the public education system services approximately 27,000 schools. In Riyadh alone, there are 3,292 schools. The public system holds the majority with 72.5% but there are also private institutions consisting 27.5% of the education system (Ministry of Education of Saudi Arabia, 2018b). The curriculum followed in KSA schools is adapted from the U.S. and the U.K. school curricula with consideration of Islamic law. This law applies in the education system, so girls' and boys' education are strictly segregated in terms of school buildings and teaching staff. Further, Islamic studies are a main part of the Saudi curriculum for all stages (Al Harbi, 2014; Al Muljim, 2014a). School calendars follow the American system (9-10 months of school, 2-3 months of summer vacation). However, religious holidays are observed by all schools, both private and public (Almakhalid, 2012). The next sections will overview the special education context, particularly for students with ID.

1.5 Special Education in the Kingdom of Saudi Arabia

There were no special education services in KSA prior to 1960 with the first services provided to students with visual impairment who were studying in the evenings to use Braille in one of the schools in Riyadh, KSA (Althabet, 2002). In 1974, a General Directorate for Special Education (DGSE) was established for planning and improving special education programs across the country (Al-Ajmi, 2006). After establishing a special education department in the Ministry of Education in Riyadh, the KSA government paid more attention to special education. DGSE was responsible for organising, developing and supporting programmes for all students with special needs including students with hearing or visual disabilities, learning disabilities, ID, speech impairments, autism, behavioural disorders, physical disorders and several other disabilities, as well as for students who are gifted and talented (Al-Ajmi, 2006; Al-Mousa, 2010; Alotaibi, 2015). According to Al-Mousa (2010), these categories can be educationally assisted in “self-contained classroom programmes, resource room programmes, itinerant teacher programmes, teacher consultant programmes, and follow-up programmes" (p. 17).

Compared with other Arabic countries, KSA was the first country that applied the concept of inclusion for students with disability in public schools. The first successful integration was conducted in Al-Hofuf in 1984 and the second one was in 1989 in kindergarten in King Saud University in Riyadh. In the late 1990s, the integration of students with special needs into public schools started to expand across the country (Al-Mousa, 2010). According to the Ministry of Education of Saudi Arabia (2018b), the number of public schools that include students with a disability increased from 66 in 1996 to 8,099 in 2016. The increase could be attributed to a change in legislation at the beginning of 2000, which sought to maintain the rights of and equality between people with disabilities and other people in the society. For example, a Disability Code was passed in 2000 which established equal access to free and proper educational, medical, social, psychological and rehabilitation services through public institutions (Alfaraj & Kuyini, 2014).

The first special education department in Saudi universities was established in King Saud University in 1984, which provided pre- or in-service training programmes that focused only on ID. Over the next two decades, the number of universities to include special education departments with expertise in specific disabilities grew. Currently, more than 23 Saudi universities offer training in special education, across categories of ID, learning disabilities, behavioural disorders, speech impairments and autism. These departments offer a Bachelor of Special Education with these specialisations, resulting in increased credentials for teachers working in special education (King Saud University, 2018).

The first information that can be located about teaching students with ID in KSA describes what is detailed as the first institution for teaching students with ID, established in 1970 and supporting 10 students. Fifteen years later, there were 827 students enrolled in institutions for students with ID across the country (Althabet, 2002). The assistance of students with ID continues to increase in KSA in both institutions and in public schools. In the institutions, the students typically have severe ID and multiple disabilities, while the public schools generally include students with mild and moderate ID in what is categorised as 'self-contained' classrooms in elementary, intermediate and high schools (Al-Mousa, 2010). In other educational systems, such as Australia, this would mean that there is a special class for these students within the mainstream school. In 2008, there were 11 institutions across KSA which accommodated 1,244 students with ID, and 2,307 self-contained classes in public or regular schools across KSA which accommodated a further 11,805 students with ID (Alnahdi, 2013). According to Alnahdi (2014), 58% of all KSA special education institutions are for students with ID. As this study is predominantly focused on the Riyadh region, further information has been sought about the proportion of students with ID, with records indicating there are approximately 2,178 students with ID assisted in 63 public schools (Ministry of Education of Saudi Arabia, 2018b). Further, there are two institutions for students with ID in the same region.

1.6 Thesis Outline

This chapter gives an overview of the research topic, the aims of the study and statement of the problem. It also provides the country profile and background of the education system and an overview of special education and ID in KSA.

Chapter 2 presents a literature review of the themes related to the study's aims. This includes teachers' use of ICT, attitudes and beliefs to use of ICT, factors influencing teachers' use of ICT and their attitudes and the barriers to use of ICT.

Chapter 3 explains the methodology that been used to collect the data, including the method of selecting participants, data collection and analysis, and consideration of the ethical implications of the current study.

Chapters 4 and 5 provide the findings of both the quantitative and qualitative data, respectively.

Chapter 6 discusses the main findings in relation to the research question and presents the implications of the findings for educational practice, policy and research.

Chapter 2 LITERATURE REVIEW

This chapter reviews the relevant literature in the field of ICT, specifically focused on teachers' use of ICT in the field of education. As this is a large field, a search strategy was developed to narrow the literature for use in this study. Of particular interest, as outlined in Chapter 1, is the use of ICT by special education teachers in KSA who teach students with ID. Country specific search strategies were developed to locate any literature in this topic area to ensure that local studies were included, which may not have been published internationally.

The electronic search engines that were used are academic databases, which include EBSCO Megafile Ultimate, ProQuest databases, Informit database collection, and Saudi Digital Library. In setting up the search parameters for the literature review, the above databases were searched using specific keyword searches. A copy of these can be found in Appendix 6.

The main areas identified through the literature search that relate to this study are presented below. The general areas are organised as the use of ICT in educational settings, the barriers to the use of ICT, attitudes and beliefs surrounding teachers' use of ICT, and factors related to attitudes and ICT use in schools. The chapter then focuses on the theoretical background and conceptual framework of the study.

2.1 The Use of ICT in Education Settings

Defining the term ICT is not an easy procedure and there is no universal definition of ICT. This is partly because ICT is a rapidly growing field. For example, at one time, the term “technology” was used to define only hardware; now “technology” refers to both hardware and software (Anderson, 2008). The term of ICT is a combination of two concepts, “information technology” (IT) and “communication technology” (CT), which refers to the tools, devices and equipment such as computers, laptop, scanners, digital cameras and software that allow users to “access, retrieve, store, organise, manipulate and present information by electronic means” (Zhao, Lei, & Conway, 2006, p. 685). For the purposes of this study the researcher defines ICT as all information and communication digital devices that can be used in the teaching, learning and enhancement processes inside and outside schools. These include, but are not limited to, desk-top computers or laptops, projectors, printers, scanners, video conferencing units, interactive whiteboards (e.g. SMART Board), smart devices (e.g. iPad, galaxy), digital cameras, video cameras, MP3 players/iPods and DVD players.

The last two decades has seen a global proliferation of ICT into the education field. Since the early 1980s, when computers were first used in classrooms, ICT continues to play an important role in education settings (including special education settings) for generations into the future (Council, 2000; Yelland, 2001; Yeni & Gecu-Parmaksiz, 2016). ICT has changed the teaching and learning process in which students in all stages deal with information in an active, self-directed and constructive way (Nwoji, 2015). The rapid adoption and integration of ICT in education settings led to increased interest from researchers keen to examine how teachers were embedding ICT in their classrooms for both students with and without disability (Florian & Hegarty, 2004). Therefore, there are many empirical studies which explore areas such as the impact of using ICT for teachers, students and more generally in schools (Al-Hezam, 2017; Aldama & Pozo, 2016; Alenezi, 2015; Alharbi, 2012; Awan, 2011; Condie & Munro, 2007; Farhat, 2009; Haydn, 2004; Penland, 2011; Smeets et al., 1999); advantages and benefits of using ICT (Amoudi & Sulaymani, 2014; Bakadam & Asiri, 2012; Fuchs & Akbar, 2013; Ghasemi & Hashemi, 2011; Lidström & Hemmingsson, 2014; Pétursdóttir, 2012; Wood, 2015; Yunus, Nordin, Salehi, Embi, & Salehi, 2013); pedagogical strategies for using ICT (Abou Hassana, 2008; Alharbi, 2014; Alkhatnai, 2013; Booth, 2009; Hammed, 2014; Harrold, 2017; Liu, Toki, & Pange, 2014; Petras, 2010; Rogers, 2005); and ICT policies (Aksal & Gazi, 2015; Al-Maliki, 2013; Alenezi, 2017; Alhawiti, 2013; Almalki & Williams, 2012; Cubukcuoglu, 2013; Farmery, 2014; Robertson & Al-Zahrani, 2012).

These studies provide evidence that the integration of ICT is not about the tools themselves. Rather, it is a complicated process and to understand it there is a need to extend the full picture of ICT use by further exploring related aspects (Richardson & Postman, 2013). One of the important aspects is the present status of ICT use among teachers in their schools which include frequency of ICT use; examples or purposes of ICT use; availability of ICT; and common types of ICT. In order to develop the use of ICT in schools, there is a need to gather, review and understand what is the current use of ICT by teachers in their schools (Alkahtani, 2013; Buabbas & Medjdoub, 2010; Constantinescu, 2015; Cooper, 2011; Gray, Thomas, & Lewis, 2010; Hoang, 2015; Kiru, 2018; Masagca & Londerio, 2008; Mia & Haque, 2013; Mwalongo, 2011; Salehi & Salehi, 2012; Shatri & Zylfiu, 2014; Sipilä, 2014; Smeets, 2005; Uluyol & Şahin, 2016). An investigation of the current ICT use by teachers captures to what extent teachers use ICT and the role of institutions that provide ICT tools.

Education systems and policies towards use of ICT shape the ways that schools engage with ICT through the curriculum, resourcing and PD priorities. A recent study (Kiru, 2018) encapsulated the limitations associated with use of ICT across eight countries, including Australia, Finland, Latvia, Mexico, Portugal, Romania, Singapore, and Spain, and found that there is a limited use of ICT in mathematics instruction in all countries. This quantitative study sampled 6,570 mathematics teachers and compared the frequency of ICT use in Mathematics. According to the results, these differences in ICT use could be attributed to different policies on ICT use or differences in teachers' beliefs and attitudes towards ICT use. It is the teachers' beliefs and attitudes towards ICT use which is of key interest in this study. A growing body of literature confirmed that the rate of ICT use is highly affected by teachers' attitudes toward ICT use (Beacham & McIntosh, 2014; Hew & Brush, 2007; Keengwe, Onchwari, & Wachira, 2008; Kriek & Stols, 2010; Sabraz Nawaz, Thowfeek, & Rashida, 2015; Sabzian & Gilakjani, 2013), and beliefs toward ICT use (Al-Furaydi, 2013; Binyamin, Rutter, & Smith, 2017; Nam, Bahn, & Lee, 2013; Porter & Donthu, 2006; Seliaman & Al-Turki, 2012; Teo, Lee, & Chai, 2008). In addition, a large body of literature agreed that multiple barriers may result in differences in teachers' use of ICT (Al Harbi, 2014; Al Muljim, 2014; Alasaadi, 2014; Albugarni & Ahmed, 2015; Alenezi, 2015; Alsulaimani, 2012; Amoudi & Sulaymani, 2014; Arhipova & Sergeeva, 2015; Bingimlas, 2009, 2010; Budhedeo, 2016; Chan, 2011; Hakami, 2013; Hechter & Vermette, 2013; Khalid & Nyvang, 2013; Lin, Huang, & Chen, 2014; Mirzajani, Mahmud, Ayub, & Wong, 2015; Okolo & Diedrich, 2014; Oyaid, 2009; Rabah, 2015; Singh & Agarwal, 2013; Tsai & Chai, 2012).

As the teachers used ICT for a range of different objectives such as teaching, administration, PD and personal use, on some occasions low use of ICT could be related only to instructional or educational purposes. Consequently, researchers need to clarify what are the purposes of teachers' use of ICT (Mwalongo, 2011). For example, Shatri and Zylfiu (2014), who explored the use of ICT in secondary schools in Kosovo by conducting interviews with 120 male and female teachers, and found 45% of the teachers stated they used ICT in general, but 55% indicated they did not use ICT in the teaching process. This is consistent with the work of Mia and Haque (2013), who conducted a mixed method study to explore the ICT usage level of the primary school teachers in Bangladesh. Forty-three percent of the 100 primary school teacher participants were using ICT for their personal purpose such as communication. Similarly, Salehi and Salehi (2012) revealed that although the majority of Iranian high school teachers (77 %) stated that they never used ICT in the classroom, 70% of them frequently used ICT for personal purposes. In a U.S. national survey, it was found that the main use of ICT by teachers in their classrooms (56%) was for administrative and communication tasks such as communication with colleagues (CDW-G, 2006). However, this was contradicted with findings from The National Center for Education Statistics (2010), which reported that the main use of ICT by teachers (69%) in the U.S. was for instructional purposes. These studies suggest that teachers are using ICT for predominantly personal purposes in the classroom, but there is increasingly some usage for instruction in the classroom.

Similar research has also been conducted by researchers attempting to understand how ICT is embedded in special education classes. A study by Okolo and Diedrich (2014) investigated how technology is used in education settings for students with disabilities in the U.S. According to the quantitative questionnaire of 1,143 Michigan educators, 97% of respondents reported that they used technology daily in their personal activities, but 79% used it with their students with special needs for educational purposes. Examples of their educational use were for improving access to the curriculum followed by improving academic outcomes such as communication skills. In particular, access to the curriculum for students with a disability, including students with ID, supported integration between them and their peers without disabilities, and made education more accessible. Therefore, they became more likely to be taught in a regular education classroom (Okolo & Diedrich, 2014; U.S. Department of Education, 2008; Wood, 2015). Sweet (2017) interviewed six special education teachers of middle and high school students with ID to explore how they used technologies to deliver their lessons. According to the qualitative data, they all were applying effective strategies such as manipulatives, engagement of students, and color-coding on the curriculum by using the technology. In a different study, Steinberg (2012), explored the use of ICT in special education classes across the U.S. Three hundred and eleven special education high school teachers participated in the questionnaire. The data analysis revealed that ICT was used for teaching and learning by most special education teachers in their secondary schools. Similarly, Sipilä (2014), investigated teachers' perceptions about how ICT was being used. A total of 292 Finnish teachers took part in the quantitative study and according to the results, 51.7% perceived themselves to be on an adaptive or creative level in integrating ICT into their teaching.

The common types of ICT and examples of ICT use in educational settings have been identified by several studies to examine if teachers were using it in appropriate ways (Romeo, 2006). There is a breadth of global studies which explore this is depth, and some examples of language teaching are presented from China, Poland and Australia to illustrate the more specific usages of ICT in education and personal use. In each case, it is clear that there has been purposeful use of ICT by the teachers.

In China, Li and Ni (2011) examined the use of ICT in 20 primary schools across six districts in Shanghai and 141 English as a Foreign Language (EFL) teachers participated in the study. The quantitative results showed that 56% of the EFL teachers used ICT daily to prepare their lessons; 31% used IT for management; and 30% used it for core skills development of students through daily drill and practice. In Poland, Gajek (2015) found that almost half of the 620 language teachers reported in the survey that they commonly used computers, laptops, notebooks, mobile devices and interactive whiteboards only for communication with students and their colleagues at least once a week. In Australia, Hoang (2015) conducted a case study with two English teachers to explore their use of ICT with their students. According to the qualitative study, the teachers used ICT to develop specific language skills such as vocabulary, grammar, pronunciation, and writing skills as well as promoting the learner's attitude and learning behaviour. In the Netherlands, Smeets (2005) found the majority of teachers (93%) used ICT in their lessons for several purposes such enabling slower students to spend longer time on a task, presenting additional learning materials or tasks to advanced students, or for presenting different activities to students with different abilities.

In KSA, there are also examples of studies which have explored the more specific usages of ICT by teachers in elementary and intermediate schools. Alhawiti (2013) found that more than half of the 120 participant teachers in elementary schools used ICT to gather online pictures and for synthesising information. The quantitative results showed that the most commonly available hardware and software for these teachers were digital projectors followed by internet-connected computers inside and outside classrooms and interactive whiteboards. Bakadam and Asiri (2012) reported that the Saudi teachers in Prince Sultan Intermediate Schools used the Interactive Whiteboard to serve as an overhead projector to present the learning content in the form of PowerPoint presentations in simple learning activities, such as filling in the blanks, and to retrieve information from the internet. These studies provide important insight into ICT use in KSA.

With regard to the types of ICT that been used by the teachers in special education, Alfaraj and Kuyini (2014) found that Saudi special schools for students with Down syndrome used various technologies but computers, iPads and projectors were the most frequently used with these students. They were using these tools in an entertaining way to motivate the children with DS. In the U.S., Wood (2015) conducted semi-structured interviews with five general and five special education teachers from six small rural middle and high schools. According to the qualitative results, the teachers were using ICT tools such iPads for independent use in reading and writing thus providing access to the general curriculum, allowing students to be included with their peers. Even though the needs of students in some cases determined the type of ICT, iPads and iPods have been observed to play a significant role for students with DS (Lester, 2012), for students with learning disabilities (Retter, Anderson, & Kieran, 2013), and in Victorian primary schools, for students without a disability (Hoang, 2015). This indicates that iPads and iPods may be more favourable for both teachers and students with and without disabilities because these tools allowed the students to work independently (Cumming & Rodriguez, 2013). However, the most available tools in schools are the most used by the teachers. A confirmation of this statement was reported by Yeni and Gecu-Parmaksiz (2016), who found that iPads were the most available and most used device among the special education teachers. Similarly, Arhipova and Sergeeva (2015) examined the features of ICT use in special education in the Republic of Mordovia. According to the quantitative results, computers and the internet were available in classrooms, therefore, the majority of them used these tools to prepare their usual lessons.

The global focus in exploring the implementation of ICT in schools and how teachers used ICT to deliver lessons resulted in increased interest from researchers in KSA to explore the use of ICT in general education in the Saudi context. Al-Rashed (2002) explored the use of ICT as well as the factors that played an important role on teacher use. The mixed method study involved 235 teachers responding to a questionnaire and interviews across three cities - Riyadh, Makkah and Dammam. The findings indicated that for the majority of the Saudi teachers, use of ICT was generally low, particularly in the classroom, due to a barriers such as lack of availability and time. Almaghlouth (2008) explored Saudi science teachers' perceptions of the use of ICT to enhance teaching and learning. In this quantitative study, 131 Saudi teachers were found to use ICT generally in their classes. However, ICT use was limited due to both teachers and students having 'little' to 'no' access to ICT tools. The most common tools used among the participants were the projector (56%), presentation devices (53%), and curriculum specific software (36%). The most readily available tools were projectors (83%), printers (76%) and TV monitors/VCR/DVD players (67%). The main reason for using ICT was for preparing student handouts and worksheets, followed by producing lesson materials and accessing the internet for professional reading and subject association news.

Another Saudi study conducted by Oyaid (2009) investigated the perceptions of Saudi secondary school teachers regarding ICT use and the relationship to broader educational goals. A total of 14 interviews were conducted with teachers, ICT coordinators and head teachers, and 266 teachers drawn from ten secondary schools in Riyadh completed the questionnaire. The mixed method study found that the majority of the Saudi teachers were rarely using ICT in their teaching because they faced challenges such as time constraints, lack of training, and financial issues. However, they were using ICT in a traditional way for maintaining continuous communication with students via emails, bulletin boards and mail groups. In a different study, Bingimlas (2010) investigated teachers' practices in developing an effective learning and teaching environment for science in primary schools in KSA. A total of 241 teachers and 53 supervisors participated in the questionnaire, while nine teachers were involved in interviews. These Saudi science teachers used ICT in the primary classrooms in various ways such as communicating with their students in the classroom. They were most likely to use computers, data projectors for PowerPoint presentations, photos and appropriate video clips, digital cameras, digital video, interactive whiteboards, digital microscopes, e-mail or websites for presenting and delivering information in science lessons. However, the use of ICT was limited because it was used to teach the whole class, rather than for individual and group learning.

Al Harbi (2014) examined the Saudi high school teachers' ICT knowledge and implementation. A total of 251 teachers from Al-Madinah administrative area in KSA filled in a self-report questionnaire which was followed by a semi-structured interviews with 12 teachers. The quantitative results revealed that the teachers demonstrated a low level of effectiveness of ICT implementation, although they used ICT as a presentation device with little or no hands-on activity for students. In other words, they used ICT in a traditional method to deliver their lessons. According to the qualitative analysis, the reasons for this limitation were linked to several barriers such as the lack of ICT resources. More recently, Alghamdi (2015) explored secondary school principals' and Arabic language teachers' beliefs and practices with technology in Jeddah, KSA. The mixed method study involved 82 Arabic language teachers completing a questionnaire followed by 12 teachers who completed the questionnaire and also participated in interviews before and after their lesson and were observed by the researchers through direct class observation. According to the survey results, the teachers showed a high level of technology use because they addressed the barriers that they faced in their classrooms with the support from the school principals. However, the qualitative data indicated that they used ICT in more traditional ways to teach the students because they preferred it as an information presentation tool.

In the special education field, only a few studies have investigated the use of ICT with students with special needs in KSA. Key studies include that by Alkahtani (2013), who reported that the majority of the Saudi special education teachers do not use any type of technology with their students due to a number of barriers that impede them from using technology such as lack of ICT resources. Another study by Rana et al. (2011) reported that ICT infrastructure was not used to its full extent in special education and more specifically, ICT was not widely used by Saudi teachers to design, plan and deliver their lessons to students with special needs. Based on the review of the previous Saudi literature in both general and special education, it is clear that teachers' use of ICT in schools was limited, even though, since 1991, the Ministry of Education in KSA has invested resources to develop the use of ICT in all public schools (Ministry of Education, 2018).

Examples of projects that have been initiated and funded by the Ministry to assist and increase the use of ICT in Saudi public schools include:

- The General Administration for Educational Technology was launched in 1991 to accomplish the integration of technology into classrooms and to improve the quality of technology education. This project was responsible for providing technology materials and PD to the schools (Al Harbi, 2014).
- The Learning Resource Centres Project was introduced in 1997 to improve school libraries and support the curriculum and the learning process. This project was responsible for developing all the school libraries across KSA schools (Al Harbi, 2014).
- The National School Net Project (Watani) was created in 2000 to develop student skills by using ICT within education, to enhance teachers' potential by engaging computers in all educational activities; to provide an information environment, research-based

content and direct educational resources for students and teachers; and to create a comprehensive awareness of the benefits of using ICT in education (Al Sulaimani, 2010).

- King Abdullah’s Education Development Project (Tatweer) was established in 2007 to re-qualify teachers and educators to integrate technology into their teaching and curriculum (Al Mulhim, 2014a; Alharthi, 2017). This project aimed to integrate technology into the classroom by equipping classrooms with ICT tools such as computers, projectors, and interactive whiteboards. Due to this project Saudi schools are to be connected to a network that enables teachers and students to contribute in e-learning activities (Ministry of Education of Saudi Arabia, 2018a).

Unfortunately, after significant initial investments in these ICT projects, all above mentioned projects were cancelled except Tatweer because of issues related to funding support, internet capacity, and available skills (Al Sulaimani, 2010; Alharthi, 2017). Despite the best efforts of the Ministry of Education, the integration of ICT into Saudi school education has been inconsistent and has yet to be fully realised (Alshmrany & Wilkinson, 2014) and is still in its initial stages (Alharbi, 2013a). As has been discussed through the findings of studies reported in this section, Saudi teachers in both general and special education fields are facing significant barriers that limit their use of ICT in the classroom, and the projects which aimed to address these identified barriers would have been instrumental in increasing the use of ICT in Saudi schools (Al Sulaimani, 2010).

It is clear that the current use of ICT in Saudi schools has not been integrated properly. The question that needs to be asked is whether this issue can be attributed to a possible weak presence of ICT in Saudi schools, or to the need for reform to the current evaluation process to include these important practices in the educational field (Alharthi, 2017).

Apart from the need to understand the limited ICT use in KSA, Alshmrany and Wilkinson (2014) evaluated the use of ICT in Saudi secondary schools. According to the researchers, there are two reasons for the lack of use of ICT in KSA. First, the complexity that is involved with the integration of ICT into the system of education. Second, the absence of a specific and clear strategic direction. In addition, Alhawiti (2013) aimed to explore the current use of ICT in elementary schools in Tabuk, KSA, in order to develop strategies and action plans for successful ICT integrating. The role of the Ministry of Education needs to be more effective in terms of reviewing their policies and providing more financial support and PD courses to increase the extent of the use of ICT in Saudi schools. Similarly, Almalki and Williams (2012) and Al-Maliki (2013) recommended that the Ministry of Education in KSA pay more attention to the availability of ICT tools in schools and PD or training courses for teachers. Generally, there is a need to conduct a comprehensive analysis of teachers' use of ICT and the teachers' attitudes towards use of ICT in the Saudi context in order to build a strategy aimed to increase the use of ICT in education.

2.2 Attitude towards Use of ICT

In the field of ICT there are a number of different definitions of attitude. Eagly and Chaiken (1993, pp. 666) defined attitude from a psychological perspective, as a "psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour". From the same perspective, Hogg and Vaughan (2005, p. 46), defined attitude as "a relatively enduring organisation of beliefs, feelings, and behavioural tendencies towards socially significant objects, groups, events or symbols". It can also be seen as a multi-dimensional construct "comprised of cognitive, affective and cognitive components” (Zhang & Aikman, 2007, p. 1033). In determining how attitude would be defined in this study, the area most aligned with the theoretical framework from the TAM refers to attitude as an ‘individual's degree of evaluative affect toward the target behaviour’ (Fishbein & Ajzen, 1975, p. 216).

In early work, many historical studies concentrated on the role of attitude in the integration of ICT. According to Watt (1980), attitude played a vital role in the way that teachers used ICT in their classroom. The researcher proposed that the effective use of ICT is associated not only to knowledge of the capability, applications, and implications of ICT, but also to the individuals’ attitudes towards using ICT. There is no doubt that successful use of ICT in schools depends to a great extent on the teachers’ attitudes toward ICT (Lawton & Gerschner, 1982). Kluever, Lam, Hoffman, Green, and Swearingen (1994) proposed that attitudes towards technology affected teachers’ use of such technology in schools. This substantial discussion has been conducted more recently in the technology acceptance and adoption area. For example, Kim, Chun, and Song (2009) investigated the role of attitude in technology acceptance and confirmed the crucial role it plays in the effective use of ICT. Similarly, Istenic Starcic and Bagon (2014) emphasised that the role of attitude is also seen as an important to the acceptance of ICT in special education. Teacher attitude is acknowledged as important to the successful implementation and integration of ICT in school environments (Venkatesh & Bala, 2008). Indeed, teacher attitude can shape how teachers respond to new and existing technologies (Teo et al., 2008).

A large and growing body of literature has indicated that attitude toward the use of ICT is significantly associated with teachers’ use of ICT (Al Harbi, 2014; Alrasheedi, 2009; Earle, 2002; Istenic Starcic & Bagon, 2014; Kim et al., 2009; Kotrlik, Harrison, & Redmann, 2000; Kriek & Stols, 2010; Raczak, 2014; Sabraz Nawaz et al., 2015; Sang, Valcke, Van Braak, & Tondeur, 2010; Turnbull & Lawrence, 2002; van Braak, 2001; Weber & Waxman, 2014; Zhang & Aikman, 2007). Furthermore, teacher attitude to ICT use has been found to be a major predictor not only for the use of ICT in educational settings (Almusalam, 2001; Beacham & McIntosh, 2014; Bullock, 2004; Cox, 2003; Davis, 1989; Hew & Brush, 2007; Keengwe et al., 2008; Kriek & Stols, 2010; Sabraz Nawaz et al., 2015; Sabzian & Gilakjani, 2013), but also for the future use of ICT (Oyaid, 2009; Sang et al., 2010). This evidence suggests that teacher's attitudes towards ICT are an important indicator of successful use of ICT in schools. Therefore, these attitudes, whether positive or negative, influence how teachers respond to and use ICT (Sabzian & Gilakjani, 2013). However, in order to effectively use ICT with students with and without disability, it has been argued that teachers' attitudes toward ICT should be positive (Cavas, Cavas, Karaoglan, & Kisla, 2009; Istenic Starcic & Bagon, 2014).

The impact of attitude, particularly positive attitude, may encourage teachers who are less technologically capable to learn the skills required for the use of ICT in the classroom (Afshari, Bakar, Luan, Samah, & Fooi, 2009). Similarly, teachers who have positive attitudes to use technology feel more comfortable with using ICT and frequently include it in their teaching (Kersaint, 2003). Any successful implementation in educational practice demands a positive teacher attitude toward using new technology (Veen, 1993; Woodrow, 1992; Xu & Moloney, 2011). A supportive learning environment requires an effective teaching environment, and this can be enhanced if teachers hold a positive attitude to the use of ICT (Ghasemi & Hashemi, 2011). Ma, O'Toole, and Keppell (2008) also emphasised that teachers will not use ICT in their classrooms until they have a positive attitude toward it. This is because teachers who have negative attitudes also have a lack of skills in technology use and consequently they are less likely to accept and adapt the technology than those who held positive attitudes (Afshari et al., 2009; Harrison & Rainer Jr, 1992).

In the Saudi context, several studies have focused on exploring teacher's attitudes to use of ICT in educational settings. Al-Rashed (2002) investigated the present use of ICT among Saudi primary teachers in the classroom by using a mixed method design. Their sample comprised 235 teachers who generally showed a positive attitude to use of ICT. Another study by Alshumaimeri (2008) used a survey to investigate the attitude of English teachers in KSA. The quantitative data from 183 male and female respondents revealed that the teachers had a positive attitude toward the use of ICT. Several other Saudi studies have also highlighted teacher's attitudes to use of ICT in general education and found that these teachers had a positive attitude towards the use of ICT (Al-Amri, 2011; Aldossry, 2011; Almuqayteeb, 2009; Bakadam & Asiri, 2012; Khouj, 2011; Oyaid, 2009). In a similar context, Al-Zaidiyeen, Mei, and Fook (2010) examined 650 secondary Jordanian teachers' use of ICT in education as well as their attitudes towards ICT. The quantitative findings indicated that these teachers had positive attitudes towards ICT.

Similarly, more recent studies have investigated what are teachers' attitudes to the use of ICT in the special education field. For example, Ogirima, Emilia, and Juliana (2017), explored teachers' attitudes to the use of ICT in special education schools in Osun State, Nigeria. One hundred special education teachers participated in the quantitative study. The analysis of the data showed that teachers had a positive attitude to the use of ICT. Mohamed (2018) conducted a mixed method study to explore special education teachers' attitudes towards using ICT in inclusive classrooms in Oman. Over 400 special education teachers working in Omani public schools (250 teachers of students with learning disabilities, 90 teachers of students with ID, and 88 teachers of students with hearing impairment) were involved in this study. The study indicated that the special education teachers' attitudes towards using ICT were generally positive.

Several studies have examined the relationship between teacher attitude and to what extent they use ICT and for what general purpose. A study by Nair et al. (2012) investigated teachers' attitudes towards the use of ICT in English language teaching and the extent to which teachers used ICT equipment. The quantitative study involved 60 mathematics teachers at eight primary schools in Miri, Sarawak. The findings indicated that the level of teacher's attitudes towards the use of ICT was significantly related to their level of ICT use. Li and Ni (2011) explored the strong relationship between attitude and the use of ICT. A total of 72 teachers participated in the questionnaire, and according to their analysis, there was a relationship between the positive attitudes of English language teachers toward technology and their frequency of using technology both for general professional purposes and for instruction. More recently, a quantitative study by Meeplat (2015) assessed teachers' satisfaction in the primary school in the rural area of Thailand. Eleven schools were selected and 46 teachers participated. The study found a significant relationship between teachers' attitudes toward ICT which can increase teachers' competency ICT in their classroom. These studies demonstrate evidence that teacher attitudes can be linked to a greater level of use of ICT, both for personal and professional purposes.

However, a number of studies showed contradictory results regarding the association of teachers' attitudes and their use of ICT. In special education, Tautkevičienė and Bulotaitė (2009), explored teachers' attitudes to use of ICT with students with special needs. Sixty-three Lithuanian special education teachers were involved in this qualitative study. According to the findings, the majority of special education teachers had positive attitudes towards ICT, even though more than half of them did not use ICT with their students because they faced difficulty in using ICT for educational purposes. In another words, they were not trained to use ICT with their students to deliver their lessons, therefore they needed more PD support. This finding was supported by Ribeiro, Moreira, and Almeida (2011), who found that Portuguese teachers had a very positive attitude regarding the use of ICT with students with special needs, but the findings revealed a low level of ICT use because teachers were hindered by lack of ICT training. In general education, Al-Zaidiyeen et al. (2010) found that, while teachers held positive attitudes to the use of modern technology in Jordanian schools, the teachers did not often use these technologies in their practice. This was because the teachers were not trained to integrate ICT tools into their classrooms. Ndibalema (2014) explored teachers' attitudes towards the use of ICT in secondary schools in Tanzania and also found contradictory results. A total of 80 teachers from 10 schools participated in a mixed method study. The study reported that the majority of the teachers did not effectively integrate ICT in their teaching due to the insufficient training in the use of ICT, even though they had a positive attitude towards the use of ICT.

In KSA, Almaghlouth (2008) found that Saudi science teachers had a negative attitude toward the integration of ICT, even though the science teachers integrated ICT into their teaching strategies, due to the lack of PD courses. Al Sulaimani (2010) examined ICT integration into the science curriculum in intermediate schools in KSA by using mixed method research. The study collected data from 311 teachers and six policymakers for comparative purposes. The results revealed that 90% of the teachers had positive attitudes towards using ICT in education. However, there was a difference with the views of the policy makers who perceived that the teachers had a negative attitude to use of ICT. It was reported that the policy makers assumed that the science teachers were not convinced of the benefits of ICT integration. These findings agreed that having a positive attitude does not guarantee that a teacher will use ICT in teaching (Ndibalema, 2014). Furthermore, overcoming barriers, such as lack of PD or training programmes, are necessary to increase teachers' use of ICT with their students.

The reasons why teachers have a positive attitude towards the use of ICT has also been explored in a variety of contexts, including factors such as teacher age, PD provision and teacher beliefs. For example, Cavas et al. (2009) investigated 1,071 Turkish science teachers in primary schools to determine their attitude. According to the quantitative results, the majority of the teachers had a significant positive attitude towards ICT in education. The plausible explanation for these findings is that almost 65% of the teachers were below the age of 35 and had experienced ICT during their education. In another study, Yüksel and Kavanoz (2011) carried out research with 200 Turkish English language teachers by using a quantitative method. The participants' attitudes towards technology were positive, and according to the data analysis, the reason for holding positive attitudes was due to their exposure to different information technologies in the PD they received. Several other studies indicated that teacher's attitude was influenced by their beliefs. In other words, the attitude teachers hold is determined by their beliefs regarding ITC (Davis, 1985; Davis, Bagozzi, & Warshaw, 1989; Horzum & Canan Gungoren, 2012; Sang, Valcke, van Braak, Tondeur, & Zhu, 2011). Based on the findings of the studies outlined above, it is therefore important to investigate not only teachers' use of and attitudes to ICT but also the relationship of these factors to their beliefs (Buabeng-Andoh, 2012; ChanLin, Hong, Horng, Chang, & Chu, 2006; Mumtaz, 2000; Sabzian & Gilakjani, 2013). The next section will explore the literature around teacher beliefs.

2.3 Beliefs about Use of ICT

There are a range of different beliefs that influence how teachers respond to the use of ICT in schools and classroom (Overmeyer, 2012). These include beliefs towards the use of computers as a beneficial tool (An & Reigeluth, 2011; Lee, 1970); teachers' beliefs about how to use technology to support high quality learning (Cilesiz, 2009); and pedagogical beliefs explaining the use of ICT (Sang et al., 2010; Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017). In KSA, cultural and religious beliefs were also observed to be strongly related to beliefs about the use ICT (Albugami & Ahmed, 2016; Alotaibi & Almalki, 2016). Beliefs are a vital predictor of users' attitudes towards ICT (Kriek & Stols, 2010; Sabraz Nawaz et al., 2015). Several studies emphasised the need to understand attitude more deeply by using a model such as TAM that explains the motivation behind, and the factors that predict attitude, such as users' beliefs (Venkatesh & Bala, 2008; Venkatesh, Morris, Davis, & Davis, 2003).

In TAM, beliefs are divided into two types: PU, which refers to the degree to which a person believes that using a particular technology will improve his or her job performance, and PEU, which refers to the degree to which a person believes that using a particular technology will be free of effort (Davis, 1989). According to TAM, PU and PEU are not likely to be strongly correlated with actual use of ICT (Turner, Kitchenham, Brereton, Charters, & Budgen, 2010). However, there is a strong association between both of these beliefs and attitude to the use of ICT (Davis, 1985, 1993; Davis et al., 1989). This was supported by more recent studies in educational settings (Horzum & Canan Gungoren, 2012; Sang et al., 2011). While teachers may hold positive attitudes to the use of ICT, it is unclear which specific beliefs motivate their use of ICT, and to which extent these beliefs are associated with their attitude toward the use of ICT (Smarkola, 2008).

Therefore, TAM is considered to be a feasible model that explores the type of association between PU and PEU and attitude to use of ICT (Davis, 1985, 1993; Davis et al., 1989).

This association is very important because teachers who have positive attitudes to the use of ICT and perceived use of ICT in schools will use ICT in their classroom more easily and effectively than others (Becker & Riel, 2000; Cox, Cox, & Preston, 2000; Mwalongo, 2011; Pedretti, Mayer-Smith, & Woodrow, 1999; Venkatesh & Bala, 2008). The strong relationship between PU and PEU and attitude to use of ICT based on the TAM has been examined in several studies. For example, Rand and Andre (2015), investigated teacher attitude in secondary schools in South Africa using an online questionnaire involving 108 teachers from four secondary schools in Pretoria. The data analysis revealed that there was a strong positive relationship between both PU and PEU and attitude to use of ICT. Li and Ni (2011) explored EFL teachers' use of technology in China through a questionnaire with 141 respondents, consisting of primary teachers across six districts in Shanghai. The quantitative results indicated that there was a strong positive relationship between attitude to use of technology and both beliefs PU and PEU. Another example of this strong relationship was found by Jose, Abidin, and Jafre (2015) who conducted mixed method research to explore teacher's attitudes towards the use of ICT and its motivation in Oman. According to the results, both beliefs were found to be positively associated with teachers' attitudes. This positive relationship is also reported in other research (Cox, 2003; Kusano et al., 2013; Nair & Das, 2012; Sabraz Nawaz et al., 2015; Teo et al., 2008).

In the Saudi higher education context, several studies also used TAM to explore and understand the relationship among PU, PEU and attitude towards the use of ICT. For example, Alharbi and Drew (2014), used TAM to understand academics' behavioural intention to use learning management systems. Fifty-nine faculty members from different colleges and different departments participated in the online survey from Shaqra

University in Riyadh. The data analysis showed a significant relationship between PU, PEU and attitude to use ICT. This was supported recently by Binyamin et al. (2017), who investigated the factors associated with student teachers' use of learning management systems in King Abdulaziz University in Jeddah. Over 120 male and females participated in the quantitative study which found that attitude was predicted by PU and by PEU. The previous studies confirmed the assumption of the TAM, which is that PEU and PU are significantly associated with attitude towards the use of technology (Davis, 1985, 1993; Davis et al., 1989).

However, other studies have contradictory results regarding the significant association of PU and PEU with attitude to use of ICT. Moses, Wong, Bakar, and Mahmud (2013) investigated science and mathematics teachers' attitudes to use of laptops in Malaysian secondary schools and found slightly different relationships between the components of the TAM. Using data from 570 science and mathematics teachers, the study found that while PU was a good predictor of attitude to use of laptops, PEU was not significantly related with teachers' attitudes. This finding was supported early by Moses, Wong, Bakar, and Mahmud (2011), who conducted a quantitative study involving 292 secondary school science teachers to understand their attitude to the use of laptops. By adapting Structural Equation Modelling, the study found that PU was a significant determinant of attitude towards laptop use, but PEU did not directly influence attitude towards laptop use. In the special education field, Nam et al. (2013) attempted to investigate the acceptance of assistive technology by special education teachers. A total of 167 American teachers participated in the quantitative study, which found that only PU was related to the use of assistive technology. According to the studies reported above, PU was seen as a more powerful predictor to teacher's use of ICT, specifically their adaptation of ICT tools, compared to PEU where teachers believed that the simplicity of ICT helped them to integrate it into their pedagogical practices.

It is important to understand to what extent teacher positive beliefs can be attributed to PU and PEU, and whether one is likely to be more important than the other towards the use of ICT. Studies which have used the TAM to investigate this in schools are limited and show mixed results. Studies that reported PU as more important were undertaken in the school system in the U.S. in both general and special education context. Porter and Donthu (2006) developed and tested an extended version of the TAM to explain how attitudes determined internet usage in a South-Eastern, U.S. metropolitan area. A total 539 questionnaires were completed and analysed. The study found that most of the participants revealed more positive PU than PEU towards the use of internet. More recently, Nam et al. (2013) investigated the acceptance of special education teachers to the use of assistive technology and found that the teachers had more positive PU than PEU about the use of assistive technology. Studies carried out using TAM in the higher education context, including in China and KSA have also found that PU is more important. Teo et al. (2008) conducted a study to understand pre-service teachers' computer attitudes by adapting TAM. The quantitative results indicated that the majority of 239 pre-service teachers showed more positive PU compared to their PEU. In addition, Al-Furaydi (2013) explored the e-learning in intermediate public schools in KSA. The 71 participants were selected using a stratified random sample from public schools in the Al-Madinah. The quantitative analysis showed that the EFL teachers in intermediate public schools in KSA had more positive PU than PEU to the use ICT.

In contrast, several Saudi studies found that PEU was seen as more important than PU, although these were all undertaken within the higher education sector. Seliaman and Al-Turki (2012) investigated the use of mobile phones and tablets for learning purpose among university students in KSA. Sixty male students from a college computer science and information technology program participated in this quantitative study. The findings indicated that the student teachers had a more positive PEU in comparison to their PU. Also, Binyamin et al. (2017) explored the factors influencing student teachers' use of learning management system in King Abdul-Aziz University in Jeddah. A total of 142 student teachers were involved in the quantitative study where they found that most of the participants had more positive PEU than PU. The reasons of this contradictory result were related to the level of teachers' knowledge about running ICT tools. To clarify, the participants in these studies were aware and familiar with ICT and how to use it, so adapting and using ICT was easy for them (Binyamin et al., 2017; Seliaman & Al-Turki, 2012).

There is a paucity of studies in KSA looking at teacher beliefs related to the use of ICT, so these are important findings in understanding how ICT use is perceived in this country. Of interest also are other factors which explain use of ICT and attitudes and the next section will review the literature in these areas.

2.4 Factors Related to ICT Use and Attitude

The use of ICT by teachers and their attitude towards ICT have been related to a variety of factors. This section of the literature review focuses on demonstrating the association between these factors and the use of and attitudes to ICT by teachers. An understanding of these associations is important if the goal is to enhance the use of ICT in educational settings. Many studies in different nations contribute to this understanding, including the U.S. and Japan (Blackwell, Lauricella, & Wartella, 2014; Kusano et al., 2013); Turkey (Cavas et al., 2009; Kahveci, Sahin, & Sebnem, 2011); South Africa (Chigona & Chigona, 2010); and KSA (Al-Ammari, 2004; Al Harbi, 2014; Al Sulaimani, 2010; Oyaid, 2009; Wiseman, Albakr, Davidson & Bruce, 2018). To gain an understanding of the research around the factors related to the use of ICT, the scope was widened to establish the gaps in the literature around this issue, with the majority of the literature focused on students, teachers and institutional factors.

There is a growing body of literature investigating the relationship between teachers' use of ICT and various factors. Findings around factors related to institutional provisions include teachers' beliefs towards the use of ICT (Baş, Kubiatko, & Sünbül, 2016); ICT availability (Lee, 2002; Tallent-Runnels et al., 2006), type of ICT (Bai, Mo, Zhang, Boswell, & Rozelle, 2016) and presence of ICT in the curriculum and attention to special education and health concerning ICT (Akbulut, 2009). The issue of school leadership has also been examined (Suarez, 2012). A number of studies have found factors related to teacher characteristics such as age, gender, experience, academic qualifications, financial status and PD (Al Sulaimani, 2010; Buabeng-Andoh, 2012; Gil-Flores, Rodríguez-Santero, & Torres-Gordillo, 2017; Kahveci et al., 2011; Kusano et al., 2013; Rogers, 1995; Schiller, 2003). In addition, factors such as teacher self-efficacy in ICT use (Rohatgi, Scherer, & Hatlevik, 2016); teachers' pedagogical strategies (Koehler & Mishra, 2005; Petko, 2012); and teachers' efforts to integrate ICT in their classrooms (Bingimlas, 2009; Tondeur, Valcke, & Van Braak, 2008; Wong & Li, 2008) have been found to be important. Other studies have focused on students' use of ICT and its relationship with factors such as learning style, analytic intelligence, gender, socioeconomic status, and parent attitudes towards ICT (Aesaert & Van Braak, 2015; Aesaert et al., 2015), along with student-to-teacher ratio (Erdogdu & Erdogdu, 2015).

A review of the literature showed that age, gender and teaching experience dominated researchers' concerns more than the previous factors because they indicated that these common factors were found to be more significantly associated with ICT use (Akbulut, 2009; Bozdogan & Rasit, 2014; Cooper, 2011; Hohlfeld, Ritzhaupt, & Barron, 2013; Tondeur et al., 2008; Wong & Li, 2008; Wong & Atan, 2007). Even though there are increasing discussions about the influence of these factors in the use of ICT, there is no general agreement if their influence is significant. Lau and Sim (2008) investigated the extent of ICT use among 250 secondary school teachers in Malaysia. The study found that older teachers frequently used technology more than the younger teachers. However, Scherer, Siddiq, and Teo (2015) examined the relationship between the use of ICT and gender in the context of teaching and learning by involving 1,190 Norwegian teachers. According to the quantitative results, the use of ICT appears to be greater among male teachers who are relatively young. In terms of teaching experience, several studies emphasised the significant relationship between teaching experience and use of ICT in schools (Flanagan, Bouck, & Richardson, 2013; Giordano, 2007; Hernández-Ramos, 2005; Jamieson-Proctor, Burnett, Finger, & Watson, 2006; Wong & Li, 2008). However, other studies indicated that there is no relationship between teachers' experience and their use of ICT (Gorder, 2008; Haji, Moluayonge, & Park, 2017; Mia & Haque, 2013).

As segregation within educational systems based on gender is one of the most unique features of the educational context in Arabic and Muslim countries including KSA, it is important to explore the differences in the use of ICT between male and female teachers. Wiseman et al. (2018) explored gender differences in teachers' ICT use in KSA classrooms where a total of 710 teachers (232 male, 478 female) from Riyadh region participated in the questionnaire. The study showed that the use of ICT by female teachers in their classroom was more frequent and of a different type than that of males because female Saudi teachers had more experience in teaching and more education. Similarly, Al-Alwani (2005) indicated that the use of ICT by Saudi science teachers was predicted by their gender. Female teachers showed more use of ICT than male teachers due their successful response to the barriers (i.e., using their private devices with their students). This is inconsistent with the work of Al-Ammari (2004) who concluded that Qatari male teachers used ICT in classrooms significantly more frequently than their female colleagues for teaching and learning. Even though this study was conducted in a similar context, the difference in the use of ICT was due to better access to ICT tools. In a different context, Umar and Yusoff (2014), explored Malaysian teachers' use of ICT and its impact on teaching and learning. Using data from 2661 teachers, the quantitative results indicated that male teachers used ICT in classroom significantly more than female teachers in their classrooms due to the differences in their practices through ICT.

The review of literature showed mixed results regarding the relationship between age and gender with teachers' attitudes towards the use of ICT (Shapka & Ferrari, 2003). A study by Kusano et al. (2013), compared U.S. and Japanese teachers' attitudes towards ICT by using the TAM. In the U.S., 99 elementary teachers participated in the study (11 male, 88 female), while, in Japan, 67 elementary teachers participated in the study (32 male, 35 female). The quantitative findings across both nationalities, indicated age and gender were significant factors, which were positively associated with teacher's attitudes. However, Cavas et al. (2009) explored teachers' attitudes toward ICT use in education finding that although Turkish science teachers had positive attitudes toward ICT, their attitudes did not differ by gender. Nevertheless, age, computer ownership at home and computer experience were significant predictors of teachers' attitudes in this study. This finding was different to the work of Goktas (2012), who found that females had more positive attitudes toward using ICT than their male colleagues. However, age was not significantly related with teachers' attitudes in these studies. Other studies found that both age and gender were not significant factors in explaining teachers' attitudes to use of ICT.

For example, Albirini (2006) explored the attitudes of high school EFL teachers toward using ICT thorough involving 320 male and female teachers in Syria. According to the quantitative data, age and gender had no relationship with teachers' attitude. Similarly, White Baker, Al-Gahtani, and Hubona (2007) investigated the effects of gender and age with the use of ICT in KSA. The study included 1088 students, student teachers, teachers and lecturers. Again, age and gender had no relationship with teachers' attitudes. This was also supported by the work of (Agbatogun, 2010; Spiegel, 2001).

In terms of gender, a meta-analysis of 50 articles from 1997 to 2014 was been conducted by Cai (2017) in order to find which gender had more positive attitudes to the use of ICT in schools. The findings indicated that males held more favourable attitudes toward technology use than females. This was contradicted by Youngkyun, Zhang, and Seongchul (2017), who indicated that female teachers were more positive than male teachers in their attitudes. However, Teo et al. (2015), who examined gender differences in pre-service teachers' perceived acceptance of technology, found no significant gender differences in PU, attitudes toward technology, or intention to use technology. Similarly, Ogirima et al. (2017) reported that gender was not associated with teachers' attitudes to the use of assistive technologies in the area of special education. Therefore, there is evidence to support the view that gender is linked to teacher attitudes, and also evidence to support that it is not related to attitudes. The literature also showed that age is related to a positive attitude towards ICT, although the results vary in terms of whether older or younger teachers were most positive. On the one hand, some studies found younger teachers were more likely to have positive attitudes towards ICT (Cavas et al., 2009; Elsaadani, 2013; Jennings & Onwuegbuzie, 2001; Luan et al., 2005; Scherer et al., 2015). On the other hand, other studies disagreed by indicating that older teachers (i.e. over 35 years of age) had more positive attitudes to the use of ICT (Cai, 2017; Deniz, 2005). In all cases, teachers' age and gender have the potential to influence, positively or negatively, teachers' attitudes towards the use of ICT, (Elsaadani, 2013; Mustafina, 2016).

In recent years, there has been an increasing interest in investigating the relationship between teachers' experience and their attitude towards the use of ICT. Overmeyer (2012) examined the attitudes and opinions of teachers in an elementary school setting regarding technology integration and explored the possibility that teaching experience had an association with attitudes and opinions. According to the quantitative results, there was a significant difference in attitude among elementary teachers based on the number of years of teaching experience. To be more specific, the data collected showed that teachers with 1-5 years of experience had a more positive attitude towards the use of ICT than teachers with 16-20 years of experience. This is supported by Blackwell et al. (2014) who investigated the relationship between extrinsic and intrinsic factors that influence early childhood educators' digital technology use. Their study of 1,234 early childhood educators showed that more experienced teachers had less positive attitudes. This is also consistent with the work of (Ayub, Bakar, & Ismail, 2015; Karaca, Can, & Yildirim, 2013; Russell, Bebell, O'Dwyer, & O'Connor, 2003; Youngkyun et al., 2017), who all found that the more years of teaching experience the less positive attitude to use of ICT. However, a few studies found that there was no significant relationship between teachers' experience and their attitude towards the use of ICT in general and special education fields (Gorder, 2008; Lindner, 2014; Ogirima et al., 2017).

Several recent studies have examined the relationship between multiple demographic factors and teachers' use of ICT and their attitudes to it. Mia and Haque (2013) indicated that the usage level of ICT was not different whether the teacher was married or single, senior or junior or headmaster, male or female, or in government or non-government schools. Gorder (2008) concluded that no significant differences were found for technology integration and technology use regarding teacher's age, years of teaching experience, grade level taught, content area, and education level. This was also supported by the work of Haji et al. (2017), who revealed that there was no significant difference in public, private and denominational school teachers' use of ICT, access to ICT, competencies or training support. Similarly, Menon (2015) found no significant difference in the attitude of science and art secondary teachers to use of ICT, among men and women, across private and public schools, or between rural and urban areas. In the special education field, Flanagan et al. (2013) reported that PD, type of school and academic qualification were not significantly related to teachers' use of ICT and their attitudes. This finding was inconsistent with Aramide, Ladipo, and Adebayo (2015) who found that ICT accessibility, educational qualification, teaching experience, ICT use experience, and location of ICT access were the best predictors of ICT use by Nigerian science teachers. A study by Youngkyun et al. (2017), also found that teachers who taught in secondary schools had more positive attitudes than those in primary schools.

In KSA, there is a paucity of studies that have investigated these other predictors of both teachers' use of ICT and their attitudes. A study focused on KSA schools by Al-Alwani (2005) indicated that the use of ICT by Saudi teachers was predicted by their teaching location, level of training, and teaching experience. A study conducted by Wiseman et al. (2018) in KSA schools, over a decade later, indicated that years of experience, academic level attained, hours of ICT coursework, and number of ICT training courses had no significant relationship with ICT use. This may indicate that either the context of the schools has changed in this time or that Saudi school teachers have changed in their attitudes towards ICT use. In the higher education field, which is relevant to look at more in-depth given its focus on both teacher attitudes and the use of ICT, a study by Almuqayteeb (2009) examined the factors that best predicted the use of ICT and attitudes of female faculty members toward using ICT by recruiting a total of 197 lecturers. According to the quantitative analysis, age, years of experience with computer technologies, subject taught, academic degree, access to a computer at the office, access to the internet at the office, computer skill levels, and English language proficiency all had a significant relationship with teachers' use of ICT. This approach is valuable in developing a broader understanding of the multiple factors associated with teacher attitudes and use of higher education in KSA, but it should be noted that the results are representative of only female teachers in higher education.

Teachers' PD in the use of ICT is another important factor in the use of ICT in schools. It can help update the knowledge and skills of teachers and may enable them to share knowledge with others (Alharbi, 2011; Gil-Flores et al., 2017). A growing body of literature shows that there is a positive relationship between teachers' use of ICT and their attitudes towards ICT use and PD or training in ICT use (Cavas et al., 2009; Jegede, Dibu-Ojerinde, & Ilori, 2007; Kahveci et al., 2011; Lau & Sim, 2008; Mishnick, 2017; Sa'ari, Luan, & Roslan, 2005; Samak & Tawfik, 2006). These studies indicated that the more PD in ICT use, the more teachers used ICT and had a more positive attitude towards this usage (Al Sulaimani, 2010; Galanouli, Murphy, & Gardner, 2004; Giordano, 2007; Lavonen, Juuti, Aksela, & Meisalo, 2006; Luan & Teo, 2009; Sadik, 2006). Voogt, Almekinders, van den Akker, and Moonen (2005) found that teachers' previous negative attitudes towards using computers was changed in a positive manner after they completed a PD program, demonstrating the impact of PD on the use of ICT and how these courses designed for teachers, can shape teachers' attitudes. This has also been found in studies conducted in the Arabic context including KSA (Abuhmaid, 2011; Al Sulaimani, 2010; Almethen, 2017; Alrasheedi, 2009; Mansour, Alshamrani, Aldahmash, & Alqudah, 2013). Therefore, it can be stated with confidence that teachers find ICT more useful and have more positive attitudes towards the integration of technology in their work if they receive suitable training (Nair & Das, 2012). However, teachers may face some barriers that limit their ability to use of ICT with their students in classrooms. The next section demonstrates the barriers to the use of ICT in more detail.

2.5 Barriers to the Use of ICT

The adoption of ICT, whether in general or special education, is increasing around the world. This has been hindered by different issues that contrast from country to country, society to society and from school environment to school environment. A considerable amount of literature has been published on this area because it is important to identify barriers that may assist decision makers to overcome the impediments to using ICT in schools and successfully integrate ICT in general and special education classes. Studying the barriers in the use of ICT in schools and classrooms is an urgent need because this knowledge could provide "guidance for ways to enhance technology integration" (Schoepp, 2005, p. 2), and improve the teachers' use of ICT (Bingimlas, 2010). These barriers are defined in this study as "any condition that makes it difficult to make progress or to achieve an objective" (Schoepp, 2005, p. 2), differentiating them from the previous sections on teacher attitudes and beliefs and factors related to teacher ICT use and teacher attitudes.

The next section in the review has analysed the significant literature which has been increasing over the past decades and organised this into three sections – school-level barriers, teacher-level barriers and barriers for use in special education. The organisation in this manner is supported through a large-scale study in the U.K. by Jones (2004), who conducted a meta-analysis of barriers to ICT and found that most studies can be classified into school-level barriers and teacher-level barriers. Additionally, this section includes a segment on special education due to the more complex barriers of ICT use for teachers and administrators in this context, and there has been a particular focus on identifying barriers in the ID field bearing in mind the limited research that has been conducted in comparison to the general field of education.

2.5.1 School-level barriers

This section focuses on school-level barriers which can impede the educational use of ICT. School-level barriers are defined as anything that impedes teachers from using ICT inside and outside the school environment where teachers do not have the power to change it, such as limited ICT tools and adequate technology, lack of internet access, lack of policies and plans, lack of support, limited PD courses and heavy workload. The literature included is therefore organised into the sub-sections of infrastructure, policy, support and management, PD and time.

2.5.1.1 Infrastructure

This section reports on key studies which identify infrastructure as the main barrier to the implementation of ICT in the schools. Access to adequate hardware, software and access to the internet are essential for the use of ICT. However, lack of hardware and lack of ICT and other presentation equipment was seen a major obstacle in KSA (Al-Alwani, 2005; Al Gamdi & Samarji, 2016; Alsulaimani, 2012), in Oman, (Al-Senaidi, Lin, & Poirot, 2009), in Turkey (Goktas, Yildirim, & Yildirim, 2009; Özdemir, 2017) and in the U.S (Vu, 2015). As limited resources have been identified as one of the greatest barriers that impede ICT integration, the condition of these resources is also important. In a recent large-scale study investigating barriers in KSA it was explained that “devices are not enough and most of the equipment was brought by teachers’ self-efforts, some devices broke down and were abandoned in the warehouse and the school administration does not have sufficient resources to fix them, we share (four or five students) on one computer… there is [also) no Internet” (Albugarni & Ahmed, 2015, p. 48). This limitation has also been linked to the high cost of ICT devices (Farrell, 2007; Mingaine, 2013)

Lack of funds has been identified in the literature as another key barrier to the use of ICT in schools, given that obtaining the necessary ICT hardware and software for implementing across a whole school is expensive. Without sufficient funds, schools cannot provide needed equipment which therefore impedes teacher use (Alhawiti, 2013; Budhedeo, 2016; Mumtaz, 2000). Hew and Brush (2007) reported that it is difficult to motivate teachers to use ICT in their classrooms without adequate resourcing. More recently, Albugarni and Ahmed (2015) agreed that financial issues were a key barrier for teachers and administrators. A large study by Goktas, Gedik, and Baydas (2013) explored the enablers and barriers to the use of ICT in primary schools through the participation of 1,373 teachers from 39 districts across Turkey. They found that a lack of hardware and appropriate software materials were the most important barriers. More importantly, the highest ranked enabler to using ICT from the teachers’ perspective was allocation of more funds.

Access to ICT, including the internet, has been identified as the key barrier for ICT adoption in a range of studies, indicating that even if a school can afford to buy some ICT tools access can still be limited or that schools have ICT tools but limited connectivity. This is because effective use of ICT in schools is determined by the availability and accessibility of ICT tools such as computers to the whole population (Buabeng-Andoh, 2012).

In KSA, Al Mulhim (2014b) explored the reasons for not using ICT by female teachers in KSA in their classes. The study used mixed methods and surveyed 135 teachers and interviewed 20 teachers in six cities. The researcher found that 68% of the participants in the questionnaire, in addition to 55% of the interviewees, nominated lack of access to technology as a key barrier that prevented them from using ICT. This was recently supported by Al Gamdi and Samarji (2016), who reported that among 16 selected barriers, lack of access, particularly to the internet, was the top barrier that been found in the Saudi educational institutions. In Canada, 67% of teachers acknowledged that access to technology is the leading barrier to technology integration in Manitoban K-12 science classrooms (Hechter & Vermette, 2013).

Infrastructure of the schools in KSA is a frequent barrier to the use of ICT, given that many schools are old and not designed for the use of ICT and the internet. The spaces for storing and implementing ICT are often not suitable for the purpose, hindering their use by teachers. For example, Almaghlouth (2008) found that the Saudi science teachers in secondary school lacked a suitable place for using ICT such as a resources room or a laboratory equipped with the latest technologies. More recently, Albugarni and Ahmed (2015) studied success factors for ICT implementation in Saudi secondary schools from the perspective of ICT directors, head teachers, teachers and students and found that Saudi teachers faced barriers in their schools such as lack of space, resources, and lack of maintenance. Some of the school buildings were not appropriate for ICT-based education because they were designed for other purposes. In a different study, large class size, uncomfortable tables and seating arrangements were also a barrier to technology use (Means, 2010, p. 302). This situation was noticed by Rabah (2015), who suggested that schools should invest not only in new ICT tools and software but also in developing adequate school infrastructure.

2.5.1.2 Policies in relation to use of ICT

For this section, the focus is on KSA due to the unique barriers in relation to policy. Several Saudi studies in the literature have been published relating to policy, and strategic directions based on these policies, as a key barrier in schools. Al-Oteawi (2002) and Albugarni and Ahmed (2015) found that a lack of school-based policies and plans for current technology was a key reason for Saudi teachers not using ICT in schools. Another reason was that the current systems and policies regarding ICT integration were not developed enough in KSA as a whole (Hakami, 2013). There has been a clear gap between policy and practice in ICT integration between schools and the Ministry of Education (Oyaid, 2009; Robertson & Al-Zahrani, 2012) and although there has been increased focus on researching the barriers to the use of ICT in schools the findings are not applied in practice (Shaabi, 2010). Almadhour (2010) argued that ‘‘unfortunately although the KSA government has lots of funding, there is no clear strategic framework towards equipping ICT in schools’’ (p. 62).

Where there are policies in place for the use of ICT by teachers, they are not consistently implemented at the school level. Albugarni and Ahmed (2015) highlighted several studies in the Saudi context in which they established that there are effective educational policies surrounding ICT, but that they are not regularly applied, connected and re-enforced. Oyaid (2009) reported that 39.8% teachers in their study felt that an adequate explanation of ICT in Saudi educational policy would have increased use of ICT. This led to the view that there is a need to develop an effective strategy for the use of ICT in school environments and to combine it with ICT practice (Al-Harbi, 2014; Almadhour, 2010; Almalki & Williams, 2012). In addition, Alshmrany and Wilkinson (2014) and Balanskat, Blamire, and Kefala (2006), reported that stakeholders, teachers, policy makers and administrators should encourage an awareness of the importance of using ICT in schools.

Institutions also should develop a clear vision for successful technology integration (Rabah, 2015).

2.5.1.3 Support and management of ICT

Another barrier that limited teachers from using ICT in school is lack of support and management of the learning environment. This barrier includes different aspects that affect the use of ICT in schools such as technical support, leadership support and class management of resources (Tezci, 2011). Lack of technical support can be stressful for teachers and may affect the teachers' willingness to adopt ICT (Budhedeo, 2016; Trinidad, Newhouse, & Clarkson, 2005). A growing body of literature stated that the lack of technical support was a barrier to use of ICT in education settings in KSA (Abdulaziz, 2004; Al Gamdi & Samarji, 2016; Alabdulaziz & Higgins, 2016; Alhawiti, 2013; Almaghlouth, 2008), in Iran (Salehi & Salehi, 2012), in the United Kingdom (U.K.) and Netherlands (Korte & Hüsing, 2006), in the U.S. (Agnew, 2011), in Canada (Sicilia, 2006) and in Turkey (Yildirim, 2007). Therefore, providing ICT in school without providing technical support may not lead to effective use of ICT.

Another important aspect of support is lack of classroom management skills. A number of studies claimed that large class sizes was the most cited barrier that linked to the lack of organisation of resources to enable the more frequent use of ICT (Al-Alwani, 2005; Balanskat et al., 2006; Jones, 2004). In KSA, Aldossry (2011) investigated 53 female science teachers from ten intermediate schools in Riyadh City using a mixed method design. The teachers identified large class sizes as a main barrier to use of ICT, which resulted in limited class time to manage and achieve the lessons' objectives. This was supported by Al Meajel and Sharadgah (2018) who reported that student barriers, which included numbers of students, came as a third important factor. Further, the need to group students to use ICT led the teacher to lose control of the class. In a recent study, the number of the students in the classes was identified as a potential challenge for special education teachers when they aimed to teach individually through ICT (Cooper, 2011). In other words, there is a difficulty to use and manage ICT tools with a large number of students and particularly students with special needs.

Finally, leadership support, such as support provided from school principals is one of the identified barriers that limited teachers' use of ICT. Tondeur, Cooper and Newhouse (2010) investigated seven primary schools in Sydney and observed that school leadership played an important role in the successful integration of ICT in Australian schools. Similarly, Neyland (2011) emphasised that lack of school leadership support was the biggest barrier faced by these teachers in Sydney. In KSA, Al-Harbi (2014) and Ghamrawi (2013) emphasised that Saudi school principals played a main role in ICT integration. Even though Saudi teachers had little knowledge of technology use, it was hard to use technology without this leadership support (Alenezi, 2017). A supportive teaching environment cannot be created to encourage teachers to use ICT if the school principals do not provide it on a whole school basis. This is also supported by work of Hew and Brush (2007) and Rabah (2015) who revealed that school leadership was one of the most important motivations for school teachers to use ICT. Means (2010) expanded on the reasons for barriers to the use of ICT through also emphasising the lack of teacher collaboration or support from other staff and could be addressed through PD managed by school leadership.

2.5.1.4 Professional development in use of ICT

The lack of PD for teachers in the use of ICT is a key barrier identified in the literature. Bingimlas (2010) identified one of the major barriers that limited science teachers in Saudi primary schools from using ICT as lack of training and experience or as he called it, “lack of effective professional development” (p. 2). One of the teachers interviewed in this study said that the formal PD course was not professional and did not address the educational aspects of effectively employing ICT in the classroom. Another reason for not using ICT in classrooms by Saudi teachers was because of insufficient PD courses that offered basic use of ICT and internet skills (Al-Oteawi, 2002). This was linked to the Saudi universities, which did not pay great attention to PD for student teachers regarding the future use of ICT in schools (Al Mulhim, 2014a). In Canada, Rabah (2015) highlighted the fact that although standard PD courses were provided several times a year to develop the use of ICT by teachers, it did not meet demand.

The integration of technical and pedagogical aspects of PD in ICT continues to be important. Ali (2015) investigated Turkish student teachers’ use of technology in their classrooms during practice teaching. In the quantitative phase, 86 student teachers were asked to complete the questionnaire, while 12 of them were interviewed. The findings of the study revealed a gap between teacher PD courses and classroom practice due to a lack of integration between both pedagogical and technical ICT skills. In this regard, teachers in Chinese kindergartens were found to be ineffective in ICT use due to lack of integration of ICT into their pedagogical and technical teaching practices (Liu, 2010). One of the teachers in the study of Oyaid (2009) said, “the most important thing is training in how to use ICT in teaching, because general ICT skills can be obtained easily in a one-week training course, but the difficult bit is to use it in my teaching” (p. 113). This demonstrates the need to improve both the quantity and quality of ICT PD in KSA (Al Mulhim, 2014a).

A number of studies across different contexts have agreed that lack of PD or training constraints are key challenges for teachers and administrations in their schools (Al-Moussa, 2004; Al-Oteawi, 2002; Al Gamdi & Samarji, 2016; Alabdulaziz, 2013; Alahmari & Kyei-Blankson, 2016; Albugarni & Ahmed, 2015; Alghamdi & Higgins, 2015; Alharbi, 2012; Ekberg & Gao, 2018; Oyaid, 2009; Rabah, 2015), indicating that this is an important issue to further investigate in this study.

2.5.1.5 Lack of time

Lack of time is a common barrier to the implementation of ICT in educational settings in different countries. In KSA, Alsulaimani (2012) studied 309 intermediate school Saudi science teachers to explore the barriers to use of ICT and found that more than 91% of respondents perceived lack of time as the strongest barrier. The teachers claimed that 45 minutes was insufficient to prepare and use ICT in their lessons. In Libya, Emhamed and Krishnan (2011) found that English teachers agreed a typical lesson time of 45 minutes was too short to integrate ICT. In Jordan, Abuhmaid (2011) reported that lack of time was considered to be the main barrier to technology integration. In Cyprus, Vrasidas et al. (2010) carried out a questionnaire on 24 primary high schools, to investigate the challenges that teachers face when they use ICT. Approximately 71% of 1,051 teachers reported lack of time in the classroom as a key barrier to ICT integration and Salehi and Salehi (2012) also found lack of time as a key barrier for English teachers in Iran. In the UK, a survey revealed that 61% of teachers selected lack of time as a barrier to use of ICT (Neyland, 2011). In Canada also, Hechter and Vermette (2013) found that over 55% of teachers in their study reported that lack of time was a challenge in some capacity within their technology pedagogical practices. In addition, Pelgrum (2001) investigated obstacles to the integration of ICT in schools in 26 non-Arabic countries. The results showed that 54% of teachers believed that a lack of time prevented them from using ICT.

Another aspect of lack of time is the existing workload of teachers. Khan, Hossain, Hasan, and Clement (2012) found that Bangladeshi teachers had a heavy workload and they did not have enough time to both prepare ICT resources and to attend PD programmes on how to combine ICT into the curriculum. Al-Alwani (2005) found that Saudi science teachers in all education stages were impeded in the use of ICT in their classes due to their heavy schedules. Using ICT certainly demands additional time in order to successfully integrate ICT into the classroom. Therefore, facing this barrier, teachers may not have sufficient time to prepare their teaching resources to design, develop and integrate ICT into teaching and learning activities (Al-Asmari, 2011; Budhedeo, 2016; Kula, 2010).

2.5.2 Teacher-level barriers

This section focuses on teacher-level barriers, which are the barriers according to whether they were related to individual teachers (Condie & Munro, 2007). As teachers have the most direct impact on the use of ICT in school environments, barriers related to teachers are most frequently cited in the use of ICT in education (Al Harbi, 2014; Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Levin & Wadmany, 2008; Lim & Khine, 2006). The review of the literature indicated that negative attitudes, lack of positive beliefs and resistance to change are the most cited teacher-level barriers that affect the use of ICT in school settings (Bingimlas, 2009; Mirzajani et al., 2015; Papaioannou & Charalambous, 2011). The following sections discuss these barriers in more details.

2.5.2.1 Teacher attitude and beliefs in relation to ICT

The role of teachers' attitudes and beliefs is significant and so it is important to understand why they impact on the use of ICT. Studies have indicated that the reasons may be due to these attitudes and beliefs being a fundamental factor in terms of teacher practice or more as a barrier towards their use of technology (Al Muljim, 2014; Fishbein & Ajzen, 1975). In other words, exploring teachers' positive attitudes and beliefs towards the use of ICT could fundamental help increase the use of ICT in the classroom, while, negative attitudes and beliefs could be a barrier that decreases the use of ICT (Watson, 2001). Indeed, a number of studies have found that negative attitudes and beliefs have limited teachers from using ICT in KSA (Alabdulaziz & Higgins, 2016); in Iran (Salehi & Salehi, 2012) and in the U.S (Ertmer, Paul, Molly, Eva, & Denise, 1999). This sub-section discusses teachers' negative attitudes and beliefs towards the use of ICT in schools.

In focusing on teacher attitudes towards the use of ICT alone, researchers have found a range of reasons for developing negative attitudes to ICT. The first reason focuses on the teachers' unwillingness to give up the use of traditional teaching strategies and an unwillingness to take risks (Conlon & Simpson, 2003), a factor that may also be linked to their lack of confidence in using technology (Tsitouridou & Vryzas, 2004; Zhang & Aikman, 2007). Other key reasons focused on the lack of specific ICT training (Hennessy, Ruthven, & Brindley, 2005; Zhang & Aikman, 2007); lack of resources (Al Harbi, 2014); and the lack of knowledge and skills about ICT (Al-Oteawi, 2002). Another explanation for holding negative attitudes to the use of ICT was found to be related to lack of time. For example, Li (2007) reported that teachers may consider that teaching and learning without technology is even better for various reasons such as time constraints as "students and teachers may be overwhelmed" (p. 390).

An explanation for holding negative beliefs toward the use of ICT by teachers has also been examined in several studies, without reference to teacher attitudes. Al Harbi (2014) reported that participants believed that the use of ICT decreased the level of communication between teacher and student. Pierce and Ball (2009, p. 302) found that mathematics teachers believed that the best method to learn is by working with pen and paper. They also believed that learning a new technology would mean that they must learn this outside of school time. Moreover, Pierce and Ball (2009) reported that teachers were not satisfied that the use of technology would increase students' interest, motivation, confidence and learning. In addition, teachers who did not use ICT in the classroom believed that there were no benefits to using ICT or that use of ICT had unclear benefits for both teachers and students (Korte & Hüsing, 2006; Wikan & Molster, 2011). Generally, teachers' lack of beliefs is one of the most commonly explored reasons for not using ICT to deliver lessons (Goktas et al., 2009; Hew & Brush, 2007; Löfström & Nevgi, 2008; Rana et al., 2011).

As shown above, many researchers explained why teachers showed a negative attitude or belief towards the use of ICT in schools, and how this has caused a barrier to developing technological practices.

2.5.2.2 Resistance to change

Resistance to change is another key barrier that has been identified in the literature which limits the use of ICT by teachers in their schools. Resistance to adapting to the use ICT is reflected in an individuals' general disposition towards change and is a common barrier for teachers (Oreg, 2003). This barrier is when teachers keep using their traditional teaching strategies rather than integrating new technologies. According to several studies, there are reasons why resistance to change occurs among teachers. Gomes (2005) found that science teachers' resistance to change their traditional practices and accept new strategies that included ICT was because the only way that teachers could perform was by continuing old teaching methods. In different studies, Cox et al. (2000) and Chittleborough, Hubber, and Calnin (2008) found that the reasons teachers resisted changing their pedagogical strategies were due to a lack of motivation and flexibility. Additionally, no PD was provided to support and develop teachers' skills in order to integrate ICT into their teaching practices. Bingimlas (2009) reviewed the barriers to the successful integration of ICT in teaching and learning environments with a respondent (a school principal) stating, "Some teachers are not welcoming to this change [using ICT]; they do not have any idea on how to run a device, so they prefer traditional methods'' (p, 283). Other studies also found that negative attitudes and lack of collaboration among teachers to support the use of ICT created this barrier (Conlon & Simpson, 2003; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010).

2.5.2.3 Teacher's confidence in using ICT

Lack of teacher confidence impedes effective use of ICT in schools, as has been identified in previous sections of the literature. This section highlights studies that focus on teacher-level barriers in regard to confidence and use of ICT in the classroom. Bingimlas (2009) found that teachers identified their lack of confidence as a major barrier to use ICT in their classes. This study reported that teachers were afraid to use ICT in the classroom because of their lack of knowledge regarding the use of ICT. Other researchers found lack of confidence related to negative attitude (Tsitouridou & Vryzas, 2004; Zhang & Aikman, 2007). However, lack of confidence is not only associated with barriers but also with factors such as preparation. For example, Hennessy, Harrison, and Wamakote (2010) found that the prime barrier to teacher confidence in using ICT in sub-Saharan Africa was their lack of relevant preparation, either while training or in-service. Therefore, the role of PD, particularly in teacher education programs, is important to accomplish successful integration of ICT in schools and empower new teachers to be more confident in imparting their knowledge of the use of ICT within their pedagogical practices.

Using ICT effectively without sufficient personal confidence is a difficult process. In a quantitative study, Jamieson-Proctor et al. (2006) investigated ICT integration and teachers' confidence in using ICT for teaching and learning in schools, with a total of 929 teachers from seven schools in Queensland, Australia. The data analysis showed that 73% of female teachers were not confident to use ICT in their classrooms, and this proportion was significantly greater than their male colleagues. Bozdogan and Rasit (2014), who explored the factors affecting perceived self-efficacy levels of pre-service English teachers in Turkey through participation of 241 students teachers (195 female and 46 male), also found that teachers were not confident to use ICT, but there were no significant differences in regard to gender. Lack of teacher confidence has been identified in the Arabic countries as well. In Oman, Al-Senaidi et al. (2009) investigated the barriers to use of ICT in general education and found lack of confidence was one of the most important barriers.

2.5.3 Barriers to use of ICT in special education

In special education, teachers face challenges different to regular education due to the unique environment. However, special education teachers also experience some of the common barriers that have been earlier discussed (sections 2.5.1 and 2.5.2). These barriers include lack of PD for teachers, students and their families; lack of teacher knowledge; lack of teacher awareness; lack of infrastructure and particularly ICT resources, lack of time, lack of support and cooperation among teachers, lack of integration of technology into the curriculum and lack of shared responsibility in technology integration (Flanagan et al., 2013; Girgin, Kurt, & Odabasi, 2011; Lee & Vega, 2005; Marsters, 2011; Ribeiro et al., 2009). This section discusses the barriers that were reported by a number of special education studies and particularly in ID.

The reasons for not using ICT with students with special needs were explored by several studies, with findings indicating lack of use of ICT may be related to teacher beliefs. Jackson (2013) reported that, although teachers in the U.S. wanted to use technology in their classrooms, they believed that technology (particularly computers) were not necessary to assist the students. This was also supported by Constantinescu (2015), who found that teachers believed that assistive technology was not helpful in the learning process. Similarly, Ribeiro et al. (2009) found that teachers' use of ICT with students with special needs played a secondary role in their practice. Other studies link the reasons for not using ICT in special education classes to school environment and student skills. According to Tautkevičienė and Bulotaitė (2009), there were two main barriers that prevented Lithuanian teachers from using ICT - lack of supportive ICT environments in schools and lack of student ICT skills. These teachers' reasons for not using ICT included the perception that students did not have the ICT skills needed to do the tasks and that the students would not be interested in using ICT for their learning

The literature showed a variety of barriers in different countries that limited the use of ICT for special education teachers. In the UK, Williams (2005) found that the main barriers faced by special education teachers were lack of devices, poorly functioning devices, paucity of suitable learning materials, and unique challenges related to the different needs of the students. In India, Mishra, Sharma, and Tripathi (2010) summarised the barriers to the use of ICT in special education as including lack of PD; lack of specialised hardware and software resources; lack of government or organisation support; negative attitudes towards disability; and lack of ICT policies and limited finances. In UAE, Almekhalfi and Tibi (2012), identified many barriers including limited PD; lack of ICT devices, administration support and technical support; negative perceptions held by special needs teachers towards their special needs students and their parents; and a lack of awareness of technology devices and their impact on students' performance. In the Republic of Mordovia, Arhipova and Sergeeva (2015) reported that the biggest barriers included lack of technical support followed by lack of specialised computer programmes. Another barrier was access to the technology, which must be appropriate for students who have disabilities, and must accommodate their needs, or they will not respond appropriately (Söderström & Ytterhus, 2010). Therefore, teachers should be more careful when they select the technology devices (Almethen, 2017; Stendal, 2012).

Student ability is one of the barriers that may have limited the benefits of using ICT. For instance, the use of the internet requires multiple steps and abilities in reading and writing. Therefore, language ability has been found to be a main barrier in the use of ICT integration in the ID field. (Nordbrock, Gappa, Mohamad, & Velasco, 2004; Wong, Chan, Li-Tsang, & Lam, 2004). This view is consistent with the findings of a recent study by Constantinescu (2015), who reported that student ability limited special education teachers from the use of assistive technology in their classrooms. Singh and Agarwal (2013) stated that ICT helped students with ID to develop their education and social skills. However, some barriers limited the benefit of learning by ICT such as the characteristics of students with ID and the lack of a universal design that considers issues of cognitive accessibility. In addition, lack of awareness among teachers and parents about the level of technology usage created a barrier, while lack of adequate infrastructural support impeded the use of technology in the ID field. Barriers have also been identified among other disabilities in the special education field, for example, autism. According to a recent study in KSA, barriers faced by Saudi teachers who taught students with autism were unavailability of suitable training workshops for technology use, school financial difficulties, ICT being not prioritised by the school and the cost to teachers in participating in ICT courses (Alotaibi & Almalki, 2016). To conclude, being aware of the hindrances, barriers, and obstacles that faced teachers when they used ICT was important, since the use of ICT in schools and particularly classrooms, may not be achieved without overcoming them.

2.6 Theoretical Framework

As the study aimed to investigate teachers' attitudes, their use of ICT, and their relationship with the factors PU and PEU, the TAM (Davis, 1985) was selected and adapted as the theoretical framework for the study. This section discusses the background of TAM, the model and the conceptual framework.

2.6.1 Theoretical background of TAM

There has been a considerable number of Information Systems studies since the 1970s as technology has continued to evolve. Researchers often concentrated on identifying the factors that could enable technology integration into businesses (Legris, Ingham, & Collerette, 2003), as well as developing models to predict the use of the technology in a wide range of contexts. TAM, is an information systems model which explains how users come to accept and use a technology and is one of the most well-known models in the technology acceptance field. The background of the TAM is derived from the Theory of Reasoned Action (TRA).

TRA, which was developed and expanded in the early 1970s (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), who found that there is an explainable relationship between attitudes and behaviour (See Figure 2.1). In TRA, attitudes are defined as “a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour” (Eagly & Chaiken, 1993, p. 15). Attitudes are an independent expression and “not merely related to beliefs, they are actually a function of beliefs” (Ajzen, 1989, p. 247). The theory considers the individuals’ behaviour as rational and based on a systematic use of current information. To illustrate, a person’s intention which is related to a person’s attitude toward the behaviour, determines the performance of the behaviour (such as use of ICT). The only factors that can impact this intention are "attitudes and subjective norms" (Dillon & Morris, 1996, p. 6).

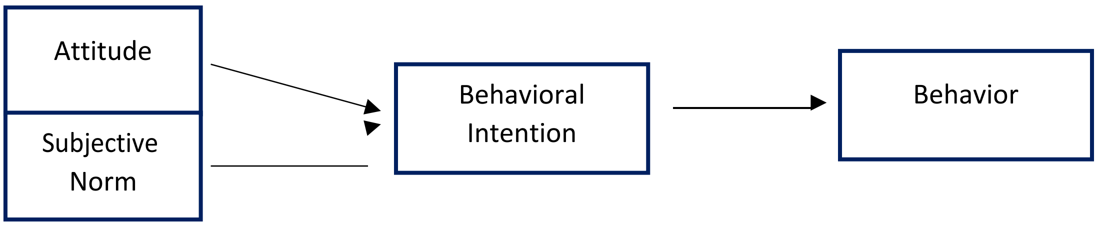

Figure 2.1 The original Theory of Reasoned Action (Ajen & Fishbein, 1980)

Even though the TRA includes individuals’ beliefs, which determine a person's attitude toward a behaviour, the theory considered attitude as a silent belief. This is because TRA is a general model, and, as such, it does not define the beliefs as an effective element. It also covers the subjective norm, which refers to "the person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Fishbein & Ajzen, 1975, p. 302).

2.6.2 Technology Acceptance Model

The TAM, was first introduced by Fred F.D. Davis in 1985 as part of his dissertation at Slone School of Management, Massachusetts Institute of Technology (Davis, 1985). This model has continued to evolve, and the TAM has made Davis one of the most well-known researchers in the area of technology adoption (Legris et al., 2003). TAM refers to an information system model that shapes how users come to accept and use a technology (Davis, 1989). TAM is different from TRA in two aspects. First, TAM comprises two belief variables. These beliefs are PU, or the degree to which a person believes that using a particular technology will improve his or her job performance, and PEU, which refers to the degree to which a person believes that using a particular technology will be free of effort (See Figure 2.2). Both beliefs are assumed to be fundamental determinants of user acceptance. Second, TAM does not include a subjective norm as a determinate of user's acceptance (Davis, 1989).

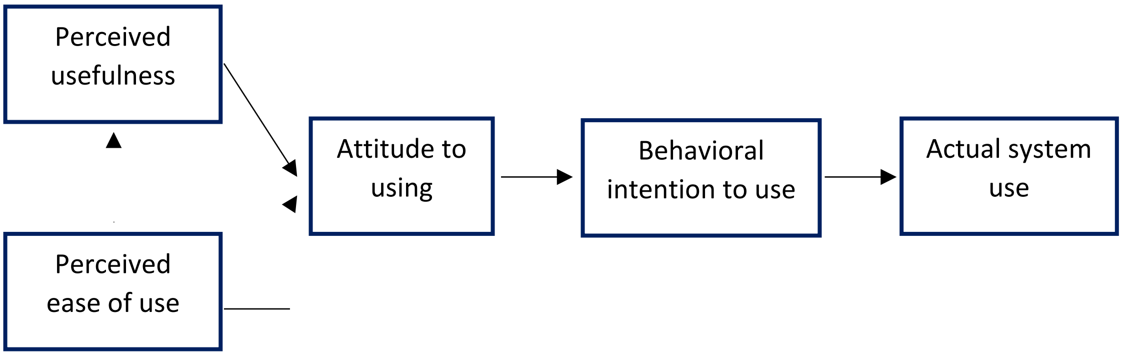

Figure 2.2 TAM proposed by Davis (1989)

Figure 2.2 shows that the intention to use technology is impacted by attitude toward technology use, as well as the direct and indirect effects of PU and PEU. According to the TAM, intention to use is jointly determined by attitude and PU, and both PU and PEU jointly affect attitude to the use of technology. Also, between the beliefs, PEU has a direct influence on PU. PEU was hypothesised to have a significant direct effect on PU but not vice versa (Davis et al., 1989). This is because PU is concerned with the overall impact of system use on job performance (process and outcome), whereas PEU of use pertains only to those performance impacts related to the process of using the system *per se* (Davis, 1993, p. 477). However, according to TAM, attitude is jointly determined by PU and PEU (Davis et al., 1989).

Although there is now a large volume of published studies on adapted TAM (Chen, Shing-Han, & Chien-Yi, 2011; Govender, 2012; Mac Callum & Jeffrey, 2014; Turner et al., 2010), early studies began in business and marketing (Davis, 1989). The main goal of this early work was to explain and describe the individual's use and acceptance of general use of ICT or any specific device in different environments. These early frameworks combined different mediating elements to gain an understanding of which components had more explanatory power. In another words, TAM explains the relationship between internal psychological variables – such as beliefs, attitudes, and behavioural intention – and actual system usage (Davis, 1985, 1989).

Since the start of the 21st century, many researchers adapted this model to different environments, including school environments (Chuttur, 2009; Kripanont, 2007; Nair et al., 2012; Sabraz Nawaz et al., 2015). These adaptations are relevant to a variety of teaching environments, including special education (Courduff, Szapkiw, & Wendt, 2016; Nam et al., 2013; Yeni & Gecu-Parmaksiz, 2016). Furthermore, educational researchers have extended TAM into education settings, examining the issues of technology acceptance and use among students and teachers (Teo, 2011, 2012; Teo & Wong, 2013). TAM has also been used to explain user behaviour across a broad range of end-user computing technologies and user populations. As a result, it has been empirically confirmed as a successful process in predicting up to 40% of technology use (Hu, Chau, Sheng, & Tam, 1999; Rice, 2012).

TAM is frequently cited in the literature on technology acceptance and adoption (Lai, 2017; Legris et al., 2003). As far back as 2002, the Institute for Scientific Information's Social Science Citation Index listed 517 journal citations for the two journal articles by Davis (1989) and Davis et al. (1989) that introduced TAM (Gentry & Calantone, 2002). TAM has also been utilised with different types of technology (e.g., word processors, e-mail, hospital information systems) and with different predictive factors (e.g., gender, organisational type) (Lee, Kozar, & Larsen, 2003). The scales were also used to measure the components of the TAM and have shown strong validity and reliability (Attis, 2014; Moses et al., 2013).

In the area of information systems and technology, and technology acceptance, many scholars have tested the utility of TAM to predict and explain individuals' behaviour to use of ICT. In other words, to what extent the use of TAM helpfully explains changes in technologies and users' behaviours (Aldhaban, 2016). For example, Mathieson (1991) and Taylor and Todd (1995) found after many tests that TAM provided a complete explanation of intention and attitude to use of technology. Their research also showed that TAM was easier to apply and was a perfect and useful predictor of technology usage. ChanLin et al. (2006) examined how much TAM was useful and found that it had a good fit to the data and concluded that it is the most parsimonious and generic model that can be utilised to study both initial and continued assistive technology adoption. Researchers compared TAM and TRA generally and regarding the prediction of actual usage of technology. Davis et al. (1989) and Mathieson (1991) found that TAM predicted software usage intention and actual usage better than the TRA and other alternative models such as the Theory of Planned Behaviour. Similarly, Igbaria, Zinatelli, Cragg, and Cavaye (1997) found that TAM was much simpler, easier to use, and a more powerful model of the determinant of user acceptance of computer technology than TRA.

To conclude, TAM is a commonly used model with many studies and it is a “robust, powerful, and parsimonious model for predicting user acceptance” (Venkatesh & Morris, 2000, p. 187). Further, TAM is frequently used in studies that focus on the acceptance of technology among different users (Attis, 2014; Lee et al., 2003). It is classified as the most effective model for determining information technology acceptance and also has been used in empirical studies across the globe in numerous technological contexts (Attis, 2014).

2.6.3 Conceptual framework

Recent evidence in KSA pointed out the lack of research that explored the acceptance of using ICT in KSA education (Alharbi, 2013a; Alshmrany & Wilkinson, 2017). Furthermore, the review of the literature showed a lack of studies that investigated personal and motivating factors, such as attitude and beliefs in the special education field in KSA. Therefore, an investigation in the use of ICT in special education in KSA by adapting TAM is needed, and particularly, to explore teachers’ attitudes and the possible related factors to ICT use (Alharbi, 2013a; Alotaibi & Almalki, 2016; Alshmrany & Wilkinson, 2017). As explained earlier, this effective model predicts the actual use of ICT by teachers by measuring different factors such as attitude, beliefs and intention to use (Davis, 1985).

Even though the TAM has been globally used, some studies made changes to the model in order to reduce its limitations by including and extracting selected factors (Legris et al., 2003; Nagy, 2018; Nair & Das, 2012). An example of these limitations was introduced by Bagozzi (2007) who found that even if there was an intention by the teacher to use ICT, in the time period between the 'intention to use' and the 'actual use', the teacher would often be influenced by factors which then made them uncertain about if they could actually use the ICT in practice. Another limitation was that PU and PEU may not mediate all influences from external environmental factors on actual use. Instead factors such as age, experience and academic qualification may have a direct impact on actual use (Burton-Jones & Hubona, 2006). These two limitations justified the extract of intention to use and added new variables if the aim was to predict the actual use of ICT (Chuttur, 2009).

However, the choice of additional external variables depends on the relevance of the construct and the important relationship between these variables and the acceptance technology being evaluated (Gardner & Amoroso, 2004), and must be theoretically justified (Davis et al., 1989). Thus, the TAM is an appropriate model for this current study because of these features and because it incorporates the constructs of PU and PEU. In addition, TAM is a simple structured model that has the ability to include selected external factors (i.e. demographic information) and extract selected internal factors (i.e. intention to use) (Attis, 2014; Davis, 1989; Nair & Das, 2012).

New variables or models based on the original TAM have been reported in several studies. Venkatesh and Davis (2000) combined subjective norms with TAM. Chiu, Lin, and Tang (2005) integrated personal innovativeness with TAM. Gefen, Karahanna, and Straub (2003), Walczuch, Lemmink, and Streukens (2007) and Lin, Shih, and Sher (2007) integrated technology readiness with TAM. Lee (2009) united the TAM with the Theory of Planned Behaviour, perceived risk and perceived benefit to understand the adoption of internet. Therefore, many researchers emphasised the need to extend the TAM through adding external factors and variables, so the extended model could explain more variance (Alharbi & Drew, 2014; Aljuaid, Alzahrani, & Islam, 2014; Attis, 2014; Colvin & Goh, 2005; Davis et al., 1989; Holden & Karsh, 2010; Nair & Das, 2012).

Based on these findings, the conceptual framework of the current study was informed by TAM (Davis, 1985) and the previous related literature. The purpose of using this conceptual framework in the current study was to examine the relationship between twelve independent variables (age, gender, highest academic qualification, type of school, years of experience, PD, PU, PEU, number of class periods per week, number of classes in school, region of school, and number of students in teachers' classes) and two dependent variables (teachers' use of ICT (UICT) and their attitude to use of ICT (A)).

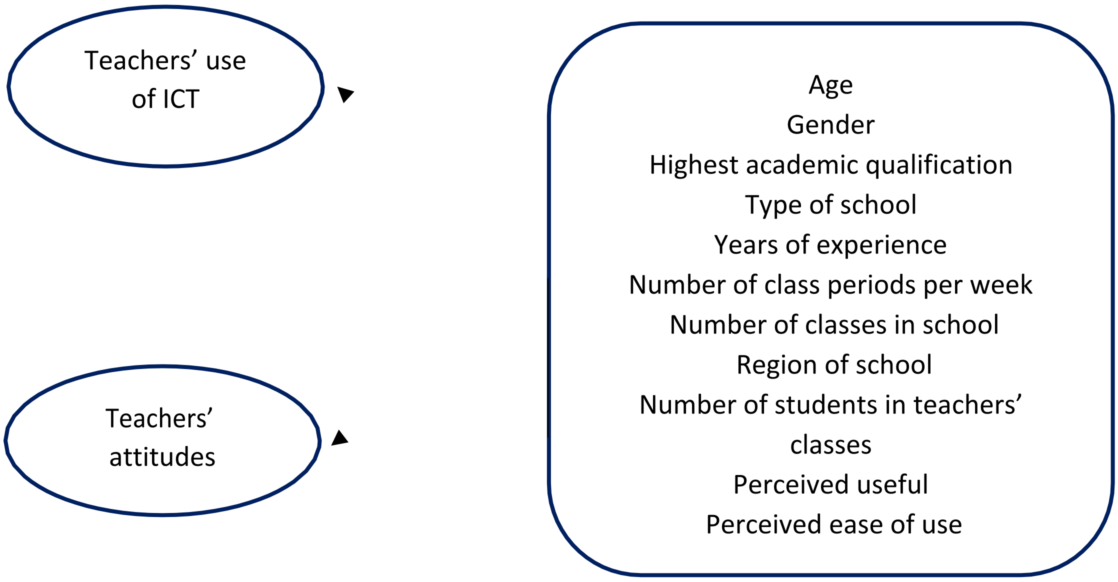

Figure 2.3 The conceptual framework of the study

The 12 independent variables including PU and PEU were selected by the researcher following a review of the literature on the use of ICT in educational settings including special education. The researcher was interested in which of these factors have an influence on both the teachers' use of ICT and their attitude (see Figure 2.3). Thus, a modification was made to the original model of TAM in order to fit the aims of the present study (Attis, 2014; Venkatesh & Davis, 2000).

As shown in the Figure 2.2, the TAM includes PU, PEU, attitude, intention to use and actual use. This study builds the conceptual framework from all the TAM components except intention to use for four important reasons. First, there is more concentration on intention to use than attitude in the use of TAM in technology acceptance (Alshmrany & Wilkinson, 2017; Hur, Shen, Kale, & Cullen, 2015; Joo, Lim, & Kim, 2016; Kounenou, Roussos, Yotsidi, & Tountopoulou, 2015; Porter & Donthu, 2006). Second, the importance of attitude in technology acceptance and integration in the general and special education field is widely acknowledged (Hew & Brush, 2007; Keengwe et al., 2008; Sang et al., 2011; Xu & Moloney, 2011). Third, it is important to extend TAM based on previous research to different contexts, such as special education field in KSA, to reduce the TAM limitations including the deficiency of support (Bagozzi, 2007; Chuttur, 2009; Holden & Karsh, 2010). Fourth, for reasons of clarity and conciseness, the deletion of the intention to use variable will permit the addition of selected factors including PU and PEU as possible predictors of teacher's use of ICT and their attitude (Davis, 1985; Davis et al., 1989).

This study contributes to the TAM research by using attitude as a dependent variable that is hypothesised to be predictive of ICT use. Even though this decision is in contrast to the TAM structure (Davis, 1985), which has placed actual use as the only dependent variable, it is predicted that the results of the study will build on existing insights of the TAM. Theoretically, this study provides an opportunity for additional empirical support by modifying and extending TAM as it extends its application to the use of ICT in ID classes and to a new population - Saudi special education teachers. This adapted model may also help to narrow the empirical gap in the acceptance and use of ICT literature in the Saudi context because this model can serve as a reference for teacher acceptance and use of ICT with a collection of variables that have not been used in any previous study. Finally, this study has the potential to inform the use of ICT in special education, an area of crucial importance in view of the increasing roles of ICT in teaching and learning process.

2.5 Summary

In this chapter, the relevant literature to the current study has been presented. The chapter started with an overview of ICT, which included the use of ICT in education settings. The literature regarding teacher attitude and beliefs to the use of ICT, and factors related to ICT use and attitudes, were then examined. Barriers to the use of ICT, an extensive field of study including school-level barriers, teacher-level barriers and specific barriers to using ICT in special education, were also examined. Finally, the TAM which is the theoretical framework for this study, was articulated.

The review of the literature showed that research into the use of ICT in education has been growing rapidly in recent years due to the potential benefits for teachers and students, in both education generally and for special education. Research evidence indicated that key factors such as teacher attitude, teacher beliefs and the provision of appropriate PD were important in teachers' use of ICT and their attitudes. Understanding the association between these factors and the use of ICT is important if the goal is to enhance the use of ICT in educational settings. However, the literature review has shown that teachers are experiencing multiple barriers which negatively impact on their use of ICT, including school-level barriers, teachers-level barriers and specific barriers unique to special education.

In addition, the following points were found after the researcher reviewed the context of KSA. First, most of the Saudi studies were either small-scale or were published online as Masters and PhD theses. Second, most of the studies were concentrated on investigating the general education fields rather than the special education field to examine the influence of ICT in specific discipline areas. Third, even though most of the Saudi studies used Western theoretical frameworks, the TAM or other technology acceptance models have not been used to investigate the use and adoption of ICT in schools.

Chapter 3 METHODOLOGY

3.1 Introduction

This chapter explains the methodology used in this study. As mentioned in chapter one, this study seeks to:

1. examine the use of ICT and attitudes towards ICT by Saudi Arabian teachers of students with ID,
2. explore the relationship between these variables in relation to teachers' beliefs (PU, PEU), PD and demographic information (which includes age, gender, qualification, type of school, years of experience, number of class periods per week, numbers of classes in schools, region of school and number of students in teachers' classes) by testing an adapted TAM;
3. investigate the barriers that impede teachers from using ICT in schools.

Due the nature of the study, a mixed-methods design was used. The mixed methods in this study comprised a questionnaire and interviews with Saudi special education teachers qualified to teach students with ID in the region of Riyadh. To be more specific, a questionnaire was used to investigate teachers' attitudes, beliefs, use of ICT and barriers to this use. Furthermore, the questionnaire allowed exploration of the relationships between teachers' use of ICT and their attitudes and some selected variables, along with an investigation of predictor variables. The interviews provided further understating of and explanation for teachers' use of ICT and other factors that related to the use of ICT and their attitude. An identification of the barriers in the use of ICT will also presented. This chapter includes the following sections: research design, rationale for using an explanatory sequential research design, research questions, population and sample, research instruments, translation, validity and reliability, procedure, phase one and two analysis and ethical considerations.

3.2 Research Design

The research questions were addressed by use of an explanatory sequential mixed-methods design, an increasingly common design in education research (Teddlie & Tashakkori, 2009) (see Figure 3.1).

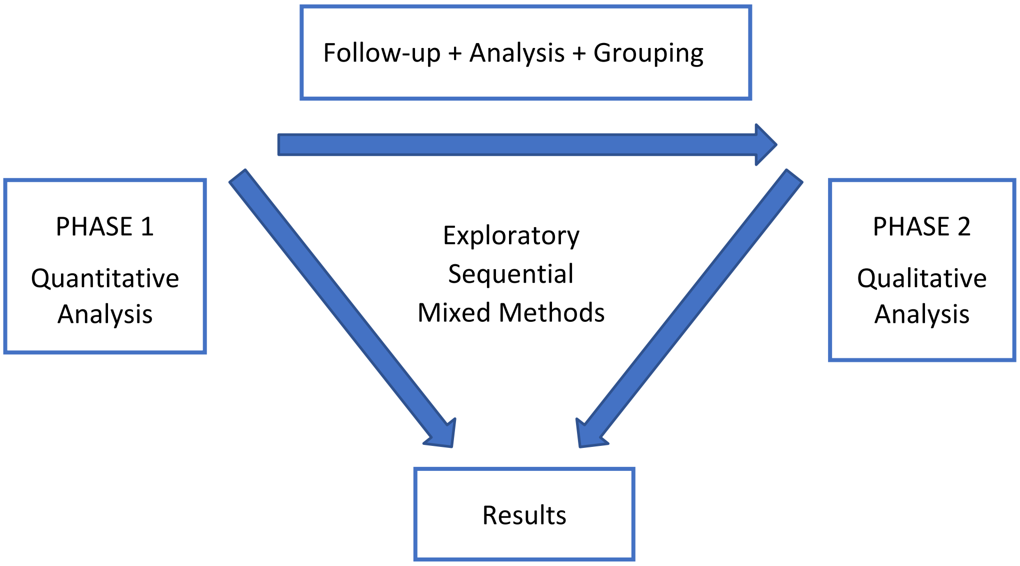

Figure 3.1 Research design

Mixed methods research includes the collection, analysis and interpretation of both quantitative and qualitative data at different times in the research procedure (Christensen & Johnson, 2016). In other words, the use of a variety of methods can help strengthen confidence in the reported results as the researcher can confirm, explain, and verify the data (Gorard & Taylor, 2004; Johnson & Christensen, 2004). The use of mixed methods by a researcher means the adaptation of quantitative research techniques for one phase of the study and a qualitative technique for the other phase (Creswell & Plano Clark, 2007; Leech & Onwuegbuzie, 2009). Further, the use of both qualitative and quantitative phases in a mixed method design may be concurrent or sequential (Johnson & Onwuegbuzie, 2004). To illustrate, a concurrent design means that quantitative and qualitative data are collected at one time, while a sequential design means collecting one type of data followed by the other (Leech & Onwuegbuzie, 2009).

Even though quantitative and qualitative techniques have their own strengths and weaknesses, a combination of both can decrease their individual weaknesses and increase their strengths. Using quantitative techniques, such as a questionnaire, allows the researcher to reach a large number of participants and to collect a large amount of data in a short time for a fairly low cost. Generalisation of results can be achieved if the data were collected from a representative sample of the population. Nevertheless, several weaknesses have been identified. For instance, using a quantitative method such as a questionnaires is unlikely to produce detailed or profound information and, in some cases, it may have a low response rate (Burton, Brundrett, & Jones, 2014).

An important objective of using qualitative methods is to deeply understand the phenomena that is being investigated (Gay, Mills, & Airasian, 2011). Limitations of qualitative research are that data collection and analysis is time-consuming and generalisation of the results may be limited due to the size of sample (Fraenkel & Wallen, 2003). However, in qualitative research the researcher relies on the views of participants, asks broad and general questions, collects data consisting largely of words or text from participants, describes and analyses these words for developing themes, and conducts the inquiry in an unbiased, objective manner (Creswell, 2012).

In this mixed method study, the quantitative phase is the priority in the study, and the qualitative phase is used to elaborate the quantitative findings (Creswell, 2012) (see Figure 3.1). A mixed methods approach was chosen for this study due to the nature of the research, which investigated teachers' attitudes, beliefs, the predictors of teacher use of ICT and the barriers to use followed by an exploration of how teachers utilise ICT both inside and outside the school environment and whether this use was linked to other factors and barriers. Given the complexity of the study variables and their inter-relationships, one research approach may not be enough to address the research problem or to answer the research questions (Creswell, 2012).

This study used, for the first phase, a questionnaire adapted from Ajzen and Fishbein (1980), Davis (1993) and Okolo and Diedrich (2014), which contained six sections: UICT**,** PD, A, PU, PEU and B (see Table 3.1, p. 84 for a full description of the questionnaire). The second phase of the study collected data using semi-structured interviews. The researcher interviewed teachers one-on-one to collect in-depth information to validate the quantitative findings. This qualitative phase used researcher-generated questions (see Appendix 3).

The study explored an adapted version of the TAM that included four components: use UICT, Attitude, PU and PEU. The TAM was developed to describe the associations between users' beliefs and attitudes on their intention to use technology and their use and level of acceptance of technology (Davis, 1985).

3.3 Rationale for Using Explanatory Sequential Mixed Methods Design

An explanatory sequential mixed methods design has been used for three reasons. First, to enhance the interpretation of the results of this study. According to the TRA, which is the heart of the TAM, attitude is a hypothetical construct that cannot be directly observed but can only be inferred on the basis of estimated responses by participants (Ajzen, 2005; Fishbein & Ajzen, 1975). Due to the main aims of the study, to explore the attitude of teachers to the use of ICT with students with ID, using both questionnaire and semi-structured interview approaches will enrich the results about attitudes rather than using only a single method (Onwuegbuzie & Leech, 2004)

A second reason is complementarity, which is utilising different methods to investigate different aspects of the phenomenon under investigation (Greene, 2007; Greene, Caracelli, & Graham, 1989). This reason is also concordant with TRA and TAM, which assume that attitudes towards an object are directly based on beliefs about the object (Ajzen & Fishbein, 2000; Davis, 1985, 1993; Fishbein & Ajzen, 2010). In other words, peoples' beliefs are strongly linked with their attitudes. The study, therefore, used a semi-structured interview, in addition to a questionnaire, in order to obtain an in-depth understanding of teachers' attitudes to the use of ICT. The questionnaire was used to measure teachers' attitudes to the use of ICT and its predictors, while the use of an interview approach helped to explain in better detail the foundation of teacher use of ICT and their attitudes. Further, the interview provided more information about which factors were associated with teachers' attitudes and the reason for those attitudes along with the reasons of using or not using ICT. Thus, the goal was to capture a comprehensive picture of teachers' attitudes and the predictors of those attitudes along with the use of ICT. Finally, the mixed methods design enriched the results by describing the barriers to using

ICT. An understanding of these barriers can assist in providing solutions to these problems.

3.4 Research Questions

1. To what extent do KSA teachers of students with ID use ICT in the school environment?
2. What are the attitudes to the educational use of ICT by KSA teachers of students with ID?
3. What are the beliefs about the educational use of ICT by KSA teachers of students with ID?
4. What factors are predictors of educational use of ICT and attitudes to use of ICT by KSA teachers of students with ID?
5. What are the barriers to the education use of ICT by KSA teachers of students with ID?

3.5 Population and Sample

The target population in this study was all male and female Saudi special education teachers who were qualified to teach students with ID in the Riyadh region. This encompassed the Riyadh district and the surrounding suburbs which included Shaqraa, Afif, Al Zulfi, Hafar Al-Batin, Dawadmi, Wadi ad-Dawasir, Alkharj, Al-Hota and Al-Hariq, Al Majma'ah, Al-Quway'iyah, and Al-Ghat. This included elementary, intermediate, high public schools and public institutions under the control of the Ministry of Education schools during the 2016-2017 school years. There were two reasons for selecting this region from thirteen regions across KSA. First, the Riyadh region constitutes 23% of the country's population (Central Department of Statistics and Information of KSA, 2018). Second, this region is representative of the Saudi education system, education polices and curriculum and the teachers in this region are representative of Saudi teacher's socio-demographic information (Alamri, 2014; Thuwaini, 2010).

Participants were limited to special education teachers (male and female) who specialised in the ID field. This sample of Saudi special education teachers was selected because of the urgent need for research in the area of ID in KSA and is a reflection of the experience of the researcher in this particular area. In addition, the sponsor that provided the PhD scholarship for the researcher required research in this specific area. According to the Saudi Ministry of Education, there were approximately 900 Saudi special education teachers in the Riyadh region qualified to teach students with ID (Ministry of Education of Saudi Arabia, 2018b). These teachers were deemed to be specialised in ID by holding at least a Bachelor degree qualification in special education, specifically trained for teaching students with ID. To be included in the study teachers needed to both hold the qualification and also be working with ID students in public schools and institutions, including stand-alone classes for students with ID which were supervised by the government.

The Ministry of Education indicated that there were up to 25 private schools serving students with ID in Riyadh region, which was 39% of the population of all ID schools in Riyadh region (Ministry of Education of Saudi Arabia, 2018b). However, private schools were not included in the sample unless they were under Ministry of Education control due to the differences in their support, roles, curriculum and environment. Obtaining permission for the participation of private schools involved seeking permission from each private school and the researcher had limited time to collect the data. Further, according to the Saudi Ministry of Education, teaching in those schools does not require a special qualification in ID.

3.5.1 Rationale for selecting the sample size

In mixed methods research, selecting a suitable sample size for both quantitative and qualitative phases is critical to the extent to which research findings can be generalised (Field, 2013; Onwuegbuzie & Collins, 2007). Therefore, researchers must take into account both the quantitative and qualitative phases of the study when selecting the sample size (Collins & O'Cathain, 2009). Since the present study used a sequential design, which means the quantitative preceded the qualitative phase, the use of nested samples was suitable for this study. Nested samples involve the selection of sample participants in the qualitative phase of the study that are a representative subset of those who participated in the quantitative phase (Collins, Onwuegbuzie, & Jiao, 2007)

For the quantitative phase, this study sought responses from the total population of approximately 900 qualified school teachers of ID in Riyadh region. The purpose for choosing this quantity was for three reasons. First, large sample sizes are desirable in quantitative studies to add power to statistical analyses. The minimum recommended sample size for factor analysis is 300 cases Tabachnick and Fidell (2007) and (Comrey & Lee, 2013) described 300 participants for factor analysis as "good". The second reason was that this number was able to be practically accessed from a single region that was representative of the total Saudi teaching population (Central Department of Statistics and Information of KSA, 2018). Third, this sample constituted almost 20% of the relevant Saudi teacher population, which was approximately 4,411 in the ID field in KSA (Ministry of Education of Saudi Arabia, 2018b).

In the qualitative phase, a very large sample size can lead to difficulties in deriving in-depth information about the research problem. However, a very small sample size can lead to issues in obtaining data saturation (Collins et al., 2007; Sandelowski, 1995). In qualitative research, saturation is commonly used as a criterion for estimating the size of the sample (Fossey, Harvey, McDermott, & Davidson, 2002; Guest, Bunce, & Johnson, 2006; Sandelowski, 1995), which means that sampling continues until saturation emerges. Even though the concept of saturation is crucial in qualitative inquiry, “there are no published guidelines or tests of adequacy for estimating the sample size required to reach saturation” (Morse, 1995, p. 147)

In this matter, Guest et al. (2006) conducted a study to determine how many interviews are enough to obtain theoretical saturation. The data used in the Guest et al. (2006) study were gathered from 60 interviews to systematically review the degree of data saturation over the period of the analysis. The aim of this study was to provide practical recommendations concerning qualitative sample sizes. Based on the findings of this study, saturation was achieved within thirteen interviews. Further, it was suggested that a sample of six interviews might be “sufficient to enable development of meaningful themes and useful interpretations” (Guest et al., 2006, p. 78). This finding was supported by Morse (1994) and Creswell (2002; 2012) who advise that, for interviews, at least six participants or between five and 25 interviews are required. Based on this information, the aim was to conduct 12 interviews for the present study. For religious reasons, many activities of men and women in KSA are segregated. Therefore, the male researcher collected interview data face to face for males and via telephone for females. This limitation is commonly reported in Saudi studies that aim to investigate issues in education environments across teacher gender (Al Harbi, 2014; Al Mulhim, 2014a; Bingimlas, 2010; Oyaid, 2009)

3.5.2 Sampling methods

There are several sampling methods that can be used to select participants in mixed method studies. For example, simple random sampling, systematic random sampling, cluster random sampling, multistage random sampling, and stratified random sampling. These categories of sampling are based on equality which means that each individual from the large population has an equal chance to participate in the study (McMillan & Schumacher, 2014; Teddlie & Yu, 2007). In quantitative research, random sampling is a popular sampling method due to the ability of the sample to represent the total population (Creswell, 2012).

On the other hand, there is non-random sampling, also described as non-probability sampling. This sampling method includes convenience sampling, purposive sampling, and quota sampling (Creswell, 2012; McMillan & Schumacher, 2014). The function of this method is to select participants by type of characteristic, such age, or because of ease of selection (McMillan & Schumacher, 2014). Even though no random selection is involved in these methods, such sampling is more suitable for qualitative studies where researchers are not seeking generalisations, but rather wishing to describe a particular context in depth (Gay et al., 2011)

Due to the importance of selecting an appropriate sample size that guarantees accuracy, precision, and a good representation of the population (Gall, Borg, & Gall, 1996), the researcher decided to use multiple sampling strategies to select the sample in terms of convenience sampling, stratified purposeful and random sampling.

In the current study, non-probability sampling was used for both the quantitative and qualitative phases. In the quantitative phase, convenience sampling was adopted because these teachers were relatively easily accessible to the researcher and the sample was representative of the total population (Rovai, Baker, & Ponton, 2013). In this technique, each person in the sample has the opportunity to participate in the study with the goal of reaching the highest number of responses possible. As mentioned earlier, the present study was conducted in the Riyadh region, which is the second largest geographic region and with highest population in KSA. Therefore, selecting the 900 qualified special education teachers in Riyadh from the total population of 4,411 in KSA used the convenience sampling technique.

In the qualitative phase, stratified purposeful and random sampling was applied because this phase intended to understand the attitude of the Saudi special education teachers in the ID field. The questionnaire allowed teachers to volunteer to participate in follow-up interviews. A stratified purposeful sampling method was used to divide the participants who consented to participate in interviews into two relatively homogeneous subgroups and occurred after initial analysis of the data from the first phase. The researcher analysed the attitude data to divide participants into two groups - those who had more positive and those with a less positive attitude to the use of ICT. Then, a random sampling procedure was used to select three male and three female teachers from each attitude group (N=12) (McMillan & Schumacher, 2014).

3.6 Research Instruments

This section describes the instruments used for collecting data in this study in both the quantitative and qualitative phases. Selecting an instrument depends on the nature and aims of the study (Creswell, 2012) and the research questions.

3.6.1 The adapted questionnaire QTAMID

The instrument in the quantitative phase was developed by using scale items from the following validated instruments of Fishbein and Ajzen (1975) Davis, (1993), and Okolo and Diedrich (2014). Permission to use, adapt and adjust the existing instruments was obtained from the authors' of each instrument. The adjustments to original instruments ensured that the adapted questionnaire (QTAMID) was appropriate for the aims, sample and the circumstances of the study. The next sections explain in more details each one of the components of QTAMID.

Table 3.1 outlines the questionnaire structure and content while Table 3.2 shows an overview of the methodology and its relationship to each of the research questions.

Table 3.1 Questionnaire structure and content

Questionnaire section	Questions	Authors	No of items	Variable Type	Reliability
Part A	*Demographic information*: region of school, gender, age, highest academic qualification, years of experience, level of school, number of students with ID in teachers' classes, number of class periods per week, number of classes for students with ID in school	NA	9 items Q1-Q9	Categorical & ordinal	NA
Part B	Use of ICT (UICT) in school environment	Davis, 1993	Filter + 2 items Q10-12	Ordinal: Five point Likert scale	Cronbach's alpha .70
Part B	ICT type, availability, frequency of use	Developed by the researcher	12 items Q13	Ordinal + examples	NA
Part C	Formal Professional Development (PD)	Okolo & Diedrich (2014) plus items developed by the researcher	3 items + 3 Q14-19	Ordinal	Reviewed by several members at the Michigan State University -wide technology project office
Part D	Attitude to use of ICT (A)	Adapted from Ajzen & Fishbein (1980)	5 items Q20-24	Ordinal: Seven point Likert scale	Cronbach alpha .96
Part E	Perceived Usefulness (PU) Perceived Ease of Use (PEU)	Adapted from Davis (1993)	10+10 items Q25-34 Q35-44	Ordinal: Seven point Likert scale	Cronbach's alpha .98 for PU and .94 for PEU
Part F	Barriers to use of ICT (B)	Developed by the researcher	18 items Q45-62	Categorical	NA

Table 3.2 Research questions and methodology

Research Question	Data Collection	Data Analyses
1. To what extent do KSA teachers of students with ID use ICT in the school environment?	Questionnaire Part B: UICT scale ICT type availability and usage Semi-structured interviews	Descriptive statistics Factor analysis to check instrument robustness Thematic Analysis
2. What are the attitudes to the educational use of ICT by KSA teachers of students with ID?	Questionnaire Part D: A scale Semi-structured interviews	Descriptive statistics Factor analysis to check instrument robustness Thematic Analysis
3. What are the beliefs about the educational use of ICT by KSA teachers of students with ID?	Questionnaire Part E: PU and PEU scales Semi-structured interviews	Descriptive statistics Factor analysis to check instrument robustness Thematic Analysis
4. What factors are predictors of educational use of ICT and attitudes to use of ICT by KSA teachers of students with ID?	Questionnaire Part A: Demographic information, Questionnaire Part B: UICT scale Questionnaire Part C: PD Questionnaire Part D: A scale Questionnaire Part E PU & PEU scales Semi-structured interview	Correlation /association analysis Multiple regression analysis Thematic Analysis
5. What are the barriers to the education use of ICT by KSA teachers of students with ID?	Questionnaire Part F: B scale Semi-structured interview	Descriptive statistics Thematic Analysis

3.6.1.1 Teachers' demographic information

One of the aims of this study was to assess the association between teachers’ demographic information and relevant dependent variables. This demographic information included age, gender, highest academic qualification, type of school, years of experience, number of class periods per week, number of classes in school, region of school, and number of students in teachers’ classes.

3.6.1.2 Use of ICT

The current study considered the UICT as a dependent variable, along with attitude to use of ICT. Therefore, the study adapted two items from (Davis, 1985, 1993). According to the TAM, actual ICT use is influenced by attitude and behavioural intention. The items were used to obtain a self-reported measure of ICT use. The first item is a filter or contingency question that was developed by the researcher to determine if teachers used ICT or not. The second item measured the frequency of ICT use by the teachers. This scale using a five point, Likert-type scale of (1) less than once each week (2) once each week (3) several times each week (4) once each day (5) several times each day. The third item asked subjects to specify how many hours the teachers usually spent each week using ICT. In this scale, the participants were asked to add a number of hours and days that applied for them. The reliability Cronbach’s alpha score of the second and third items combined was 0.70 in Cronbach alpha, which was suggested by Davis (1985; 1993). The next section of QTAMID asked teachers to specify the availability and frequency of use of the common forms of educational ICT. These examples of technology were developed by the researcher following a review of the relevant literature.

There has been debate among researchers regarding the use of self-report data for the Use of ICT and TAM studies. In relation to system use, self-reported usage data is a subjective measure based on the opinion of each individual and is not an objective measure. Some researchers argue that self-report usage data is unreliable in measuring actual use of a system (Legris et al., 2003; Yousafzai, Foxall, & Pallister, 2007). However, many studies have avoided measuring actual use because of practical difficulties. Due to that, intention to use, beliefs and attitudes are more frequently measured than observed usage (Keung, Jeffery, & Kitchenham, 2004; Lee et al., 2003). A number of TAM studies utilise self-reported use data (Davis, 1989, 1993; Venkatesh & Bala, 2008). Lee et al. (2003) found 36 studies using self-report usage data in this area. In addition, the basis of the TAM model is to measure users' acceptance of technology by linking different components in one model, so measuring actual use in detail is not essential. Also, all the variables within the TAM are typically measured using a short, multiple-item which can be checked for internal consistency (Davis, 1989; Szajna, 1996; Turner et al., 2010; Van der Heijden, 2003).

3.6.1.3 Formal professional development in ICT

Due to the importance of PD in ICT use and attitude, the study adapted three questions (from Okolo & Diedrich, 2014), to investigate willingness to know more about ICT by PD, to attend PD and to be trained by online modelling. These three questions were answered on a nominal scale in respect to the last five years of the teacher's experience. The questions of this section were reviewed by several members at the Michigan state University-wide technology project office and by two Doctoral special education students (Okolo & Diedrich, 2014). Furthermore, three further questions were developed by the researcher following a review of the relevant literature, which explored the experience of PD, the quantity of PD and the type of PD in the last five years.

3.6.1.4 Attitude toward use of ICT

An important component in the present study was an adapted version of the Attitude Toward Actual Behaviour Scale (Ajzen & Fishbein, 1980). The present study used the scale originally developed by Fishbein & Ajzen (1975). This scale was later modified (by Ajzen & Fishbein, 1980) for operationalising attitude toward behaviour (Chuttur, 2009). This ordinal scale allows participants to identify a position on a seven point scale with opposed anchor points, in relation to a given statement related to their attitude.

In the present study, the original scale was adapted to ensure it was relevant to the Saudi context. First, the researcher deleted “All things considered” from the beginning of each statement for the purpose of clarity. Second, the researcher provided consistent descriptors for each of the seven possible response options for each of the five items measuring attitude (e.g., very bad, moderately bad, slightly bad, neutral, slightly good, moderately good, very good). This change was made to aid participants’ responses. The reliability coefficient for these combined five items for this study was .96. Thus, this part of the QTAMID was a reliable measure of teachers’ attitudes to use of ICT (Davis, 1993).

3.6.1.5 Perceived Useful and Perceived Ease of Use

A considerable amount of literature has been published on the TAM (for example, Chen et al., 2011; Govender, 2012; Mac Callum & Jeffrey, 2014; Turner et al., 2010). These studies and others have used the existing measures of PU and PEU by Davis (1993). After reviewing the literature in order to determine the most suitable measures of PU and PEU in ICT use, the present study selected these scales which high internal reliability (.98 for the PU and .94 for the PEU) (Davis, 1993).

The versions of the PU and PEU scales used in the present research comprise 10 items each. The researcher added the wording “with students with intellectual disability in school environment” to the end of each item to ensure that participants responded with this group of students in mind. These ordinal scales were on a seven point Likert scale ranging from Strongly Disagree to Strongly Agree.

3.6.1.6 Barriers to use of ICT

This part of the QTAMID focused on the barriers that impact the use of ICT with students with ID in Saudi schools and public institutions. The items of this part were developed by the researcher following a review of the literature on reported barriers to the adoption of ICT in educational settings. All of these items have been adapted to fit the aims of this study. These items were on a nominal scale with response options ranging from Not a barrier, Small barrier, Moderate barrier, Important barrier, and Don’t know/No opinion. The list of barriers items are shown in Table 3.3.

Table 3.3 The list of barriers items in the QTAMID

1.	Unavailability of ICT resources, for teachers.
2.	Difficult to access ICT in classes.
3.	Lack of funds or providing ICT resource by the government.
4.	Unclear policy regarding the use of ICT in schools.
5.	Lack of plans to use ICT in schools.
6.	ICT is not supported by school leadership, supervisor or policy.
7.	Not enough technical support for ICT.
8.	Lack of professional development/training around using ICT in intellectual disability field.
9.	Lack of time to prepare lesson by using ICT.
10.	Heavy load and long tasks
11.	Lack of Arabic educational software.
12.	Lack of suitable educational software for students with intellectual disability.
13.	Difficult to use ICT into their curriculum.
14.	Large number of students in one classroom.
15.	Lack of students ability
16.	Lack of interest and motivation to use ICT.
17.	Lack of awareness to use ICT

3.6.2 Semi-structured interviews

The main purpose of using this phase was to validate the quantitative findings and to extend and clarify these findings. Interviews have the potential to provide greater insight and to provide more depth to the data. According to Baumbusch (2010), a semi-structured interview involves a set of open-ended questions that allow for spontaneous and in-depth responses.

In order to gather more understanding of the data from Phase One, the researcher conducted semi-structured interviews with a selected sub-sample of the participants in Phase One. The main aims of conducting the interviews and analysing the transcripts were: (1) to investigate teachers' use of ICT with students with ID, (2) to explore other factors associated with the use of ICT and teachers' attitudes, and (3) to discuss the barriers that prevent teachers from using ICT with students ID in schools. The protocol of the interview in English and Arabic is attached in Appendix 3.

Since the interviews were conducted with a selected sub-sample of the participants in the QTAMID, there was no need to gather basic demographic information. The first and second questions were designed as introductory questions (e.g., “tell me about your ICT knowledge and experience”) to build rapport with the participants (Plas & Kvale, 1996).

Eleven questions were developed to obtain in-depth data. These questions derived from the research questions, from the review of the literature and from the researcher’s professional experience. Questions 3 and 4 asked about teachers’ attitudes and beliefs towards the use of ICT and Question 5 asked about the effectiveness of formal PD and its relationship to the teacher’s attitude. Next, Questions 6 -10, identified the barriers to use of ICT and sought reasons that prevented or enabled the teachers to use ICT. Finally, Question 11 sought teachers’ recommendations to improve the use of ICT among teachers in the ID field. The interviews were recorded using a MP3 player and the researcher transcribed the interviews using Microsoft© Word.

3.7 Translation

Due to the nature of the study, which was conducted in KSA, the QTAMID and interview questions was translated into Arabic and then back-translated into English by the researcher. A qualified translator with a doctoral degree in education, teaching certificates in both Arabic and English, and fluent in both languages, was employed to verify the translation process. To be more specific, first the researcher translated the instruments into Arabic. Then, the translator assisted the researcher to compare the Arabic and English versions. The researcher then made some minor changes to the Arabic version to ensure that the wording was culturally relevant. For instance, the English abbreviation of information commination technology (ICT) has been removed, and for the Arabic translation of full term was used. After the interviews had been conducted and transcribed in Arabic, the translator translated the interview answers to English one by one with no identification.

3.8 Validity and Reliability

Validity refers to the extent to which an instrument measures what it is designed to measure. This is a critical consideration in all forms of research (Creswell, 2012; Gay et al., 2011). To establish confidence in the validity of the QTAMID, a KSA panel of six people familiar with teachers' responsibilities and their activities in schools were invited to review the QTAMID items and the interview questions to make sure that each was relevant to the aims of the study and that all were clearly worded. For the QTAMID, most members recommended minor changes. For instance, the response option of < 20 for Question 3 (age), and the intermediate diploma response option in Question 4 (highest academic qualification) were removed because they were not relevant in the Saudi context. Further, five panel members identified two items in Section F that were repetitive and one of these items was deleted. Another procedure regarding the validity of the scale is to check for the construct validity, which refer to the degree to which a test measures what it claims, or purports, to be measuring (Hair, Black, Babin, & Anderson, 2010). This step was carried out using Exploratory Factor Analysis (EFA) after the data collection process was completed.

Reliability, which refers to the degree to which an instrument consistently measures whatever it is measuring (Gay et al., 2011), is a very important property of any measurement scale (Miller, McIntire, & Lovler, 2011). Therefore, a questionnaire considered to be reliable, if a value of Cronbach’s alpha is 0.7 or above (Kline, 1993). According to Table 3.1, all QTAMID scales displayed acceptable levels of internal consistency or reliability.

3.9 Procedure

Before the researcher collected data, three steps were completed. First, approval from the Ministry of Education in KSA to complete this activity has obtained. Second, safety approval to conduct the research was obtained from the University of Newcastle. Third, approval from the University of Newcastle Human Research Ethics Committee also obtained (Approval number H-2016-0235, Appendix 4.7).

To enhance the response rate to the QTAMID, the Ministry of Education distributed via email to the principals of the 63 schools and public institutions eligible to participate, the School Principal Participant Information Statement (Appendix 4.2), the Teacher Participant Information Statement (Appendix 4.3), the Principal Consent Form (Appendix 4.4), the web link to the electronic version of the QTAMID, and a hard copy of the QTAMID (Appendix 1). Next, the principals distributed to their teachers of students with ID, the Teacher Participant Information Statement, the web link of the electronic version of the QTAMID and a hard copy of the QTAMID. In total, approximately 900 teachers were contacted.

The teachers were asked to complete either an online (preferred) or a hard copy questionnaire. It was estimated that the QTAMID took no longer than 25 minutes to complete. For those teachers who completed a hard copy of the QTAMID, a return box was provided at the school where they could leave their QTAMID. The researcher collected the QTAMID at a later date. SurveyMonkey© was used as the platform for the online QTAMID. Three weeks after the first distribution, The Ministry of Education sent email reminders to encourage teachers to participate.

Phase Two of the study involved 12 selected teachers who were asked to participate in an audio-taped interview. A section of the QTAMID allowed them to provide their contact details if they would like to participate in an interview. This phase began following analysis of completed QTAMID. For male interviewees, the researcher conducted interviews face to face during normal school hours. Telephone interviews were conducted for female teachers. The interview questions in Arabic were provided to the participants before the interview and it was estimated that the interviews would take about 25 minutes to be completed.

3.10 Phase One Analysis

In the quantitative phase, two sequential procedures have been used to analyse the data. First, prepare, organise and clean the data for analysis and second, conduct the statistical analyses. The data analysis phase involved descriptive statistics, reliability analysis, EFA Chi-square test, independent sample t-test, ANOVA, Pearson's and Spearman’s correlation coefficient and Multiple Liner Regression (MLR).

3.10.1 Prepare, organise and clean the data for analysis

In this stage, six procedures were employed. The first procedure included data coding, selecting a statistical software package, entering the data into a computer program, cleaning and accounting for missing data, and checking for outliers and normality of distribution of the data.

3.10.1.1 Data coding

Since the study has ordinal and categorical scales, the researcher used two ways to code the data. For ordinal scales, each item in this scale was coded consistently using the same numbering system. In the A scale, for instance, the responses ranged from “Very Bad, Moderately Bad, Slightly Bad, Neutral, Slightly Good, Moderately Good, Very Good” were scored from “1” to “7” (Ajzen & Fishbein, 1980). For categorical scales, for example, “Do you use ICT with students with ID in school environment?” the researcher coded 1 = Yes, 2 = No (Marin, Garcia, Torres, Vázquez, & Moreno, 2005).

3.10.1.2 Selecting a statistical program

After coding the data, the researcher selected a suitable statistical software package, following the recommendation by Leedy and Ormrod (2010). The Statistical Package for Social Sciences (SPSS)© Version 22 was selected to analyse the quantitative data (IBM Corp, 2016). SPSS considered to be as the most common software in Social Science research because it is used by many statistical textbooks and easy to learn and use (Field, 2009, 2013). Furthermore, SPSS included most of the statistical tests that were needed in the current study.

3.10.1.3 Data entry

As mentioned earlier, the study used two methods to collect the data: online using SurveyMonkey© and a hard copy. In the electronic technique, there is no need to enter the data, however, the data needs to be downloaded and saved as an Excel spreadsheet. For the hard copies, the researcher manually entered the data from the questionnaires to an Excel spreadsheet. Next, the two Excel spreadsheets were combined and converted to SPSS sav files. Blanks were used to deal with the missing data because SPSS considers blanks as missing data (Morgan, Leech, Gloeckner & Barrett, 2010).

3.10.1.4 Cleaning and accounting for missing data

When the researcher completed data entry, many processes to check for missing data were carried out. First, the researcher assumed that the data were Missing Completely at Random (MCAR) and the MCAR Test developed by Little (1988) was applied to test if, in fact, the missing data were MCAR. Even though there are many techniques to treat the missing data, the researcher will use the most suitable technique to treat the missing data in the current data (see section 4.2.1).

3.10.1.5 Checking for outliers and normality of the data

Two approaches have been selected to check for univariate outliers. First, histograms and box plots for the main variables were generated to inspect for any extreme cases. Second, calculating Z-scores where the figure should be in the range of -4.0 to +4.0 to be acceptable. Since the current study used factor analysis and multiple regression, any cases with an outliers were omitted. To check multivariate outliers, Mahalanobis D2 were used.

The critical value for regression with 12 independent variables that will be used in the study is 32.91 (Tabachnick & Fidell, 2007).

To check normality, the researcher inspected the distributions of the histograms and probability plots as well as calculating skewness and kurtosis. Next, the researcher calculated skewness and kurtosis values in order to make sure that the distribution was considered to be normal. Cleaning and accounting for missing data and checking for outliers and normality of the data are discussed in more detail in Chapter 4.

3.10.2 Statistical analyses

Chronbach's alpha was used to check the reliability of individual scales in the instrument (see Table 3.4). Furthermore, EFA was also used to check the internal characteristics of the scales. Descriptive statistics such as frequencies, means and percentages were produced for the demographic information (Gravetter & Forzano, 2012). Multiple regression was then used to assess the relationships between the dependent variables UICT and A, and the independent variables (i.e., beliefs, gender, age, type of school) (Field, 2013; Tabachnick & Fidell, 2007). (See section 4.3.1 and 4.3.2.)

3.11 Phase Two Analyses

As highlighted by Creswell (2013), in many qualitative methods the processes of collecting and analysing data occurs at the same time. In addition, Creswell (2013) and Lichtman (2012) found that the analysis of the data during collection plays an important role in the consistency of the findings of qualitative studies. Analysis of the qualitative data occurred initially in Arabic and was then translated into English. The researcher organised the data by transcribing the interviews from audio files into text documents, in Arabic, then translated them into English. As there were only 12 interviews, manual coding was selected rather than NVivo.

3.11.1 Thematic analysis

In order to analyse the qualitative data clearly, deeply and continuously (as suggested by Creswell, 2013; Lichtman, 2012), themes were developed through the recursive analysis of the transcripts of the interviews (Braun & Clarke, 2006). ~~Adapting this model to analysis of the qualitative data was due to several reasons.~~ Using this model provided flexibility in using different theoretical frameworks to explore qualitative data such as interview (Braun & Clarke, 2006), allowing the researcher to create themes in a number of ways. In addition, it allowed additional explanation to extend the analysis process with short data. Further, it was a flexible approach that could be used across a range of epistemologies and research questions. According to Patton (2002), to analyse qualitative data, flexibility is required, meaning analysis is not a straightforward process that moves from one step to the next, but it is more recursive process where movement is back and forth as necessary throughout the steps (Braun & Clarke, 2006). Therefore, applying this model provided flexibility that supported the researcher to establish effective and related themes. In addition, this thematic approach helped the researcher to analyse and effectively manage the qualitative data manually word by word and line by line. The function of this comprehensive framework was to develop a thematic analysis by following six steps. These steps included 1) establishing familiarity with the data, 2) generating initial codes, 3) searching for themes, 4) reviewing themes, 5) defining and naming themes, and 6) producing the report (Braun & Clarke, 2006) (see Table 3.4). An explanation of these steps of this model is provided in the following paragraphs in more details.

Table 3.4 Components of data analysis by Braun & Clarke (2006)

Steps	Description of the process
1. Familiarising yourself with your data	Transcribing data (if necessary); reading and re-reading the data, noting down initial ideas.
2. Generating initial codes	Coding interesting features of the data in a systematic fashion across the entire data set; collating data relevant to each code.
3. Searching for themes	Collating codes into potential themes; gathering all data relevant to each potential theme.
4. Reviewing themes	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2); generating a thematic 'map' of the analysis.
5. Defining and naming themes	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells; generating clear definitions and names for each theme.
6. Producing the report	The final opportunity for analysis. Selection of vivid, compelling extract examples; final analysis of selected extracts, relating back of the analysis to the research question and literature; producing a scholarly report of the analysis.

3.11.1.1 Establishing familiarity with the data

After the interviews had been transcribed in Arabic and translated into English, the researcher reviewed the data and compared the Arabic and English versions to ensure accuracy. Through this process, the researcher re-read the interview transcripts in both languages to become familiar with the data. The data were then organised and prepared for the next step by coding each interview with a different colour. According to Braun and Clark (2006), it is important for the researcher to immerse himself in the data to the highest level of familiarity. Therefore, the researcher undertook 'repeated reading', and read the data in an active way. To be more specific, this included searching for ideas, meanings and patterns that helped establish the initial codes used in the next step of analysis (Braun & Clarke, 2006).

3.11.1.2 Generating initial codes

This step involved the development of initial codes, which were generated by "coding interesting features of the data in a systematic fashion across the entire data set" and "collating data relevant to each code" (Braun & Clarke, 2006, p. 87). The process of coding is not only a vital part of the qualitative analysis (Miles, Huberman, & Saldana, 2013), but also the foundation for what comes later (Burns, 1997). The code can be observed as a feature of the data that is of interest to the analyst, and refers to 'the most basic segment of the raw data or information that can be assessed in a meaningful way regarding the phenomenon' (Boyatzis, 1998, p. 63). In this step, the researcher coded as many potential codes as possible, in order to cover all the important and interesting details in the data. The data were continually reviewed along with the initial codes. This step was completed for all interviews by highlighting the segments that represent a significant number of initial codes and a table was drawn up collating all of the codes and how many times each code emerged from the whole data.

3.11.1.3 Searching for themes

After developing and applying the initial coding framework, this step re-focused the analysis at the broader level of themes. This involved grouping the initial codes into potential themes, and collating all the relevant coded data extracts within the identified themes (Braun & Clarke, 2006). In another words, the analysis of this step involved three parts. First, combine codes to overarching theme. Second, develop a thematic map or graph, chart and network to find out the relationship between codes-codes and codes-themes. Third, establish a first order themes and sub-themes. To do so, the researcher continually read the data to extract all of the common and the new and interesting themes.

3.11.1.4 Reviewing themes

In this step, an evaluation and reorganisation process of the themes was applied. Through this process, it became clear that some of the first order themes including sub-themes were not really themes (e.g. when there was not sufficient data to support them, or the data were too diverse), while others should be collapsed into each other (e.g. two apparently separate themes might form one theme). Then, a restructure of some of the first order themes to become second order themes to develop consecutive two step approach. Lastly, all the codes for each theme were reviewed and checked to ensure they presented a coherent pattern the validity of individual themes was verified in relation to the data set. In another words, checking if the developed themes and codes reflect the data set as a whole.

3.11.1.5 Defining and naming themes

After the final themes were developed, the themes were then defined and refined. To be more specific, the 'essence' of what each theme is about (as well as the themes overall), and what aspect of the data each theme captures was identified. According to Braun and Clarke (2006), the researcher not only paraphrases the content of the data extracts presented, but also identifies what is of interest about them and why. They should also identify the 'story' that each theme covers, and how it fits into the broader overall 'story' that the data is about, in relation to the research question. Therefore, it was important to consider the themes separately, and in relation to each other (Braun & Clarke, 2006). Sub-themes were also refined by identifying whether they included any sub-themes (Braun & Clarke, 2006). At the end of this step, a description of the scope and content of each theme was added. Further, a concise name was given to each theme to provide the reader with an immediate idea of what the theme was about (Braun & Clarke, 2006).

3.11.1.6 Producing the report

The last step was to write-up a thematic analysis of the interviews that described the story behind the data. Braun and Clarke (2006) state that the analysis should deliver a concise, coherent, rational, non-repetitive and interesting information of the themes that represent the story of the data. Therefore, the researcher should provide adequate evidence of all the themes in the data. In other words, sufficient data extracts to prove and explain the prevalence of each theme by providing representative examples and extracts that capture the essence of the idea in a simple way. However, the data extracts need to be convincing by including an analytic narrative that not only explains the story of the data but also describes the data, and develops an argument in relation to the research questions (Braun & Clarke, 2006).

3.11.2 Trustworthiness

In order to ensure the trustworthiness of the qualitative data, the present study used the trustworthiness criteria proposed by Lincoln and Guba (1985) for constructivist studies: credibility, transferability, dependability, and confirmability.

3.11.2.1 Credibility

Credibility refers to what extent the degree of isomorphism between the constructed meanings of participants and the reconstructions attributed to these meanings (Guba &

Lincoln, 1989). In qualitative studies, this process is considered to be similar to the concept of internal validity in quantitative studies. To achieve credibility, two processes were applied: peer debriefing and triangulation. These two approaches ensure that participants' perspectives are represented accurately in the reported findings.

In peer debriefing, the purpose is to minimise researcher bias (Lincoln & Guba, 1985). To achieve this, the researcher used an independent reviewer with an educational background and experience in the qualitative analysis. The independent reviewer verified the interview transcriptions by matching the recordings and the transcriptions. In the process of the data coding and analysis, frequent meetings were conducted with the independent reviewer to discuss the developing coding framework and to reach mutual agreement on broad themes.

In triangulation, the researcher integrated the two data sources (i.e., questionnaire and interview data) to enhance the interpretation and assist the researcher to look at the research problem from different angles. This combination helps the researcher understand the phenomena in more depth and, particularly for complex constructs such as attitude, such constructs need to be examined using multiple approaches. This is due to the complexity of the construct (i.e. attitude), that cannot be well understood using either purely quantitative or purely qualitative methods (Teddlie & Tashakkori, 2009). The integrated data sources are explored in the discussion chapter.

3.11.2.2 Transferability

Transferability refers to a decision about whether the researcher's working hypothesis is applicable in different contexts (Zhang & Wildemuth, 2009). Mertens (2014) stated that "the burden of transferability is on the reader to determine the degree of similarity between the study site and the receiving context. The researcher's responsibility is to provide sufficient detail to enable the reader to make such a judgment" (p. 259). Therefore, the researcher established the transferability by providing the maximum description of the methodological procedures followed in the current study, the teachers' demographic information and the setting in which the study took place. All of this information allows a judgement to be formed about the transferability of the results to another context.

3.11.2.3 Dependability and confirmability

Dependability concerns "the coherence of the internal process and the way the researcher accounts for changing conditions in the phenomena", while confirmability is concerned with "the extent to which the characteristics of the data, as posited by the researcher, can be confirmed by others who read or review the research results" (Bradley, 1993, p. 437). Dependability and confirmability are considered to be similar to the reliability and objectivity in quantitative studies (Guba & Lincoln, 1989).

According to Lincoln and Guba (1985), dependability and confirmability can be reached through an audit trail, in which the auditor assesses both the process (dependability) and the product (confirmability) of the study. Based on that, dependability and confirmability were established by using an audit trail and the independent reviewer. During all stages of the research, frequent meetings were conducted with the independent reviewer to assist in the process of data analysis and iterative interpretation of findings. Further, sufficient information about the research process was provided to achieve dependability. Study materials such as copies of the de-identified taped interviews and transcripts were available in an audit trail to establish the confirmability of the research data.

3.12 Ethical Considerations

Approval from University of Newcastle Human Research Ethics Committee (H-2016-0235) required a number of procedures to be followed. The researcher made sure that all potential participants (i.e., school principals and special education teachers) received sufficient information about the study in order to give informed consent. All the participants were informed that they had the choice to withdraw from the study at any time without penalty, and whether or not they decided to participate would not disadvantage them. Teachers could anonymously complete the QTAMID, but they provided their contact details to nominate to participate in an interview. This contact information was separated from the QTAMID once survey data were converted to electronic format. Further, the researcher explained to the participating teachers that their data would be kept in a secure location and shared only with his academic supervisors. The researcher used pseudonyms for teacher names when sharing and discussing research findings to maintain anonymity of the participants.

4.12 Summary

An explanatory sequential mixed methods design was used in the current study in order to facilitate the collection of rich and in-depth data about the use of ICT of Saudi special education teachers and their attitudes towards the use of ICT. The quantitative data were collected using an online or hard copy questionnaire, while the qualitative data were collected through in-depth interviews with a selected sub-sample of participants. To analyse the QTAMID data, SPSS statistical analysis software was used. The results of the quantitative and qualitative data of the study will be presented in the following chapters.

Chapter 4 RESULTS OF PHASE ONE ANALYSIS

4.1 Introduction

The present study was pursued (1) to examine the educational use of ICT and attitudes towards ICT by Saudi Arabian teachers of students with ID, (2) to explore the relationship between these variables in relation to teachers' beliefs (PU, PEU), PD and demographic information by testing an adapted TAM, and (3) to investigate the barriers that impede teachers from using ICT in schools. The current study used a sequential mixed methods design starting with a quantitative questionnaire followed by qualitative interviews with special education teachers. These teachers were qualified to teach students with ID in the Riyadh region in KSA. This chapter which describes the quantitative data analysis, is divided in two sections: preliminary data analysis and quantitative results.

4.2 Preliminary Data Analysis

A series of preliminary analyses and data screening were carried out. This process checked for missing data, checked for data outliers and checked for normality of distribution.

4.2.1 Checking for missing data

Missing data are a common issue in the social sciences (Allison, 2002), and researchers must take this into account before starting to analyse the data to answer research questions

(Pallant, 2013). According to Collins, Schafer, and Kam (2001) and Pallant (2013), substantial numbers of missing cases minimises statistical power and impacts on generalisation of results. To address this problem, first the researcher needs to determine the nature of any missing data and whether the data is MCAR, Missing at Random or Not Missing at Random (Little & Rubin, 2014; Rubin, 1976). Identifying the nature of missing data helps the researcher to select the appropriate strategy that can resolve the issue of missing data.

There are two types of strategies that have been used to address missing data. The first group includes listwise deletion, pairwise deletion, mean substitution and regression predictions (Acock, 2005; Collins et al., 2001; IBM Support, 2017; Peugh & Enders, 2004). These types of strategies have been widely and effectively used (Acock, 2005). Other strategies have developed more recently and include Expectation Maximisation (EM) and Multiple Imputation (MI) (Baraldi & Enders, 2010; Peugh & Enders, 2004; Tabachnick & Fidell, 2007). There are advantages and disadvantages with each type of strategy. For instance, traditional strategies can result in a potentially dramatic reduction in the sample size and thus in statistical power. On the other hand, EM and MI influence the type of imputation, and increase the imprecision of a questionnaire because the data are not real, and because the missing data have been predicted from participants' responses to other questionnaire items (Scheffer, 2002). The traditional strategies of deletion and substitution are common in empirical research (Baraldi & Enders, 2010; Peugh & Enders, 2004; Tabachnick & Fidell, 2007). According to Peugh and Enders (2004), who reviewed 160 studies that had missing data, approximately 96% of these studies used listwise deletion, pairwise deletion, or both to deal with missing data, and only five studies used more recently developed strategies.

To deal with missing data in the present study, the researcher used Little's MCAR test to check the missing data (Little, 1988). The missing data occurred only in the following QTAMID sections: A, PU, PEU, B, UICT and PD. That is, there were no missing data in the demographic section of the QTAMID. However, the proportion of missing data for A, PU, PEU, B were 19.7%, 21.1%, 21.1% and 22.0% respectively. With the exception of Q13 (see below), missing values for UICT and PD, which included Q10-19, ranged from 2.5% to 22.8% (see Table 4.1).

Table 4.1 Summary of the nature of missing data across the QTAMID (N=396)

Sections/Questions of the QTAMID	**Number of responses**	**Missing cases (%)**	**Little's MCAR test**
Demographics	396	0.00	
A section	318	19.69	χ^2 (30, N = 396) = 32.99, p= .32
PU section	313	21.10	
PEU section	313	21.10	
B section	309	21.96	
Use of ICT Q10	Yes 280 No 106	2.50	χ^2 (1, N = 396) = 3.29, p = .06
Use of ICT Q11	229	18.20	
Use of ICT Q12	229	18.20	
Use of ICT Q13:			
Availability	296	18.30	χ^2 (715, N = 396) = 812.33, p = .007
Frequency of use	322	22.80	
Use of ICT Q13:			
Examples of use	56	80.00	
PD Q14	Yes 76 No 248	18.18	χ^2 (23, N = 396) = 19.4, p = .67
If Yes to Q14:			
PD Q15:			
Hours	71	6.57	
Days	71	6.57	
PD Q16:			
Option 1	45		
Option 2	51	3.31	
Option 3	34		
Willingness Q17- 19	319	19.4	χ^2 (2, N = 396) = 1.20 p = .54

The component of Q13 that asked for examples of ICT use had a large proportion of missing data (80.0%) (see Table 4.1). Due to the nature of this open-ended question, which required a written response, a high percentage of the participants chose not to respond. Therefore, these data were not be used in the further analysis process and the researcher acknowledges this as a limitation of the research.

After reviewing the literature, the researcher selected listwise deletion as the strategy best suited to address missing data in the current study (Peugh & Enders, 2004). In listwise deletion, a case is dropped from an analysis because it has a missing value in at least one of the specified variables.

The use of this technique has several justifications. As the missing data in this study is MCAR except Question 13 (examples of ICT use) ($p<.05$), the use of the listwise deletion technique is recommended by many researchers (Peugh & Enders, 2004; Scheffer, 2002). In addition, using listwise deletion will not negatively affect the sample size (reduced from 396 to 313), because over 300 participants is considered to be good for a study of this type (Comrey & Lee, 2013), and is considered adequate for factor analysis (Tabachnick & Fidell, 2007).

Although strategies such as EM can deal with missing data, particularly when it is MCAR, the replacement values may not reflect reality because those values have been statistically predicted. Consequently, data replacement techniques may produce biased estimates with different types of missing data, unlike listwise deletion (Baraldi & Enders, 2010; Peugh & Enders, 2004). In addition, EM is recommended when the missing data is less than 10% (Scheffer, 2002). Therefore, employing listwise deletion was the most suitable option for the current study.

4.2.2 Checking for outliers

Outliers are cases with an extreme value which can significantly impact statistical analyses such as the mean and standard deviation of a distribution (Hair et al., 2010). Outliers can have a substantial effect on the analysis of outcome data, can distort correlation coefficients which in turn creates problems in regression analysis, and can affect the degree of linearity between two variables impacting on exploratory and confirmatory factor analysis (Brown, 2006; Cohen, Cohen, West, & Aiken, 2013; Osborne & Overbay, 2004). Therefore, it is important to check for any outliers. There are two types of outliers relevant to the present study; univariate outliers with extreme scores on one variable and multivariate outliers with a unique combination of values on two or more variables. Two methods are recommended to check for outliers. First, the researcher visually inspects the histograms of each variable to check for any data points sitting on the extremes (Pallant, 2013). Second, the researcher converts data values to standardised scores (Z scores) and checks those scores against a standard (Hair et al., 2010; Tabachnick & Fidell, 2007).

To check for outliers, first, individual items of A, UICT, PU and PEU were analysed and no cases were found as outliers based on standardised scores. Second, the total scale scores for A, UICT, PU and PEU were checked once again for outliers. The present study omitted PD and B in outlier analysis because the extremity of value for categorical data were not straightforward (Boriah, Chandola, & Kumar, 2008; He, Deng, & Xu, 2005). In the second step, both univariate and multivariate outliers were checked and are described in the following paragraphs.

To check for univariate outliers in the current study, the researcher generated histograms and box plots for the main variables of the study to inspect for any extreme cases and found that none of the dependent and the independent variables revealed obvious outliers. Then, the data were checked firstly for univariate outliers by calculating Z-scores. As recommended by Hair et al. (2010), any Z-scores exceeding the range of -4.0 to +4.0 are considered to be outliers. Using this standard, none of the dependent and independent variables showed evidence of outliers (see Table 4.2).

Table 4.2 Descriptive statistics of the standardised scores for the dependent and independent variables

Variable	Minimum	Maximum
UICT	-1.10	2.17
A	-3.96	0.84
PU	-3.54	0.98
PEU	-1.91	2.07

The researcher then checked for multivariate outliers by using Mahalanobis D^2 (Hair et al., 2010; Pallant, 2013). This multivariate technique measures "the distance of a case from the centroid of the remaining cases where the centroid is the point created at the intersection of the means of all the variables" (Tabachnick & Fidell, 2007, p. 74). Multivariate outliers are identified if the Mahalanobis distance is greater than the critical value of 32.01, as assessed by a Chi-square (χ^2) reference table for 12 variables (Tabachnick & Fidell, 2007). In the present data, the study found two cases which had higher Mahalanobis distance scores than the critical value. These two cases were omitted from all further quantitative analysis in the current study.

4.2.3 Checking for normality

Checking for normality of data was an essential process because the normal distribution of the data were an underlying assumption in the parametric testing (Tabachnick & Fidell, 2007). A non-normal distribution is characterised by skewness and/or kurtosis (Field, 2013). Skewness occurs when the greatest frequency of cases is clustered at one end of the distribution, while kurtosis refers to values clustered at the tails of the data distribution and how a distribution peaked is (Field, 2009, 2013; Pallant, 2013).

Two common approaches can assess the assumption of normality - the Kolmogorov-Smirnov test (K-S) and z-scores to measure skewness and kurtosis. Use of these approaches confirm that the data were normally distributed if the K-S is non-significant (p >.05) or when the z-scores of skewness and kurtosis have values between -1.96 and +1.96. However, these two approaches are not appropriate to large sample sizes of 200 and more (Field, 2013). Two other methods can be used for large sample sizes; first, visually inspect the shape of the distribution and second, check the absolute values of skewness and kurtosis (Field, 2009; Harrington, 2009). Combining these graphical and statistical methods can helpfully complement each other when the researcher investigates the assumption of normality (Field, 2013; Hair et al., 2010). As explained by Kline (2010), normality can be achieved if the shape of the distribution is 'bell-like', and the absolute values of skewness and kurtosis are less than 3.0 and 10.0, respectively.

In the present study, A, UICT, PU and PEU scores were checked by inspecting their histograms and probability plots, as well as calculating skewness and kurtosis. As shown in Figure 4.1, the dependent (UICT and A) and independent (PU and PEU) measures were relatively normally distributed. Table 4.3 shows skewness and kurtosis values for the dependent and independent variables were below the threshold values of 3.0 and 10.0, respectively. Based on these assessments, the distributions of the dependent and independent measures were suitable for parametric statistical analysis.

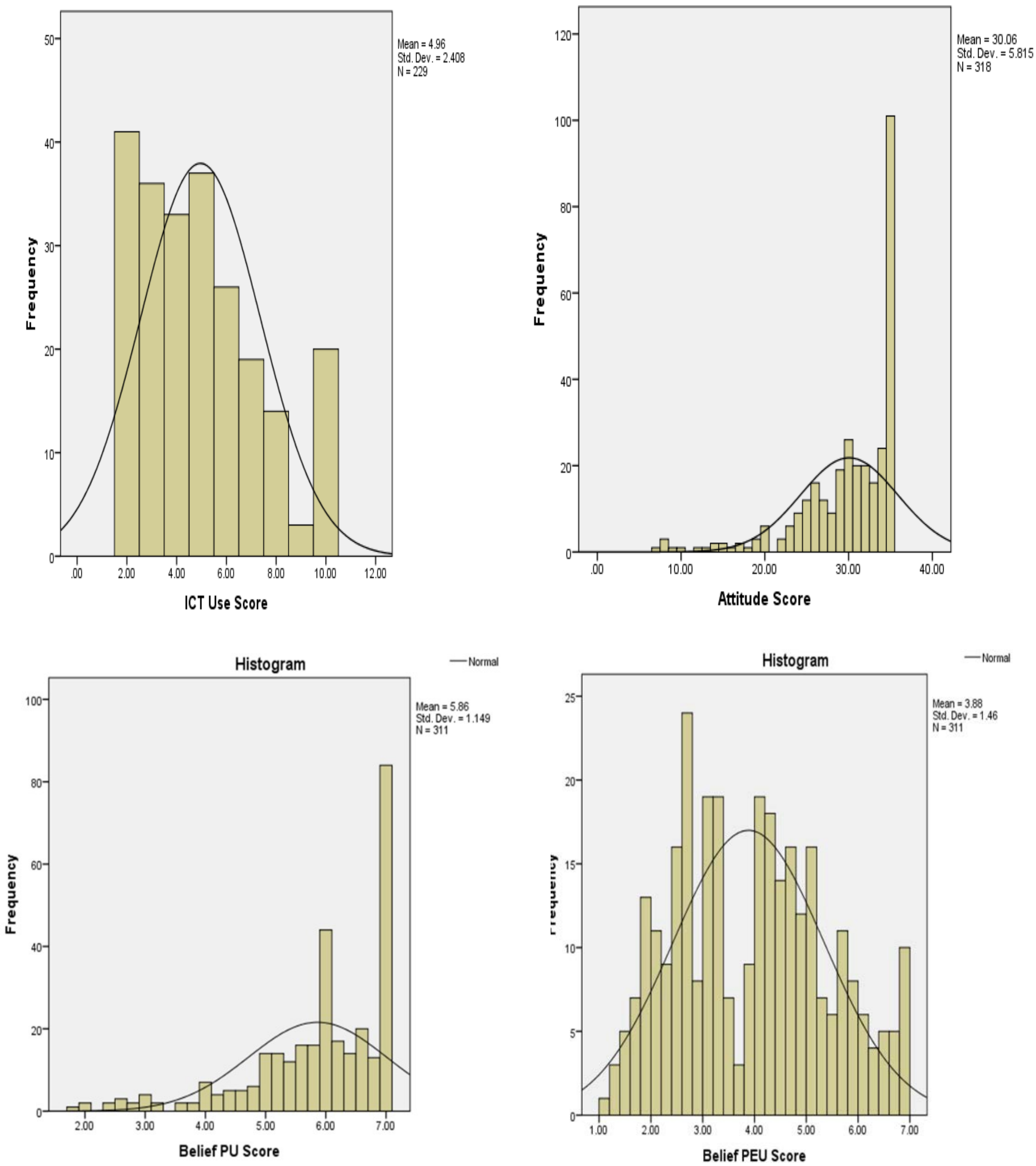

Figure 4.1 Histograms of the dependent and independent variables

Table 4.3 Skewness, standard error of skewness, kurtosis, and standard error of kurtosis for dependent and independent variables

Variable	**N**	**Skewness**		**Kurtosis**	
		Statistic	Std. Error	Statistic	Std. Error
UICT	333	0.54	0.13	-0.68	0.27
A	311	-1.64	0.13	2.93	0.27
PU	311	-1.29	0.14	1.50	0.28
PEU	311	0.22	0.14	-0.86	0.28

4.3 Establishing the Reliability and Validity of Study Instruments

In this step, the researcher conducted an investigation of the internal consistency and construct validity of the main scales used in the present study. As mentioned earlier in the methodology chapter, it is important to establish the reliability and validity for the study instruments because the original instruments have been adapted. Reliability refers to the degree to which an instrument consistently measures whatever it is measuring (Mills & Gay, 2015). Checking for reliability is imperative in applied research using quantitative methods. Checks for validity (i.e., the extent to which scales measure what they are assumed to measure) are also essential. In the present study, a check of the content validity of study scales was conducted via a selected panel of informed practitioners and researchers before the QTAMID was distributed. In addition, the present study used EFA to assess the underlying structure of the scales. The following sections explain in detail these checks for reliability and validity.

4.3.1 Checking reliability

In the current study, internal consistency was calculated sing Cronbach's alpha coefficient. Internal consistency refers to the extent to which the items in a scale measure the same construct (Field, 2013). An alpha coefficient of at least .70 is regarded as an adequate indication of reliability (Kline, 2010). In this study, the internal consistency was checked for A, UICT, PU and PEU since they are continuous scales used as dependent and independent measures. Other items from the QTAMID were not included in reliability checks because they were filter questions or reported categorical data and demographic information (Davis, 1985, 1993). The Cronbach alpha coefficient of the scales of A, UICT, PU and PEU were .94, .90, .98 and .97, respectively. All the

Cronbach's alpha values for these measures were higher than .70 and these measures were considered to be suitable for use in the current study (Pallant, 2013).

4.3.2 Checking for underlying structure

EFA is a common statistical grouping method that is used in the social sciences to design and test scales and instruments. In the psychology and education fields, checking for underlying structure using EFA is considered to be a helpful method for interpreting self-reporting questionnaires (Bryant, Yarnold, & Michelson, 1999; Costello & Osborne, 2005; Gorsuch, 1983). According to Hair et al., (2010), Pallant (2013) and Tabachnick and Fidell (2007), EFA is a method that aims to determine the underlying structure of the interrelationships among a scale’s items by combining groups of items that are interrelated. The method can be used to reduce a scale’s items into a smaller number of factors (Hair et al., 2010; Tabachnick & Fidell, 2007). EFA serves at least three useful purposes that include collapsing the number of scale items to understandable groups, examining the structure and relationship between groups of scale items, and evaluating the construct validity of an instrument (Williams, Onsman, & Brown, 2010).

Four main steps should be considered when the researcher decides to conduct EFA. These steps include, (1) assessment of assumptions of EFA, (2) factorability of the data for EFA, (3) factor extractions, and (4) factor rotation and interpretation (Pallant, 2013; Williams et al., 2010). The following sections describe each step.

For the first step, several assumptions need to be met in order to use EFA. These are having interval variables, an absence of outliers, and a sample size with least 300 cases recommended (Pallant, 2013; Tabachnick & Fidell, 2007). The second step in performing EFA is to check the factorability of the data. This can be done by implementing two procedures. Inter-item correlations should be greater that .3 (Tabachnick & Fidell, 2007). Then, two statistical measures need to be determined to assess the suitability of the data for EFA: the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test. A minimum KMO value of 0.5 is recommended for the conduct of EFA (Fabrigar, Wegener, MacCallum, & Strahan, 1999; Kaiser, 1974), and the Bartlett's test score should be statistically significant (i.e., $p<.05$). The third step is factor extraction which aims to simplify the factor structure of a group of items. Determining the number of factors can be achieved by using Kaiser's criterion and Catell's scree test (Field, 2013; Pallant, 2013). To retain factors by using Kaiser's criterion, the eigenvalue should be 1.0 or more (Kaiser, 1960). The other technique for this step is a visual inspection of the slope line (scree test) produced by plotting eigenvalues across different factor solutions (Cattell, 1966).

The final step in EFA is factor rotation and interpretation, which is a process that calculates the loading of the item on each factor and reports the best factor structure solution. Two options can be used for factor rotation. First, orthogonal rotation which retains uncorrelated underlying factors. Varimax is the most common technique applied in orthogonal rotation which minimises the number of items that have strong loadings on each factor (Field, 2013; Pallant, 2013). Second, oblique rotation which assumes that the underlying factors are correlated (Brown, 2006; Field, 2013; Pallant, 2013). Direct Oblimin is commonly used in which the factors are simplified "by minimising sum of cross-products of squared loadings in pattern matrix" (Tabachnick & Fidell, 2007, p. 639). In the current study, the rotation method used was Varimax because the present study did not include any assumptions of correlation for the underlying factors. The next three sections describe the EFA analysis for the four scales used in this study.

4.3.2.1 UICT scale

The UICT scale included two items measuring the frequency of ICT use (Q12) and how many hours the teachers usually spent each week using ICT (Q11). The frequency of use item used a 5-point, Likert-type scale. The hours per week item was re-scaled to provide the same response range as the frequency of use item (Davis, 1985). To illustrate, the researcher reclassified item 12 of the UICT from a continuous to a categorical form. Item 12 was “I normally spend about ….. hours each week directly using ICT with students with ID in school environment”. The responses have been classified into five groups to be consistent with Q11, which also has five groups. The new groups were, (1) 0-1.99 hours “Very low”, (2) 2-3.99 hours ”Low”, (3) 4-5.99 hours ”Moderate”, (4) 6-7.99 hours ”High”, and (5) >7.99 hours ”Very high”. A histogram was developed to check that the classification was impartial and symmetrical. This reclassification was done to allow the combination of the frequency and use items into a single scale (i.e. item 11) (Davis, 1985, 1989). No outliers were found in the data for this scale and the sample size was 333.

The bivariate correlation of these two items was 0.76, which is higher than the recommended minimum value of 0.3. The KMO value was .50, and the Bartlett’s test was found to be statistically significant ($p < .05$). Therefore, the factorability of the data was confirmed.

One component was extracted with eigenvalue exceeding 1, accounting for 87.8% of the total variance in the data with a factor loading of .94. In addition, an inspection of the scree plot confirmed the existing of one component (see Figure 4.2). The EFA confirmed the construct validity of the UICT scale.

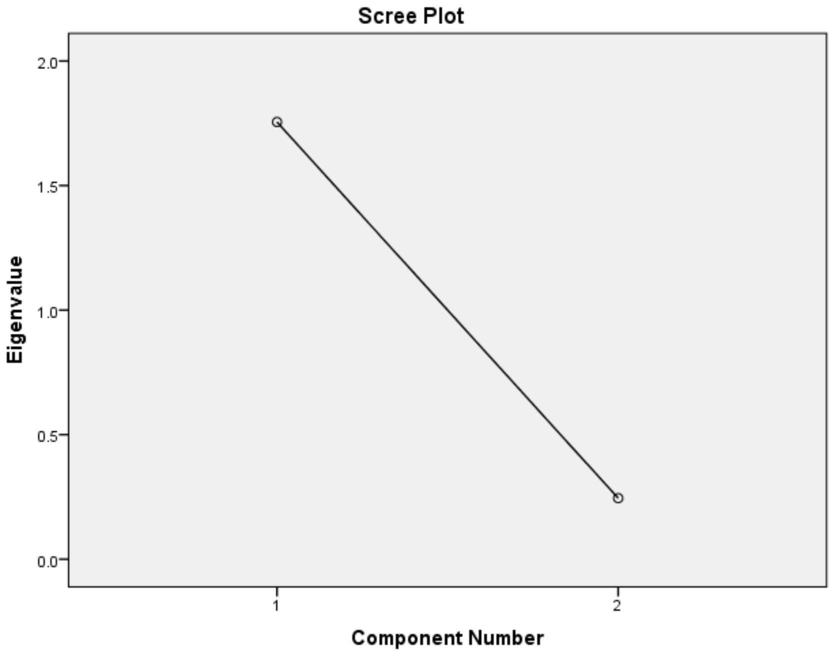

Figure 4.2 Scree plot for the UICT scale.

4.3.2.2 A scale

The bivariate correlation of the A scale was higher that the recommended minimum value of >0.3. Further, the KMO value was .88, and the Bartlett's test was found to be statistically significant (p< .05), which confirmed the factorability of the data. No outliers were found in the data for this scale and the sample size was 316.

In Table 4.4, one component with an eigenvalue exceeding 1 accounted for 82.5% of the total variance in the data. In addition, an inspection of the scree plot confirmed the existence of one component (see Figure 4.3). The factor loading of each of the five items of the A variable was greater than .81. One factor solution with orthogonal (Varimax) rotation was a valid solution for the items measuring A.

Table 4.4 Factor loading of the items of attitude variable (n=316)

Scale Item	**Factor loading**
Q20 Attitude	.81
Q21 Attitude	.89
Q22 Attitude	.94
Q23 Attitude	.94
Q24 Attitude	.93

Extraction Method: Principal Component Analysis

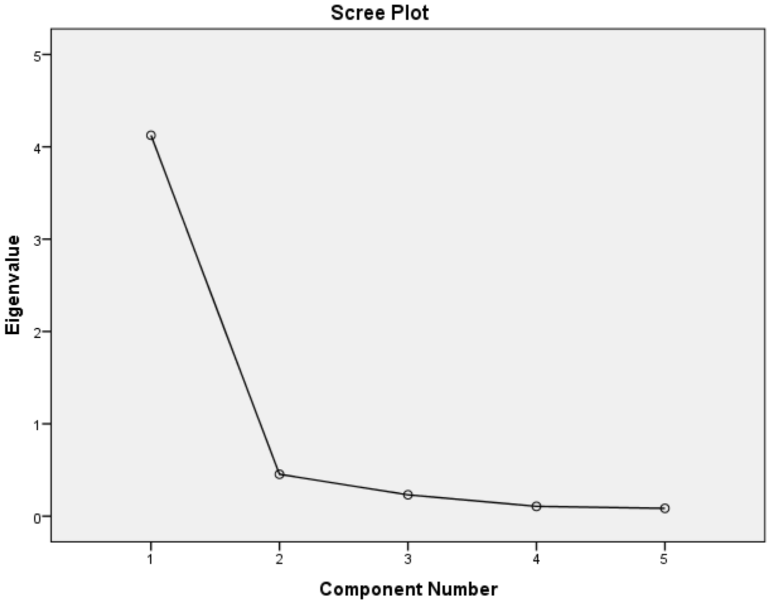

Figure 4.3 Scree plot for the Attitude scale

4.3.2.3 PU scale

The correlation matrix for PU items showed inter-item correlations >.3. The KMO value was .96 and the Bartlett's test was to be statistically significant (p< 0.05). No outliers were found in the data for this scale and the sample size was 311.

Table 4.5 shows one extracted component with eigenvalues exceeding 1 and which accounted for 85.30% of the total variance in the data. Moreover, an inspection of the scree plot also supported the existence of one component (see Figure 4.4). The factor loading of all the ten items from 25 to 34 of the PU variable was greater than .79. One factor solution with orthogonal (Varimax) rotation was a valid solution for measuring PU.

Table 4.5 Factor loading of the items of PU variable (n=311)

Scale Item	**Factor loading**
Q25 Belief PU	.84
Q26 Belief PU	.79
Q27 Belief PU	.84
Q28 Belief PU	.86
Q29 Belief PU	.88
Q30 Belief PU	.85
Q31 Belief PU	.86
Q32 Belief PU	.86
Q33 Belief PU	.87
Q34 Belief PU	.83

Extraction Method: Principal Component Analysis

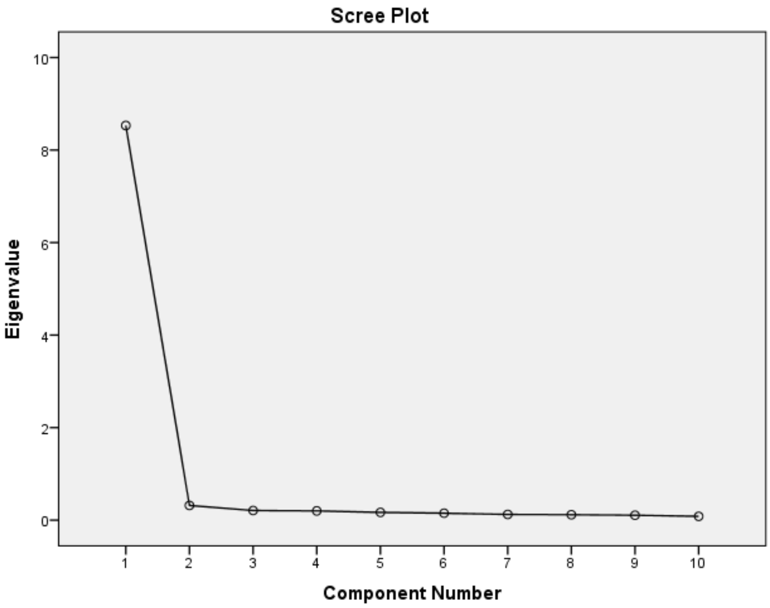

Figure 4.4 Scree plot for the PU scale

4.3.2.4 PEU scale

The correlation matrix for PEU items showed inter-item correlations >.3. In addition, the KMO value was .96 and the Bartlett's test was found to be statistically significant (p< .05), justifying the use of factor analysis with these items. No outliers were found in the data for this scale and the sample size was 311.

In Table 4.6, one component was extracted with eigenvalues exceeding 1 and accounting for 78% of the total variance in the data. Furthermore, an inspection of the scree plot also supported the existence of one component (see Figure 4.5). The factor loading of all the ten items from Q35 to Q44 of PEU was greater than .70 for factor one. Therefore, one factor solution with orthogonal (Varimax) rotation was a valid solution for measuring PEU.

Table 4.6 : Factor loadings of the items of PEU variable (n=311)

Scale Item	Factor loading
Q35 Belief PEU	.93
Q36 Belief PEU	.78
Q37 Belief PEU	.80
Q38 Belief PEU	.76
Q39 Belief PEU	.74
Q40 Belief PEU	.76
Q41 Belief PEU	.77
Q42 Belief PEU	.70
Q43 Belief PEU	.77
Q44 Belief PEU	.77

Extraction Method: Principal Component Analysis

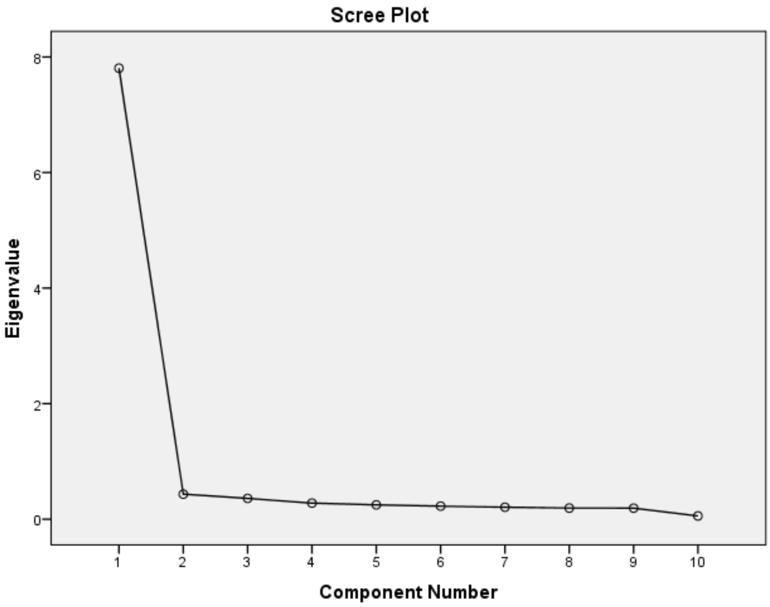

Figure 4.5 Scree plot for the PEU scale

4.4 Quantitative Results

This section includes two parts that present the quantitative results. In the first section there is a description of the demographic information of the sample with detail about the respondents' age, gender, highest academic qualification, type of school, years of experience, number of class periods per week, numbers of classes of students with ID in the schools, the regional location of the school, the number of students in teachers' classes, and the nature of teachers' PD in the use of ICT in the last five years. The second part presents the results of the research questions.

4.4.1 Demographic information

As mentioned earlier in Chapter 3, the target population of this study was teachers of students with ID in the Riyadh region in elementary, intermediate, high public schools and public institutions under the control of the Ministry of Education during the 2016-

2017 school years. After distributing 500 QTAMID to 63 schools and public institutions, a total of 396 QTAMID were returned with a response rate of 79%. While all of the 396 participants answered the demographic questions, there were missing data for questions in other sections (see Table 4.1). As explained in section 4.2.2, two cases were omitted from all further analysis because they considered to be outliers in the variables A and PEU, leaving 394 cases.

Table 4.7 Summary of demographic information of the QTAMID participants (N=394)

Variable	**Categories**	**Frequency**	**Percent**	***p*-value**
Region	Riyadh	200	50.8	.801
	Outside Riyadh (other districts)	194	49.2	
Gender	Female	172	43.7	.014
	Male	222	56.3	
Age	20-24	52	13.2	<.001
	25-29	98	24.8	
	30-34	80	20.3	
	35-39	66	16.8	
	40-45	47	11.9	
	45-49	40	10.2	
	> 49	11	2.8	
Highest academic qualification	Bachelor or Higher Diploma	322	81.3	<.001
	Masters or PhD	74	18.7	
Years of experience	1-5	163	41.2	<.001
	> 5	233	58.8	
Type of school	Elementary School	186	47.2	<.001
	Intermediate School	84	21.3	
	High School	55	14.0	
	Institution	69	17.5	
Number of students with ID in class	0-5	165	41.8	<.001
	5-10	163	41.4	
	> 10	66	16.8	
Number of class periods per week	1-9	1.7	27.2	<.001
	10-15	156	39.6	
	16-20	111	28.1	
	>20	20	5.1	
Number of classes for students with ID in school	None	33	8.4	<.001
	1-3	166	42.1	
	4-6	127	32.2	
	7-9	18	4.6	
	> 9	50	12.7	

Among the 394 remaining participants, there were 200 from the Riyadh district and 194 from outside Riyadh which included the districts of Shaqraa, Afif, Al Zulfi, Hafar Al-Batin, Dawadmi, Wadi ad-Dawasir, Alkharj, Al-Hota and Al-Hariq, Al Majma'ah, Al-Quway'iyah, and Al-Ghat (see Table 4.7). There were 222 male respondents (56.3%) and 172 respondents were female. Most of the participants (62%) were aged from 25 to 39 years and the majority had a Bachelor degree as their highest academic qualification. Over 40% of the teachers had less than six years teaching experience. Almost half of the participants taught in elementary school and 83.2% of the teachers had less than 11 students in their class. Most teachers taught up to 15 lessons a week and had up to six different classes of students with ID.

Chi-square tests were used to evaluate whether there were significant differences across the categories of the demographic variables. To meet the requirement of cells or categories with at least 5 cases (Moore, 1999), 2 categories with cell counts <5 (highest academic qualification and years of experience) were collapsed for the Chi square analysis. All of the demographic categories (except region) had significant differences in frequency distribution.

4.4.2 PD in use of ICT

PD was considered as one of 12 possible predictors of educational use of ICT by KSA teachers of students with ID and their attitudes. Therefore, the present study used descriptive statistics (mean, standard deviation, and percentage) to analyse PD questions. The first question in the PD section was a filter that aimed to distinguish between who attended PD and who had not in the last five years. According to the statistical analysis, 77% of the teachers had not attended formal PD in the use of ICT with their students with

ID. Since the educational environment in KSA is based on gender segregation, the present study also investigated possible differences between male and female teachers regarding their PD. The proportion of male and female who attended PD was 23.9% and 22.2%, respectively (see Table 4.8). By using a Pearson Chi-Square to compare the PD proportion for both genders, the difference in their PD proportions was not significant, $\chi 2$ (1, *N* = 322) = .13, *p* = .71.

Table 4.8 Teachers' attendance in PD in the use of ICT by gender (n=322)

Gender	**Yes**	**No**
Female	22.2%	77.8%
Male	23.9%	76.1%
Total	23.0%	77.0%

The second question in the PD section addressed PD attendances in hours and days over the last five years. For hours of attendance, there was no significant difference between male (*M* = 11.5, *SD* = 9.3) and female teachers (*M* = 9.2, *SD* = 10.0), *t* (69) = -1.02, *p* = .31 (two-tailed). Regarding days of PD attendance, there was also no significant difference between male (*M* = 3.3, *SD* = 1.9) and female teachers (*M* = 2.8, *SD* = 2.0), *t* (69) = -1.13, *p* = .26 (two-tailed). In general, the teachers spent approximately 11 hours or three days attending PD in their last five years (See Table 4.9).

Table 4.9 PD: Means and standard deviations of teachers' attendance in hours and days (n=71)

Professional Development	**Mean**	**SD**
Hours of PD	10.39	9.63
Days of PD	3.07	0.24

Three types of formal PD were presented to the participants who had attended formal PD in the use of ICT in the last five years (general, educational and special education PD).

The most frequent type of PD was educational, and the least frequent type was special educational. (See Table 4.10). There was no significant difference in the participation of male and females for general χ^2 (1, N = 74) = 0.51, p = .075, educational χ^2 (1, N = 74) = 1.58, p = .209, and special education PD χ^2 (1, N = 74) = 0.87, p = .351.

Table 4.10 Proportion of teachers attending types of PD by gender (n=74)

Gender	**General PD**	**Education PD**	**Special Education PD**
	Yes	**Yes**	**Yes**
Female	65%	76%	51%
Male	57%	62%	41%
Total	61%	69%	46%

The last question in the PD section explored the teachers' willingness to know how to use ICT, to attend formal PD and to attend online modules. Between 85 to 90% of teachers said they were willing to engage in PD in some manner. (See Table 4.11). Among male and female teachers there was no significant difference in willingness to know how to use ICT $\chi2$ (1, N = 319) = 5.47, p = .06, willing to take PD $\chi2$ (1, N = 319) = 1.85, p = .39, and willing to take online modules $\chi2$ (1, N = 319) = 0.02, p = .99.

Table 4.11 Teachers' willingness to engage in PD attendance by gender (n=319)

Gender		**Willing to know how to use ICT**				**Willing to take PD**				**Willing to take online modules**			
		Yes	No	Not sure	Total	Yes	No	Not sure	Total	Yes	No	Not sure	Total
Female	Count	142	2	8	152	139	4	9	152	130	6	16	152
	%	93.4	1.3	5.3	100.0	91.4	2.6	5.9	100.0	85.5	3.9	10.5	100.0
Male	Count	145	10	12	167	145	8	14	167	143	7	17	167
	%	86.8	6.0	7.2	100.0	86.8	4.8	8.4	100.0	85.6	4.2	10.2	100.0
Total	Count	287	12	20	319	284	12	23	319	273	13	33	319
	%	90.0	3.8	6.3	100.0	89.0	3.8	7.2	100.0	85.6	4.1	10.3	100.0

4.4.3 Answers to Research Questions

4.4.3.1 Results for Research Question 1

To what extent do KSA teachers of students with ID use ICT in the school environment?

A filter question was used in the UICT section in the questionnaire to distinguish between teachers who used ICT and who did not. The analysis showed that 72.4% of teachers used ICT with their students with ID (Figure 4.6). The proportion of females who used ICT was 78.8%, whereas the proportion males who used ICT was 67.3% (see Table 4.12). This difference across gender was significant, $\chi 2$ (1, N = 384) = 6.30, p = .012.

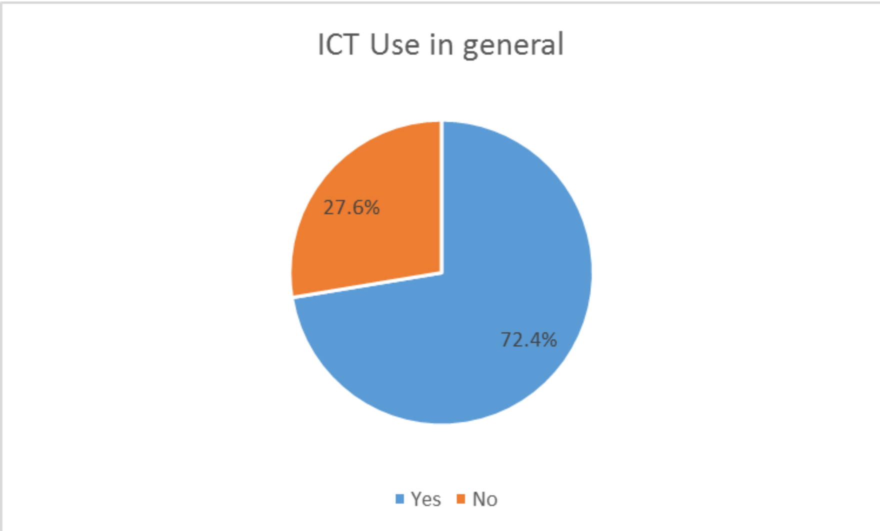

Figure 4.6 Percentage of the UICT in general (n=333)

Table 4.12 UICT by gender (n=384)

Gender	Yes	No
Female	78.8%	21.2%
Male	67.3%	32.7%

Participants were asked to indicate how often they used ICT (i.e. less than once each week, once each week, several times each week, once each day and several times each day), and for how many hours they used ICT each week. Table 4.13 shows that 1.9% of the male participants used ICT several times a day, in comparison to 14.8% of female teachers. This difference was statistically significant, χ^2 (4, N = 227) = 15.93, p = .003).

Table 4.13 How many times teachers used ICT (n=227)

Gender		**Less than once each week**	**Once each week**	**Several times each week**	**Once each day**	**Several times each day**	**Total**
Female	Count	26	23	40	15	18	122
	%	21.3	18.9	32.8	12.3	14.8	100.0
Male	Count	20	36	35	12	2	105
	%	19.0	34.3	33.3	11.4	1.9	100.0
Total	Count	46	59	75	27	20	227
	%	20.3	26.0	33.0	11.9	8.8	100.0

In the second item, participants were asked to indicate how many hours they used ICT. As shown in Table 4.14, the majority of both male and female teachers used ICT at “low” or “very low rates” (63.4%). By using a Pearson Chi-Square to compare the proportion of how many hours teachers use of ICT for both genders, the difference was not significant, $\chi 2$ (4, N = 227) = 18.36, p = .303).

Table 4.14 Teachers used of ICT by hours (n=227)

Gender		**Very low**	**Low**	**Moderate**	**High**	**Very high**	**Total**
Female	Count	43	28	23	7	21	122
	%	35.2	23.0	18.9	5.7	17.2%	100.0
Male	Count	37	36	16	10	6	105
	%	35.2	34.3	15.2	9.5	5.7%	100.0
Total	Count	80	64	39	17	27	227
	%	35.2	28.2	17.2	7.5	11.9%	100.0

The UICT score included two items measuring how many times and hours the teachers’ used ICT. The UICT score was calculated by assigning a value of 1-5 to both of the items then summing the scores for each teacher. To check for differences between female and male, a t-test was used to compare the UICT score between the genders. It was found that there was a significant difference regarding their UICT score between female teachers (M = 4.10, SD = 3.23) and male teachers (M = 2.75, SD = 2.73; t (225) = 3.37, $p < .001$).

Table 4.15 Percentages of teachers reporting availability and level of use of specific ICT devices and tools

Item	**Availability**			**Use**		
	Available in school	**Available in class**	**Not available**	**Never**	**Sometimes**	**Always**
Computer	51.6	22.2	26.3	32.5	42.6	24.9
Projector	41.0	28.0	31.1	39.9	37.1	23.0
Printer	63.0	9.1	27.9	54.5	26.9	18.6
Video Conferencing	15.4	7.9	76.7	81.4	13.7	4.9
Interactive Whiteboard	25.6	10.8	63.6	73.9	16.7	9.5
Smart Tablet	6.9	23.1	70.0	54.9	27.3	17.9
Digital Camera	13.3	1.9	84.8	88.2	9.2	2.6
MP3	3.8	4.2	92.0	86.8	9.1	4.1
DVD	20.3	9.8	69.8	74.5	20.9	4.6
Loud Speaker	34.2	24.8	41.1	49.7	33.1	17.2
Smart Device	10.8	26.6	62.7	50.7	28.8	20.6
Internet	58.2	12.6	29.2	53.4	23.9	22.7

Note. The n varied between 296 and 322 depending on the type of ICT.

Next, the availability and frequency of use of the common forms of ICT will be presented. According to Table 4.15, almost two thirds of the participants selected computers and printers as the most available type of ICT in schools, although over 30% of teachers never used this equipment. The internet was available to over 70% of teachers but was never used by over half of the teachers. Tablets and other smart devices were generally not available for use in schools and classes and were not used by teachers. Projectors were used by over half the teachers at least some of the time.

4.4.3.2 Results for Research Question 2

What are the attitudes to the educational use of ICT by KSA teachers of students with ID?

In order to address the second question, descriptive statistics were used: the mean, standard deviation, and percentage for A, which included five items 20-24. These five items measuring A had values between 1 to 7 which were then summed and the mean calculated to obtain the final A score. The mean Teachers' attitudes to use of ICT with students with ID was 6.0 (SD = 0.07). This demonstrated a generally more positive attitude by teachers to the use of ICT with students with ID (see Figure 4.7). The present study also investigated the difference between male and female teachers regarding their attitude to the use of ICT with students with ID. There was no significant difference between male teachers regarding their A score (M = 6.1, SD = 1.1) and female teachers (M = 5.9, SD = 1.2; t (314) = 1.37, p = .171, two-tailed).

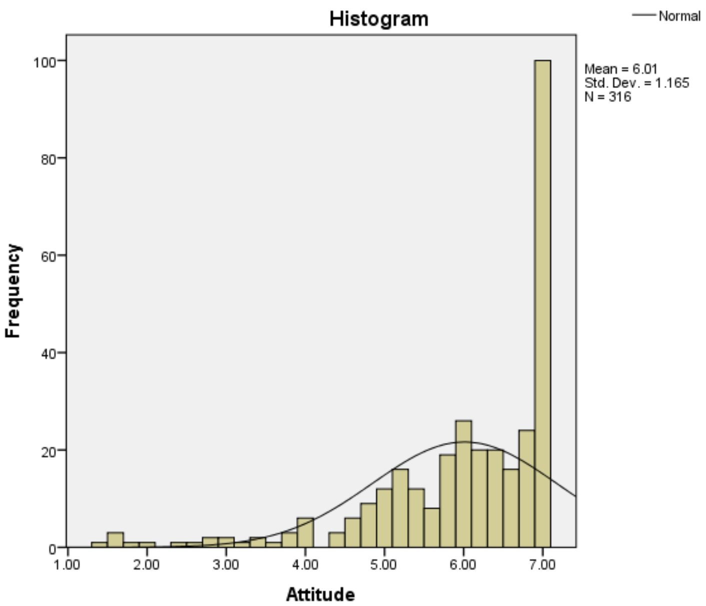

Figure 4.7 Histograms of A scale

4.4.3.3 Results for Research Question 3

What are the beliefs about the educational use of ICT by teachers of students with ID?

To answer the third question, the present study used descriptive analysis. Table 4:16 reports the descriptive statistics of teachers' beliefs for both PU and PEU. For PU, M = 5.86 and SD = 1.14. For PEU, M = 3.88 and SD = 1.45. The present study also investigated the difference between male and female teachers regarding their PU and PEU score (see Figure 4.8). There was no significant difference between male teachers regarding their PU score (M = 5.83, SD = 1.14) and female teachers (M = 5.89, SD = 1.15; t (309) = .460, p = .64, two-tailed). However, there was a significant difference between male teachers regarding their PEU score (M = 4.09, SD = 1.64) and female teachers (M = 3.66, SD = 1.42; t (309) = 2.61, p = .01, two-tailed).

Table 4.16 Teachers' beliefs PU and PEU of the use of ICT with students with ID (n=311)

	Range	Mean	Std. Deviation
PU	5.20	5.86	1.14
PEU	5.80	3.88	1.45

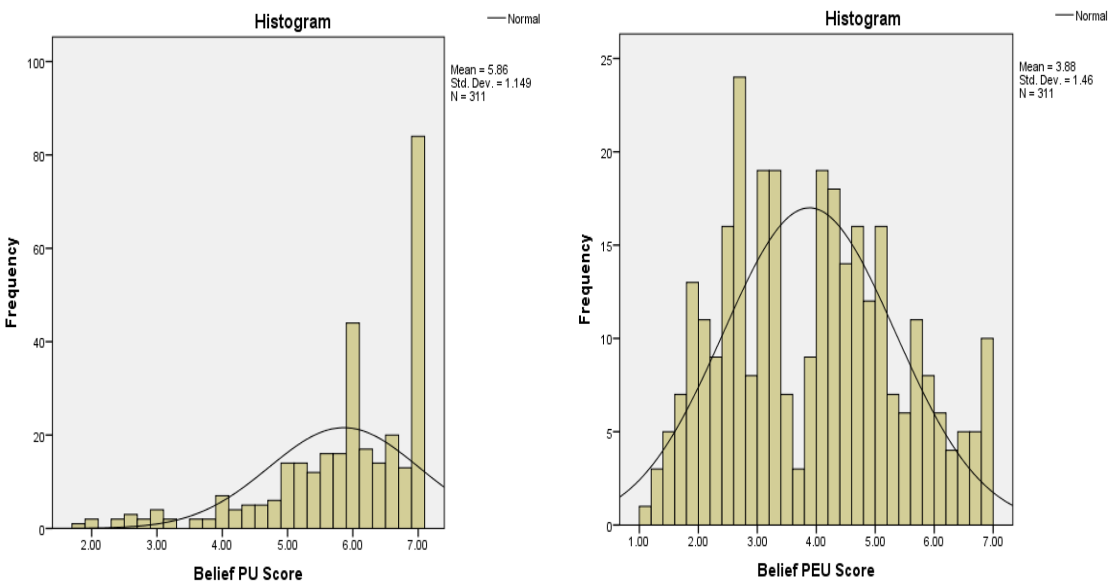

Figure 4.8 Histograms of PU and PEU scales

4.4.3.4 Results for Research Question 4

What factors are predictors of educational use of ICT and attitudes to use of ICT by KSA teachers of students with ID?

Before conducting multiple regression analysis to investigate the predictors of the two dependent variables (A and UICT) with the 12 potential independent variables, the researcher calculated the association between potential independent and the dependent variables. Potential candidates for the dependent variables were identified based on significant correlations (for continuous and ordinal variables), significant t-test results (categorical variables with two groups) and significant ANOVA results (categorical variables with three or more groups). Tables 4.17 and 4.18 shows the correlation matrix, t-test and F-test results.

To check the associations between the dependent variables (A and UICT) and the independent variable of region, a t-test was conducted with region having two levels. There was no significant difference in UICT for teacher from Riyadh district ($M = 3.48$, $SD = 3.22$) and outside Riyadh districts ($M = 3.26$, $SD = 2.86$), $t(331) = 0.64$, $p = .526$. Also, there was no significant difference in A of teacher from Riyadh district ($M = 30.43$, $SD = 5.57$) and Outside Riyadh districts ($M = 29.63$, $SD = 6.08$), $t(314) = 1.22$, $p = .223$ (see Table 4.18).

With regard to the school level, ANOVA analysis was conducted because this variable contained four levels. The results showed that there was no significant difference in UICT based on school level, $F(3, 329) = 0.46$, $p = .708$. In addition, there was no significant difference in A across different levels of schools, $F(3, 312) = 0.60$, $p = .619$ (see Table 4.18).

Table 4.17 Spearman's correlation matrix showing the relationship of UICT and A with potential predictors

Variable	Stat	UICT	A	Age	Academic Qual'n	Years of experience	Students in class	Lessons per week	Classes of students with ID	PU	PEU
UICT	r	*1.00*	.45**	-.04	.07	-.07	.11*	.21**	.08	.43**	-.24**
	p	.	.00	.39	.18	.16	.04	.00	.13	.00	.00
	n	*333*	311	333	333	333	333	333	333	307	307
A	r	*.45***	*1.00*	-.00	.07	.00	.10	.15**	.06	.77**	-.31**
	p	*.00*	.	.91	.21	.96	.06	.01	.27	.00	.00
	n	*311*	*316*	316	316	316	316	316	316	311	311
Age	r	*-.04*	*-.00*	1.00	.29**	.85**	.17**	.22**	.18**	.01	.07
	p	*.39*	*.91*	.	.00	.00	.001	.00	.00	.79	.17
	n	*333*	*316*	394	394	394	394	394	394	311	311
Highest academic qualification	r	*.07*	*.07*	*.29***	1.00	.28**	.10*	.04	.09	.06	.02
	p	*.18*	*.21*	*.00*	.	.00	.04	.41	.07	.29	.68
	n	*333*	*316*	*394*	394	394	394	394	394	311	311
Years of experience	r	*-.07*	*.00*	*.85***	*.28***	1.00	.19**	.23**	.24**	.01	.12*
	p	*.16*	*.96*	*.00*	*.00*	.	.00	.00	.00	.82	.04
	n	*333*	*316*	*394*	*394*	394	394	394	394	311	311
Students in class	r	*.11**	*.10*	*.17***	*.10**	*.19***	1.00	.31**	.35**	.07	-.06
	p	*.04*	*.06*	*.00*	*.04*	*.00*	.	.00	.00	.24	.27
	n	*333*	*316*	*394*	*394*	*394*	394	394	394	311	311
Lessons per week	r	*.21***	*.15***	*.22***	*.04*	*.23***	*.31***	1.00	.40**	.16**	-.12*
	p	*.00*	*.01*	*.00*	*.41*	*.00*	*.00*	.	.00	.00	.03
	n	*333*	*316*	*394*	*394*	*394*	*394*	394	394	311	311
Classes of students with ID	r	*.08*	*.06*	*.18***	*.09*	*.24***	*.35***	*.40***	1.00	.05	.00
	p	*.13*	*.27*	*.00*	*.07*	*.00*	*.00*	*.00*	.	.39	.91
	n	*333*	*316*	*394*	*394*	*394*	*394*	*394*	394	311	311
PU	r	*.44***	*.77***	*.01*	*.06*	*.01*	*.07*	*.16***	*.05*	1.00	-.33**
	p	*.00*	*.00*	*.79*	*.29*	*.82*	*.24*	*.00*	*.39*	.	.00
	n	*307*	*311*	*311*	*311*	*311*	*311*	*311*	*311*	311	311
PEU	*r*	-.25**	-.31**	.08	.02	.12*	-.06	-.12*	.00	-.33**	1.00
	p	.00	.00	.17	.68	.04	.27	.03	.91	.00	.
	n	307	311	311	311	311	311	311	311	311	311

*** Correlation significant at the 0.01 level (2-tailed). * Correlation significant at the 0.05 level (2-tailed).*

Table 4.18 Association of UICT and A with categorical predictors

Dependent variable	**Independent Variable**	**Association (*t/F* test)**
UICT	Region	$t\ (331) = 0.64, p = .525$
	Gender	$t\ (309) = 3.99, p < .001$
	PD	$t\ (145) = 3.23, p = .002$
	School Type	$F(3, 329) = 0.46, p = .708$
A	Region	$t\ (314) = 1.22, p = .223$
	Gender	$t\ (314) = 1.37, p = .171$
	PD	$t\ (158) = 4.44, p < .001$
	School Type	$F(3, 312) = 0.56, p = .619$

Based on the correlation matrix, *t*-test and *F*-tests presented in Tables 4.17 and 4.18, gender, number of students in class, lessons per week, PD, PU and PEU were identified as potential predictors of UICT because their respective test results were significant at <.05 level. Independent variables which did not have significant correlations or associations with the dependent variables were unlikely to be significant predictions in regression analyses. In other words, there was no good statistical reason to include the non-significant independent variables in regression analyses. Therefore, all the independent variables with non-significant correlations or associations with the two dependent variables were excluded in the multiple regression analyses, i.e., region, Type of school, age, highest academic qualification and years of experience

To explore the predictors of attitudes and educational use of ICT by KSA teachers of students with ID, a multiple regression procedure was utilised. This statistical technique can be used to examine the relationship between one dependent variable and two or more independent variables (Tabachnick & Fidell, 2007). To use this analysis, dependent and independent variables need to be either dichotomous or continuous, or dummy variables need to be used when categorical independent variables are used (Field, 2013; Miles &

Shevlin, 2001). The purpose of utilizing this analysis was to determine whether the variances in both dependent variables (UICT and A) could be meaningfully explained by the potential predictors.

Although there are several types of multiple regression (e.g., standard, stepwise and hierarchical), the current study used standard multiple linear regression (standard MLR) (Tabachnick & Fidell, 2007). There are several justifications for using standard MLR to examine the relationship between the dependent variables with their potential predictors. This approach is considered as the most commonly used among the other types of MLR. In standard MLR, all independent variables are entered into the regression equation simultaneously, which means each one is assessed as if it had entered the regression after all other independent variables had entered. Furthermore, each independent variable is evaluated in term of its predictive power, over and above that afforded by all the other independent variables (Pallant, 2013; Retherford & Choe, 2011; Tabachnick & Fidell, 2007). Therefore, this approach is suitable to simply assess the relationship among variables and to tell how much unique variance in the dependent variable each of the independent variables can explain. It is appropriate and recommended for exploratory studies such as the present study. In addition, this approach is recommended when the study has no a theoretical reason to force one or more of the independent variables into the regression equation before other independent variables (Pallant, 2013; Tabachnick & Fidell, 2007).

Using hierarchical and stepwise regression is inconsistent with the aims of the current study. For example, conducting a hierarchical regression requires theory, logic or practicality to determine the order of entry of independent variables into the equation (Brace, Snelgar, & Kemp, 2012; Tabachnick & Fidell, 2007). These requirements were inconsistent with the nature of the current study. Stepwise regression, which includes forward selection, backward deletion and stepwise regression, follows statistical criteria to enter the independent variables. The development of such criteria is not suited to the exploratory nature of this research (Retherford & Choe, 2011; Tabachnick & Fidell, 2007). Therefore, based on these justifications, standard MLR was selected as the most appropriate analysis and has been employed in the current study.

There are a number of assumptions underlying standard MLR. These are the absence of outliers, normality of the distribution of residuals, linearity and homoscedasticity of variance, absence of multicollinearity and independence of errors. These checks were conducted twice, first with regard to UICT, and second with regard to A (Field, 2009).

As explained in section 4.2.2, two cases were identified as outliers and these were deleted from subsequent analysis. The normality of the distribution of residuals for both dependent variables was checked by creating a probability plot of the residuals for UICT and A the residuals were found to be normally distributed. The assumptions of linearity and homoscedasticity were checked by creating a scatterplot of the residuals versus the predicted values. This scatterplot did not display a clear or systematic pattern (e.g. curvilinear, or a substantially larger number of scores above or below the "0" value). Therefore, there were no major violations of the assumptions of linearity and homoscedasticity.

Multicollinearity generally occurs when there are high correlations between two or more predictor or independent variables (e.g., r = .90, or above). In order to detect the presence of multicollinearity, tolerance and Variance Inflation Factor (VIF) values were computed. Multicollinearity is present if the tolerance value is below 0.1 or the VIF value is above 10 (Field, 2009; Pallant, 2013). For UICT, tolerance values were between 0.85 and 0.97, and VIF values ranged from 1.02 to 1.17. For A, tolerance values were between 0.86 and

0.97, and VIF values ranged from 1.03 to 1.16. Therefore, the multicollinearity assumption was not violated.

To examine the final assumption, which is independence of errors, the Durbin-Watson statistic was used. This requires that “for any two observations the residuals terms should be uncorrelated (or independent)” (Field, 2009, p. 220). Generally, a Durbin-Watson value needs to be between 1.5 and 2.5 to be acceptable (Vasigh, Fleming & Tacker, 2016). For the dependent variable, UICT, the Durbin-Watson value was 1.51 which falls within the acceptable range. For the A dependent variable, the Durbin-Watson value was 1.83. Based on the previous results, all the statistical assumptions of standard MLR analysis were demonstrated in the present study.

A standard MLR was performed to predict UICT with six potential predictors. Table 4.19 displays the correlation between the variables, the unstandardised regression coefficient (B) and intercept, the standardised regression coefficient (β), the semi-partial correlation (sr_i^2) and R^2 and adjusted R^2. R for regression was significantly different from zero, $F(6, 300) = 17.76$, $p < .001$. For the three regression coefficients that differed significantly from zero, 95% confidence limits were calculated. The confidence limits for gender were -1.490 to -0.292, those for lesson per week were 0.048 to 0.789, and those for PU were -1.292 to -0.736.

Only three of the independent variables contributed significantly to the prediction of UICT, gender (sr_i^2= .02), lesson per week (sr_i^2= .01) and PU (sr_i^2= .13). The three independent variables in combination contributed another .10 in shared variability. Altogether, 26% (25% adjusted) of the variability in UICT was predicted by knowing scores on these three independent variables. Although UICT was significantly correlated with number of students in class (.12), PD (-.17), and PEU (.23), these variables did not significantly contribute to the regression model.

A standard MLR was performed once again to predict A with four potential predictors. Table 4.20 displays the correlation between the variables, the unstandardised regression coefficient (B) and intercept, the standardised regression coefficient (β), the semi-partial correlation (sr_i^2) and R^2 and adjusted R^2. R for regression was significantly different from zero, $F(4, 306) = 179.98$, $p < .001$. For the three regression coefficients that differed significantly from zero, 95% confidence limits were calculated. The confidence limits for PU were -4.490 to -3.814.

Only one of the independent variables, PU ($sr_i^2 = .57$), contributed significantly to prediction of A. The one independent variable contributed another .13 in shared variability. Altogether, 70% (70% adjusted) of the variability in A was predicted by knowing scores on this independent variable. Although A was significantly correlated with number of lessons per week (.13), PD (-.21), and PEU (.29), these variables did not contribute significantly to the regression model.

Table 4.19 Standard multiple regression for predicting UICT (n=307)

Variables	UICT (DV)	Gender	Students in class	Lessons per week	PD	PU	PEU	***B***	***β***	***sr²***
Gender	-.18							-0.891**	-0.147	0.02
Students in class	.12	-.05						0.224	0.053	0.00
Lessons per week	.22	-.10	.26					0.418*	0.116	0.01
PD	-.16	.01	-.06	-.07				-0.561	-0.077	0.00
PU	-.45	.02	-.04	-.15	.19			-1.014***	-0.386	0.13
PEU	.23	-.13	.05	.11	.00	-.316		0.160	0.077	0.00
						Intercept = 6.113			R^2=0.26[a]	
Mean	3.57	1.51	1.80	2.19	1.80	2.14	4.12		Adjusted R^2=0.25	
SD	3.03	1.51	1.80	2.19	0.41	1.15	1.45		R=0.51***	

****p* <.001; ***p* <.01; **p* <.05

[a] Unique variability = .16; shared variability = .10

Table 4.20 Standard multiple regression for predicting A (n=311)

Variables	A (DV)	Lessons per week	PD	PU	PEU	***B***	***β***	***sr²***
Lesson per week	0.13					0.045	0.006	0.00
PD	-0.28	-0.07				-0.728	-0.051	0.00
PU	-0.83	-0.14	0.19			-4.152***	-0.815	0.57
PEU	0.28	0.12	-0.00	-0.31		0.127	0.032	0.00
				Intercept = 39.61				
Mean	30.06	2.18	1.78	2.14	4.12		R2 = .70[a]	
SD	5.85	0.84	0.41	1.15	1.46		Adjusted R2 =.70	
							R =.84***	

***p <.001

[a]Unique variability = .57; shared variability = .13

4.4.3.5 Results for Research Question 5

What are the barriers to the educational use of ICT by KSA teachers of students with ID?

Table 4.21 Proportion % of teachers responding to each response option on the barriers to the education use of ICT (n=307)

Barrier	Important Barrier	Moderate Barrier	Small Barrier	Not a barrier	I don't know
Lack of funds or providing ICT resource by the government	77.7	10.7	5.8	4.8	1.0
Unavailability of ICT resources for teachers	65.4	19.7	8.7	5.6	0.6
Lack of professional development/training around using ICT in intellectual disability field	56.6	23.6	9.7	5.6	4.5
School infrastructure and environment is not suitable for using ICT	53.4	23.0	11.3	10.0	2.3
Not enough technical support for ICT	44.7	27.5	21.0	4.5	2.3
Heavy load and long tasks	36.9	31.7	17.5	12.0	1.9
Lack of interest and motivation to use ICT	33.7	24.6	28.8	6.8	6.1
lack of awareness to use ICT	33.7	22.3	30.4	7.8	5.8
Lack of suitable educational software for students with intellectual disability	33.0	29.8	25.2	5.5	6.5
ICT is not supported by school leadership, supervisor or policy	33.0	30.1	18.8	10.0	8.1
Large number of students in one classroom	32.4	32.0	20.1	12.6	2.9
Unclear policy regarding the use of ICT in schools	30.7	32.4	25.2	7.8	3.9
Lack of plans to use ICT in schools	30.4	34.3	23.9	6.9	4.5
Difficult to use ICT into their curriculum	25.9	37.9	18.1	14.7	3.6
Difficult to access ICT in classes	24.3	31.7	17.2	23.9	2.9
Lack of Arabic educational software	23.9	31.4	28.2	9.4	7.1
Lack of students' ability	22.0	27.2	22.7	24.9	3.2
Lack of time to prepare lesson by using ICT	18.4	38.2	22.7	19.1	1.6

Based on a review of the relevant literature, 18 common barriers to the educational use of ICT were listed on the questionnaire. The participants were asked to indicate the extent to which each barrier was relevant to them on a 5-point Likert scale. Table 4.21 shows the proportion of teachers responding to each barrier option and the relevance of each barrier to them.

The barriers are arranged in rank order based on the Important Barrier option. The five most important barriers were (#1) lack of funds or providing ICT resource by the government (77.7%), (#2) unavailability of ICT resources for teachers (65.4%), (#3) lack of PD/training around using ICT in the ID field (56.6%), (#4) school infrastructure and environment is not suitable for using ICT (53.4%) and (#5) not enough technical support for ICT (44.7%). The least important barriers for teachers were lack of students' ability (22.0%) and lack of time to prepare ICT lessons (18.4%).

4.5 Chapter Summary

This chapter presented the quantitative data analysis collected during Phase One of this study, which included two sections: preliminary data analysis and quantitative results. The data were collected through a six-part, self-report online or hard copy questionnaire from 396 Saudi special education teachers in the Riyadh region. The preliminary analysis showed that data was MCAR and normally distributed. However, outliers were found in two cases and omitted in further analysis. Cronbach's alpha indicated a high reliability for the four scales and EFA found one factor solution for UICT, A, PU and PEU. Most of the teachers were male and were from Riyadh districts, and most teachers had not attended formal PD in the use of ICT with their students with ID.

With regard to the analysis of the five research questions, the data indicated that the majority of teachers were using ICT with their students with ID. In addition, teacher's attitude was found to be generally positive to the use of ICT with students with ID. With regard to their beliefs, the analysis indicated that teachers of students with ID had a more positive PU of the use of ICT with their students, while they showed a slightly more positive PEU of the use of ICT with students with ID. By using standard MLR, the study found that 1) PU, (2) Gender and (3) Lessons per week were predictors for UICT. However, only PU was found to be a predictor for A. Finally, lack of funds or providing ICT resources by the government was the most important barrier to using ICT in the classroom, according to the participants.

Chapter 5 RESULTS OF PHASE TWO ANALYSIS

5.1 Introduction

This chapter reports on the results derived from the interview data collected from a purposeful sample Saudi teachers who taught students with ID in elementary, intermediate, and high schools in public institutions under the control of the Ministry of Education schools during the 2016-2017 school years in the Riyadh region in KSA. The sampling process that was carried out and the participants' general demographic information will be provided in the first section of this chapter. The second section will report the analysis of the interviews in order to answer Research Questions 1, 4 and 5. As outlined in the methodology chapter, themes were developed through the recursive analysis of the transcripts of the interviews (Braun & Clarke, 2006). The four key themes which will be reported are: teachers' use of ICT; pedagogies utilised by teachers of students with ID; factors in the ICT use; and teachers' attitudes and barriers in the use of ICT.

5.2 Sampling Process and Demographic Characteristics ofRespondents

In this phase of the study it was anticipated that 12 teachers would be selected from the respondents who completed the QTAMID using stratified purposeful and random sampling (McMillan & Schumacher, 2014). The respondents would be selected on the basis of their attitudes towards the use of ICT to ensure a range of attitudes were represented. As it was anticipated there would be a high number of respondents to the QTAMID who were interested in being interviewed, the intent was to use a random sampling procedure to select three male and three female teachers from each attitude group to ensure a mix of genders - reported previously to be a factor in attitudes towards ICT (Al Sulaimani, 2010; Kusano et al., 2013). Of the 396 teachers who completed the QTAMID, 32 indicated they would be interested in being interviewed. The researcher contacted the randomly selected participants but unfortunately many had changed their mind about being interviewed. Therefore, all 32 respondents were contacted to be interviewed. Of these 13 agreed to be interviewed, three with an identified less positive attitude towards ICT from the QTAMID (2 males and 1 female) and 10 with an identified more positive attitude (4 males and 6 females).

Table 5.1 Summary of demographic information of interview participants (n=13)

Participant	**Region**	**Gender**	**Age**	**Highest academic qualification**	**Years of Experience**
Teacher 1	Riyadh	Male	30-34	Bachelor	11-15
Teacher 2	Riyadh	Male	30-34	Bachelor	11-15
Teacher 3	Riyadh	Female	30-34	Bachelor	1-5
Teacher 4	Outside Riyadh	Female	30-34	Higher Diploma	6-10
Teacher 5	Riyadh	Male	45-49	Masters	> 20
Teacher 6	Riyadh	Female	40-45	Masters	> 20
Teacher 7	Riyadh	Male	35-39	Masters	11-15
Teacher 8	Riyadh	Female	45-49	Bachelor	> 20
Teacher 9	Riyadh	Female	25-29	Bachelor	1-5
Teacher 10	Riyadh	Male	35-39	Masters	11-15
Teacher 11	Riyadh	Male	40-45	Bachelor	> 20
Teacher 12	Outside Riyadh	Female	30-34	Bachelor	6-10
Teacher 13	Riyadh	Female	30-34	Masters	6-10

In terms of location, 11 participants were from the Riyadh districts with the other two from outside Riyadh. There were seven female and six male participants. Close to the half of them (6 participants) were aged from 30 to 34 and the vast majority had a Bachelor degree as their highest academic qualification. Over 60% (8 teachers) were experienced teachers, with over ten years of teaching experience (see Table 5.1).

With regard to the school and class information of the selected teachers, less than the half (39%) were teaching in intermediate schools, which in KSA means in schools with children aged 12 to 16 years old. Over half (69%) currently taught more than 10 students in one class while the remaining teachers taught between 5-10 students. All but one teacher taught up to 15 lessons a week and eight had up to six different classes of students with ID (See Table 5.2).

Table 5.2 Summary of the school/class information of interview participants (n=13)

Participant	**School level**	**Students in classes**	**Lessons per week**	**Classes of Students with ID**
Teacher 1	High School	> 10	16-20	4-6
Teacher 2	Intermediate	> 10	10-15	4-6
Teacher 3	Elementary	5-10	10-15	4-6
Teacher 4	Elementary	5-10	16-20	4-6
Teacher 5	Institution	5-10	10-15	1-3
Teacher 6	Intermediate	> 10	10-15	1-3
Teacher 7	Intermediate	> 10	10-15	4-6
Teacher 8	Institution	> 10	16-20	> 9
Teacher 9	Intermediate	> 10	16-20	1-3
Teacher 10	Elementary	> 10	10-15	4-6
Teacher 11	Elementary	> 10	1-9	4-6
Teacher 12	High School	5-10	10-15	1-3
Teacher 13	Intermediate	> 10	16-20	1-3

Regarding the participants' information in the UICT, A and PD, most (10 of 13) were using ICT in their schools with students with ID and had more positive attitudes towards the use of ICT. However, 9 of 13 (70%) had not received any formal PD courses in the use of ICT in the last five years.

Table 5.3 Summary of the UICT, A and PD of interview participants (n=13)

Participant	UICT	A	PD
Teacher 1	Yes	High	No
Teacher 2	No	Low	No
Teacher 3	Yes	High	No
Teacher 4	Yes	High	No
Teacher 5	No	Low	No
Teacher 6	Yes	Low	No
Teacher 7	No	High	No
Teacher 8	Yes	High	Yes
Teacher 9	Yes	High	Yes
Teacher 10	Yes	High	Yes
Teacher 11	Yes	High	No
Teacher 12	Yes	High	No
Teacher 13	Yes	High	Yes

5.3 Analysis of Interviews

The aim of this phase of study was to elucidate the quantitative data which was reported in Chapter 4. In particular, through selecting participants with more and less positive attitudes towards using ICT, the interviews aimed to give more detailed information about how teachers utilise ICT both inside and outside the school environment and whether this use was linked to other factors and barriers.

The semi-structured interviews were carried out by the researcher (as described in the methodology (Section 3.6.2, p. 90). The interviews generally lasted 25-30 minutes and were conducted on-site for the male participants and by phone for the female participants, due to cultural considerations. The interviews were carried out in Arabic and, with written consent from the participants, were taped using a digital recorder. After the interviews, transcripts were made by the researcher in Arabic and participants had the opportunity to add or delete any information. Transcripts were then translated from Arabic to English, also by the researcher, and these English translations have been used for the analysis.

As mentioned earlier, four themes emerged from the qualitative data, which are teacher use of ICT; pedagogies utilised by teachers of students with ID; factors in the ICT use; and teachers' attitudes and barriers in the use of ICT. Each theme will be explored below through thematic analysis (Braun & Clarke, 2006).

5.3.1 Teachers' use of ICT

This theme captures interview data in relation to the teacher use of ICT, both personally and in the school environment, which adds depth to the quantitative data already reported in the previous chapter. Most of the teachers interviewed used ICT in schools, which aligned with the larger number of respondents who had more positive attitudes to ICT in their QTAMID. This was also consistent with the quantitative finding, which showed that the majority of the participants were using ICT with their students with ID. This theme discussed not only each teacher's use of ICT but also the level, examples, benefits, type and reasons of their use inside and outside their schools in more detail.

Most of the respondents reported experience of using ICT to differing degrees by giving a wide range of examples for using ICT in the school environment. Teacher 13 commented in that 'I know that ICT has a variety of tools, programmes and applications that could be used for educational purpose such as computer, projector, iPad and smart phone'. Whereas Teacher 3 determined her experience in using ICT for a range of purposes, not just educational 'training, teaching, rewarding and sharing information'. In addition to educational purposes, one respondent confirmed the spread of ICT use in different fields such as its use for communication with the society. Teacher 11, who had a long teaching experience (>20), said ‘I know that this type of technology is used by many people in different fields. For me, I use it inside the school with the students and outside with the society to communicate’.

One reason given by respondents for teachers’ successful integration of ICT in the ID classroom was their previous experience with using ICT and seeing it in use in a different context. Teacher 1, who taught in a high school for up to 15 years, explained that his childhood experience gave him the chance to use ICT when he became a teacher:

> *Basically, I grew up with technology and I have learnt amazing things through it [ICT]. I still remember many things that I learned when I was in high school because the teachers were using ICT devices. After I have become a teacher, I use ICT and I see the same result.*

Furthermore, Teacher 10, who had a Master’s degree in ID, had previously experienced how ICT could be used with students with ID through his interactions with teachers using ICT with ID students in U.S. schools. He was then able to use this experience to implement ICT in his own classroom in KSA. He explained:

> *Yes, I have some experience in using ICT. I know how I can make the students use it with me, but before that I visited U.S. and I saw how the teachers use ICT even if it is too simple, at least they use it. There is a strong school policy that supports that [the use of ICT] and no one can break it.*

The qualitative data also showed that the use of ICT with students with ID was considered to be important, due to multiple justifications. Respondents reported positive benefits to their planning in the classroom, as it saved them time in planning their lessons and it could be used by the students to search for information so they did not have to prepare the resources in advance. Examples of this were that it ‘made the lesson very easy’

(Teacher 10) and '… it saves my time and gives me wonderful results in a short time' (Teacher 1).

Consistent with these benefits, Teachers 3 and 9, who shared the same attitude, years of experience and UICT, agreed that using ICT with students with ID has many advantages for both teachers and students. Teacher 3 commented, 'it [ICT] is very useful, entertaining and it shortens the time and effort. It increases the focus among students with ID', while Teacher 9 said, 'it brings student's attention because it has the power to interact with all the student's senses. It is also very easy and it has the power to deliver the information quickly with a high quality as well'. Teacher 7, who also had a Master's degree in ID, confirmed some of the advantages of using ICT and suggested that ICT should be used anywhere inside and outside schools:

> *It is useful, easy, smooth and effective and could be used to pass information to the students with ID. There should be no excuse for the teachers to not use and practice it inside and outside the schools.*

Teacher 10 added that 'using ICT is helpful for the teachers by assisting them to teach easily and effectively'. He also commented that the greatest benefit of using ICT was to 'change the students' life by integrating them into the community and give them the chance to work independently. It basically has a significant role in their lives'.

Teacher 1 clarified that ICT is important not only to the students with ID but to the school community. He described ICT as 'a big door and each one can enter it, including the students with ID. There is no doubt that ICT can help not only the students but also the wider school community'. He also claimed that ICT had the ability to fulfil the gap between the limitation of students with ID and required skills:

> *It is very important to the students with ID, and generally students with special needs, due to their lack of abilities and skills. To be more specific, students with ID*

have issues with imagination due to their disabilities, and ICT has the power to overcome that limitation and develop their skills and improve their weaker points.

Respondents reported that utilising ICT in the classroom with the students with ID, helped to achieve teaching goals and involved the students with ID in the teaching and learning process, one respondent stated:

> *As a teacher to students with ID in secondary school, I have had a good experience with ICT tools because it helps me to reach my teaching goals in an interesting way. It requires less time and effort. I use it for many advantages such as the students becoming a significant partner in the learning process. There is nothing which is difficult to use. Using ICT, the teacher presents his lesson in a way that gives everyone a chance to participate. Furthermore, the teacher can confirm to what extent the students interact and understand the aims of the lesson. (Teacher12)*

This teacher also reported that a positive outcome of utilising ICT in the classroom with the students with ID was that it encouraged her to use it continuously with them. She specifically mentioned her teaching aims, which were successfully met when she used ICT with her students:

> *The positive outcomes that I received when I used ICT with students with ID are as follows: achieved many high goals such as training the student to use electronic mails like Gmail, achieved the basic principle of learning process, such as integrating ICT with cooperative learning and teaching by peers and provided feedback by using ICT. (Teacher12)*

Similarly, Teacher 8, who has a long teaching experience (>20 years) explained why she believed that ICT use was essential to use in the classroom by providing examples of the positive outcomes. She stated:

> *The reasons behind my use of ICT is rational. The use of ICT gives me extraordinary positive results. The students with ID can respond to questions, exercise themselves*

and communicate very well with me and with the other students using the help of ICT.

It is also clear that ID is not the only disability that can be benefit from ICT, there are other disabilities and disorders that can be supported by using ICT, such as speech issues. Teacher 8 emphasised this in her comment:

I know that ICT is being used for students with speech issues. It helps the teachers to communicate between them inside and outside the school. Furthermore, use of social media can support the students to express themselves by sharing their ideas and thoughts.

She also demonstrated her experience with students with speech issues and how ICT can assist and support assessment by providing the following example:

It helps in the assessment process. For example, students who have speech issues will be assessed perfectly if ICT is being used. The teachers, based on my opinion, will understand what skills or information has been received by the students with ID. It is easy to use and generally useful in the learning process and supposed to be available for them in the classes.

With regard to the favourite types of ICT, only four of the ten respondents, who used ICT with students with ID, identified which device of ICT they been used. This was because all of the ten respondents believed all ICT devices are suitable with the students with ID whatever the type was. The qualitative data was consistent with the quantitative results, which found that computers and projectors are the types of ICT most used by the teachers of ID.

Of interest were the reasons given for using the specific type of ICT in the ID classroom, for example, to teach reading. One respondent explained:

> *I have read several western articles which state that the interactive whiteboard is a suitable technology for students with ID because it has the power to touch their sensitivities and release the students' abilities (Teacher10).*

This demonstrates that teachers' use of ICT in the classroom, at least for one of the participants, was influenced by that teacher's professional reading of current journal articles on how to use ICT to further develop the abilities of students with ID.

One respondent claimed that using projectors was the most popular device among the teachers of ID, even though there are many other options such as the iPads, smart phones and whiteboards. Teacher 4 linked that comment to the unavailability of other ICT types in their school. She also identified that her main experience was by using 'the applications of the iPad'. Another respondent explained his favourite type of ICT: 'I use smart devices such as iPad and iPhone'. He justified his choices by saying 'it helps me to use YouTube easily with the students with ID' (Teacher 1).

On the other hand, three participants were not using ICT with their students with ID. These three participants linked their decisions for not using ICT to multiple obstacles such as unavailability, lack of training and knowledge of how to utilise the technology in the classroom, which will be discussed later in a different theme. However, this group of respondents also reported disadvantages and negative outcomes for use of ICT in the classroom. One respondent pointed out that ICT was difficult to use, which made him decide not to use ICT with students with ID. He made clear that his reason was because 'it is a complicated tool or material' (Teacher 7). Teacher 2 added, 'I do not use … it takes a huge effort and a long time to prepare it for the lesson'. In addition, he believed that the lesson will not be understood by the students if ICT was used. This was also consistent with Teacher 5, who said 'I don't believe that ICT can be beneficial for students with special needs'.

It was observed that Teachers 2 and 5 believed that ICT was not appropriate for teaching students with ID, or at least being used in schools. Interestingly, Teacher 5 said that he had used ICT in social situations but not in the school environment with his students, even though he knew that it could be used in the education field. He explained that clearly:

> *For me, I have heard about the use of ICT inside and outside the education field, however, I have not seen someone use it especially for teaching students with ID.*
>
> *I have some experience in the use of ICT but only for my daily life. I do not know how I can use it for teaching or learning in special education, particularly for students with ID.*

To conclude, the main reasons for using ICT reported by respondents were to increase communication and engagement in the ID classroom, to motivate students with ID and to assist in differentiating activities for students of varying abilities and to make it easier for teachers to develop resources. On the whole, most of the respondents (77%) used ICT with students with ID and could see the advantages for the students and for their own preparation. There was a range of types of ICT used, which is in agreement with the findings in Phase One of the study. Some respondents did not see the benefits of using ICT in the school and classroom due to multiple barriers. However, believing that ICT is not beneficial for students with ID was the common statement between those three respondents.

The next section will expand teachers' use of ICT through exploring the pedagogical use of ICT in the ID classroom, which also elucidates the abilities of students with ID to learn (or to be taught) through ICT.

5.3.2 Pedagogies utilised by teachers of students with ID

One of the most important themes that emerged from the qualitative analysis was related to pedagogies utilised by teachers of students with ID, building on the previous theme where ICT use by teachers was explored for more general reasons. This theme describes to what extent the students with ID can by taught through the use of ICT in classrooms. In addition, this theme includes how ICT can be used as a tool or as a strategy for students with ID, as opposed to the more traditional teaching strategies, and explores for what purpose ICT is used in the classroom.

The first aspect that will be reported is to what extent teachers perceive students with ID can be taught using ICT. This is an important consideration as teachers will be more likely to use ICT if they believe that students have the capabilities to engage with the technologies. Most of the respondents (85%) believed that students with ID had the ability to learn through the use of ICT. However, the quantitative data showed that 24% of 307 respondents perceived that students with ID had the ability to deal with ICT. A number of examples were given on the importance of ensuring that students had the opportunity to engage with ICT, including to improve communication, to improve their sense of independence and to increase the learning potential of each student in the classroom (Teachers 6, 7, 10 and 11).

Importantly, some respondents (Teachers 4, 8, 10) believed that use of ICT in the classroom had the potential to support students with all types of disabilities. An example given was that students with hearing and visual impairment could be significantly assisted with technologies which were made suitable to their level of ability. For those students who are severely impaired with multiple disabilities, such as quadriplegia, use of ICT gives them the opportunity to access learning in the classroom similar to other students through the use of a device. One respondent clarified his experience with this type of disability by saying:

> *I saw many students have severe ID. They still have the ability to learn by ICT such as iPad. They can use their hands to use it, and to be more specific, they can move their fingers to touch the iPad screen as much as they want. I totally disagree with people who think that the IQ level of students with ID can prevent the teachers to use ICT with them. I saw some students who have quadriplegia along with ID and they still respond to the device by their eyes. There are many examples like that in the Arabic and the western world. (Teacher 10)*

Teachers cautioned that even if the use of ICT is extremely beneficial to the student there was a need for the teacher to be trained in how to effectively utilise the technology in the classroom. It is well established that particular pedagogies are conducive to the use of ICT in the classroom, and this is also the case with classrooms of students with ID. Approaches to using ICT effectively included alignment with the students' social as well as cognitive needs, as explained below by an experienced teacher (with more than 20 years of experience):

> *Use it [ICT] gradually based on the student's mental and social abilities, use it [ICT] easily and simply and finally take into account their limited abilities because it will be hard for them to understand the lesson or on some occasions, he [teacher] will lose their enthusiasm. (Teacher11)*

Respondents also commented that it was important for students to have the skills to be able to use ICT and that this needs to be integrated into the curriculum. One respondent (Teacher 9) said, 'it is possible that their abilities are low but by training, the use of ICT will become effective'. She confirmed in her comments that ICT 'requires many steps' and emphasised that the continuous use of ICT 'day by day will make it easy and fast for both the teachers and the students' to improve their skills in ICT.

Respondents acknowledged that some of the learning about use of ICT also happens through teachers having the opportunity to experiment with using ICT themselves and outside of the classroom. Teacher 12, who taught outside the Riyadh district, agreed that training for students with ID played a major role in the effective use of ICT. She suggested that 'students with ID will know how to use the iPad and iPhone in a wonderful way if they have been trained by the schools and their families'. She thought that 'they [students] should get the opportunity to learn by trial and error' because, based on her experience in the ID field, 'there are many good examples of students who can handle an ICT tool and use it effectively'.

However, two respondents disagreed with the majority of the respondents and argued that students with ID were not able to be taught through ICT in their classrooms. Teachers 2 and 5, who also reported that they did not use ICT with students with ID, had a less positive attitude towards its use as they believed that students' abilities were not suitable for being taught by ICT or through any other pedagogies integrating technology in the classroom. Teacher 5, who had been teaching students with ID for more 20 years, emphasised that ICT was 'too hard for them [students with ID]'.

On the whole, respondents found that utilising pedagogies that integrated ICT in the classrooms were an effective method of teaching students with ID. Indeed, they perceived that the use of ICT assisted them with teaching the students. Four of the respondents elaborated on this, with Teacher 10 explaining that the use of ICT was 'an assistance process that helped the students to learn more effectively', Teacher 8 also reiterated that ICT would 'definitely help the learning process significantly', and Teacher 12 described it as 'the next revolution in the teaching and learning processes'.

Teacher 7 elaborated on the use of ICT by arguing that 'ICT is an important assistance tool that is most suitable for the modern way of teaching and learning'. He added that his previous perspective 'matched with other teachers and researchers, who realised the benefits of using ICT with students with ID. They considered it as one of the new important directions to improve the learning process of the students with ID'. He concluded his comment by comparing the use of ICT with older teaching strategies, 'ICT is considered as the new and best way to teach instead of old strategies, according to many educators'.

It was clear that pedagogical strategies integrating the use of ICT were being utilised by respondents on the whole as opposed to more traditional teaching methods, with ICT being seen as a more popular method (Teacher 1) and more engaging for the students with ID (Teacher 11). One respondent who had spent time studying the use of ICT in the U.S. argued that 'learning through ICT is better than learning by the traditional strategies, which are based on conversation and indoctrination'. Examples were given as to how the use of ICT provided a wider range of options for teaching, with Teacher 3 remarking that 'the use of old strategies is too limited while ICT provide a variety of options ... I have whiteboards for teaching groups and iPads for teaching individually'.

A number of respondents commented on the benefits of the use of ICT in the classroom for the students, through motivating the students to learn and enabling them to be more independent in their learning. Teacher 6, who had a Masters Degree in Special Education, explained that ICT can make the learning easier and 'help to increase their enthusiasm and encourage the students to engage in the lesson'. In addition, allowing the students to become a partner in the teaching and learning process is one of the advantages of using ICT instead of teaching in more traditional ways. Teacher 12 emphasised this and elaborated how she was inspired to use ICT in the teaching and learning process:

First, it will motivate students and improve their academic, social and independent skills. Second, it makes it easy and clear for students when they receive information. Third, it adds fun and entertainment into the lesson, particularly, when the teacher presents it in attractive way. Fourth, it helps the teacher to control the lesson and the class. Teachers can use many strategies easily with ICT. Finally, it establishes a motivational environment through giving the students the chance to communicate with ICT.

Pedagogies discussed by the respondents drew on a range of types of ICT to enhance learning across different contexts. Respondents commented that it was important to consider the purpose of the lesson and what type of ICT was most appropriate to use in the classroom. Examples included to improve literacy lessons, to search for information and to use multimodal texts such as film. Types of ICT used included a projector to teach students the Quran, an iPad so that students could research animals or subjects of interest and the use of film to present content in a more entertaining format. Some teachers found that using the iPad as a reward made students more engaged with all lessons, because if they worked hard then they had priority to use it. Some used ICT to motivate the students in class by being able to draw on visual literacies such as pictures and stories to introduce the subject for a lesson and through the use of interactive software such as PowerPoint to differentiate activities for the students in her class.

Integrating the use of ICT into regular lessons was also seen as important. Teacher 10, for example, believed that ICT can be used to teach 'the basic academic skills such as reading, writing and arithmetic'. In addition, he used it for teaching science and for social skills. A number of respondents discussed the importance of using ICT to help students with ID to learn life skills outside of the classroom. Teacher 3 outlined aspects such as 'social communication', while Teacher 1 emphasised ICT for building 'daily life skills' and Teacher 4, to 'search for information and write some scripts'. However, Teacher 5 believed that using the traditional strategies was the best way to teach students with ID and that ICT could be used only ‘for communication, but not for teaching and learning‘.

To sum up, most of the respondents believed that students with ID should be taught using pedagogies that integrate the use of ICT in the classroom, for learning and for the development of social skills. Although it requires time and effort to teach the skills of using ICT with students with ID, the benefits to teaching and learning over traditional methods were acknowledged by most respondents. Different types of ICT were used in the classroom, including projectors and whiteboards which were used by the teachers and iPads which provided more individualised instruction opportunities for each student. The factors in the use of ICT and teachers’ attitudes will be explored in the next section.

5.3.3 Factors in the use of ICT and teachers’ attitudes

While most of the participants in interviews used ICT with their students with ID and had positive attitudes towards this usage, it is important to explore the factors that improve the use of ICT in schools for students with ID. To be more specific, this theme is about the factors or enablers that help the teachers of students with ID to make successful use of ICT in their schools and classrooms. In addition, the factors that played an important role in their attitude to the use of ICT will be also identified and explained.

This section is an extension to the quantitative data already reported in the previous chapter where the predictors in the use of ICT and attitude were examined. In the qualitative phase, 70% of the participants, who had a more positive attitude, elaborated the factors that enabled them to effectively use ICT and shaped their attitude to ICT use. For example, they believed that the use of ICT depended on different factors such as PD, willingness to use ICT, positive attitude, motivation, awareness, suitable tools, availability and early intervention (Teachers 1, 8, 9 and 13).

Moreover, one respondent gave more in-depth reasoning about the factors that played a vital role in their use of ICT. The key enabler was self-exploration of the knowledge needed about ICT which assisted him to select suitable devices for students with ID that were most effective and gave him an appreciation of the advantages of using these particular devices. This type of knowledge can be obtained by the teacher's professional reading of journal articles on how to use ICT to further develop the abilities of students with ID. One respondent said:

> *The enablers behind my ICT use have come through my reading of the studies for the last ten years. It helped me to understand the advantages of it [ICT] and how I can use it effectively. I have the complete knowledge of which technology I can use with the student with ID and how I can do it easily. I believe that if the teachers open their mind and read about it they will use it daily. (Teacher 10)*

He also cautioned to add further factors that increased the effective use of ICT and make it easier for the teachers, such as supported policy and PD:

> *It is easy and useful for teachers who have the knowledge and PD. We cannot say that all the teachers use ICT unless there is a strong policy that support the use of ICT and provide the right PD. It is true that the internet and laptops can help them, but formal training is still important for effective use of ICT. (Teacher 10)*

Furthermore, respondents pointed out that PD was important, as well as teacher's attitude and time. This combination of factors lead to the successful use of ICT in the classroom. One respondent mentioned:

> *I think PD courses help me a lot to use ICT and to train others as well. Also, I have a positive attitude that motivates me to work hard and use all possible things that*

> *can support the students. I can say the time also gives me the chance to create and produce many things for the students, such as movies. (Teacher 13)*

Interestingly, respondents discussed the importance of establishing new and effective legislation to support the use of ICT for students with ID and to protect the teachers when they use ICT in their classes. They claimed that the students with special needs should have more rights to be taught by the way they prefer so that the aims of teaching are easily achieved. These rights could be achieved by following other developed countries that have been through the same situation. In another words, the teachers found that the legislation to support the use of ICT in ID schools was considered to be a factor that would increase or decrease the use of ICT by the teachers or students with ID in the school environment (Teachers 1, 7, 8, 9, 10 and 13)

In a comparison of these results with the quantitative findings, the factors that significantly predicted teachers' use of ICT were their gender, the number of lessons they taught per week and PU. So, the results from the qualitative data differed from the quantitative regarding the factors that played a role in the use of ICT with students with ID.

With regard to the factors that contributed to attitude towards the use of ICT, respondents who had a more positive attitude to the use ICT asserted that their positive experience of using ICT with their students was the most important factor associated with their positive attitude. In another words, they believed that their attitude become positive due to a successful experience with ICT and as a result of using ICT with students with ID (Teachers 3, 6, 8, 13).

In addition to the positive experience of using ICT, respondents believed that professional reading of how to use ICT was related to the positive attitude that they held (Teachers 7 and 10). One respondent explained that in more detail:

> *My positive attitude is based on two things, my reading on the use of ICT and my practice of ICT with students of ID. It is something that I read about and see it practically in my class. How can I ignore it? There is no doubt that those who have the knowledge and the experience in ICT will definitely use it. It might be difficult at the beginning but it will be easy after couple of weeks. (Teacher10).*

Interestingly, the interview findings suggested that PD in the use of ICT was considered as an important factor by teachers who changed their attitude towards their use of ICT. Moreover, respondents claimed that PD had the power to influence their attitude and change it from negative to a positive (Teachers 7 and 10). This perspective was also reported by Teacher 9, who believed that lack of ICT use in the classrooms of children with ID was because of the lack of PD offered to teachers:

> *Of course, PD will help me to use it [ICT] widely and more effectively, not only in how to use it but also it will affect my attitude. I really believe that PD will change the teacher's attitude to use of ICT. Most of the teachers have a negative attitude because they have not been trained, so they do not see how easy and beneficial it is for them and for the students with ID.*

Beside the personal impact of PD on teachers' attitudes, the skills obtained from PD can be disseminated from one teacher to another, which increases the positive impact in school communities. One respondent said:

> *It is also clear that when the Ministry trains the teachers, they [teachers] would change their attitude if it is negative right now. Furthermore, the teacher who received this training will pass his experience to other teachers. Therefore, most of the teachers will have a positive attitude. I can say that the more formal*

> *professional development is provided on the use of ICT, the more positive the attitude we can see from the teacher. (Teacher10)*

However, one respondent, who had a less positive attitude explained his beliefs by adding several factors or reasons that shaped his attitude:

> *I may have a negative attitude, as you can say, but I think there are some factors behind that. First, ICT is not available in my institution. Second, I did not receive any professional development courses or training programmes. Third, I believe that the student's abilities will be always a huge barrier for the teachers if they plan to use it [ICT] with them. (Teacher 5)*

The qualitative results suggested that PD was an important factor in teachers' attitudes to using ICT. However, PD was not a significant predictor of teacher's attitude towards the use of ICT with students with ID in the quantitative analyses. Here, PU was found to be the only predictor of teacher's attitude to use of ICT with students with ID.

In summary, findings from the qualitative data indicated that the use of ICT was influenced by several factors such as PD and knowledge, supported polices and legislation to protect both teachers and their students with ID. These factors have been seen as an essential step in making the use of ICT effective and successful for teaching students with ID in KSA. On the other hand, teacher attitude to use of ICT with students with ID was related to different factors, such as the positive experience of using ICT, the professional reading of how to use ICT and PD. Based on these factors or enablers, it was found that teachers perceived that if they were able to practice using ICT in the classroom it would give them the opportunity to understand the benefits of ICT in a more realistic environment. The barriers in the use of ICT in the schools with students with ID will be explored in the next section.

5.3.4 Barriers in the use of ICT

This theme captures the barriers in the use of ICT and adds more detail to the quantitative data already reported in the previous chapter where the barriers in the use of ICT was explored statistically. All the interview respondents reported that they had experienced barriers to them implementing ICT in the ID classroom, even those who had a more positive attitude towards this use (i.e., 10 of the 13 respondents). According to the qualitative data, four main barriers were identified: availability of ICT, teachers PD, support, and other barriers in the use of ICT. The four main barriers identified from the interviews will be reported and discussed in the following paragraphs.

5.3.4.1 Availability of ICT

The first theme regarding the barriers for the use of ICT in ID classes was the availability of ICT which was identified as a school, Ministry and whole system issue by respondents. The majority of the respondents (77%) reported that the lack of ICT availability was an important barrier to the teacher's use of ICT with students with ID. The main reason cited by these respondents was inadequate funding. In KSA, schools are reliant on funding from the Ministry of Education for technology. As the technology costs so much, teachers are not able to provide these items as part of their teacher resources, as they might do for resources such as stationery or teacher-made resources. Teachers 5, 8 and 12 commented that the expensive nature of the devices meant that they were reliant on the Ministry to fund them for their classes.

Another more important theme emerged through the interviews, and that was the perception from the respondents that the general classes in schools were given more technology resources than the classes with students with ID. Teacher 11 elaborated, saying that 'lack of ICT tools in special education classes is more common than in general classes, so we need more attention from them [Ministry of Education]'. As such, respondents felt that the barrier in ICT availability in their classes was created by the Ministry of Education, and described it as 'a management problem in the Ministry'. Administrators were perceived to believe that using funds with special classes was not worthwhile. Teacher 10 explained that there is a communication gap between the Ministry and schools because the supervisors (Inspectors) from the Ministry were not helpful, and the requests for providing ICT tools into ID classes take a very long time:

> *Many schools asked many times to have projectors or computers [but they have not received those]. Unfortunately, the supervisors visit us monthly, and they see the lack of ICT tools but they do not inform the Ministry about our situation. For more than 5 years, I sought a computer for my school and the Ministry ignored my request. Finally, they sent it this year. Furthermore, they have given us financial support to buy some other devices such as TV and projectors. (Teacher10)*

In addition to the negative view of the Ministry of Education in KSA towards special education classes, school principals also considered general education to be more important than special education. In fact, teachers of students with ID did not have the opportunity to use ICT tools when it was available because the technology 'belongs' to the general education teachers, according to the principals (Teachers 6, 9 and 11). Furthermore, one respondent believed that ICT tools such as the internet were available but the teachers of students with ID were not allowed to use it in both schools and classrooms. She said, 'We do not have access to the school internet because the school principal prevents us from using it' (Teacher 12). This was consistent with the quantitative data, which indicated that there was a high availability of ICT in schools but a low use in classes of students with ID.

The availability of ICT for students with ID was identified by some respondents as a systemic issue for the education system in KSA. This highlights more serious issues of equity for teachers in special education and for their students. As Teacher 13 explained, ‘unfortunately, the whole concerns in KSA are for general education, therefore, it is very hard for special education to be developed’. There is a lack of equality between general education and special education, and it was perceived that it went beyond the use of ICT in schools. One respondent explained how the Ministry of Education ignored students with ID to learn through a national television channel and how students missed the use of it to make them independent in all life aspects:

> *The Ministry should provide specific technology tools and programmes for the special education students. For example, the Ministry of Education provides a national channel called EAN, and unfortunately, it is suitable only for normal students. What is the problem if they make the language very simple for other categorises? Why do they only focus to the general education? All of the students are a national power that can be used to develop the country. We have a high disability rate, which is around 3.3 percent in the KSA, and we do not use them [students with ID] because they did not have the skills. I think we need to qualify them very strongly by using ICT. We need to make the students with ID independent and that will happen by the integration of technology. (Teacher 3)*

It was also felt that the education system in KSA should integrate policies of a range of countries, such as the U.S., rather than following the education system of other Arabic countries such as Jordan. To be more specific, respondents believed that the use of ICT could be increased if the Ministry of Education delivered a successful experience in other countries such as U.S. and Australia to Saudi schools (Teacher1, 10 and 12).

5.3.4.2 Teacher formal PD in ICT

Another barrier to use of ICT identified by respondents was the lack of formal PD in the use of ICT. This included training courses, workshops and seminars in the use of ICT as it related to general education or more specific special education settings. Most of the respondent’s (70%) believed that lack PD was an important barrier to implementing ICT in Saudi schools. These respondents emphasised that there was a lack of PD provided to them, preventing them from understanding how the use of ICT could be used effectively in their teaching in order to receive its benefits so they can be more aware of the current trends in technology in relation to education. They believed that lack of teachers’ knowledge and awareness were caused by lack of PD. In another words, the less PD for teachers in the use of ICT, the less was teachers’ knowledge and awareness regarding the use of ICT (Teachers 9, 12 and 13).

Respondents reported that even when formal PD courses are available, the teachers were not willing to attend the sessions. They felt that this was related to a lack of motivation, which prevented teachers from working hard and doing their best to develop their skills. One respondent stated:

> *I also see that some teachers do not have any arrangements to have professional development in their schools. For example, two years ago I ran a professional development course in selected schools and unfortunately most of them did not attend. I think they must be forced by the law to attend these courses. I can say that attending the courses requires some motivation but most of the teachers do not have that. To be honest, some of the teachers believe that the minimum work is the only requirement whether in schools or institutions. (Teacher13)*

Respondents raised concerns about attendance at formal PD when the training was provided by the Ministry of Education, as there is a disconnect with the school aims. These concerns may therefore lead to the courses not being beneficial for both the government and the teachers of students with ID. Due to the lack of cooperation between the Ministry of Education and school principals, the teachers were not able to attend these courses because 'the principals prevent the teachers from going outside the schools during school hours' (Teacher 5), meaning they were not supported to attend the courses sponsored by the Ministry of Education. With regard to formal PD content, respondents believed that the PD courses should be focused on how to use ICT with students with ID and other disabilities. Unfortunately, the Ministry of Education did not take serious steps by giving the priority to this kind of PD, one respondent commented:

> *The Ministry has established a new way to develop the teachers as Practitioners of Special Education, which involves weekly training for all the education teachers in schools and institutions, and there is only a small part in it that helped them to use the technology. However, after reviewing the content of this part, the courses are either too simple or too hard. (Teacher 4)*

Although the lack of Ministry supplied PD was only articulated by one respondent, it was consistent with the quantitative findings that PD in use of ICT, for the general school population or just for the use of ICT, was more prevalent than specific PD for special education (see p. 27).

5.3.4.2 Support

The third main barrier that emerged from the qualitative data were lack of support, which included the Ministry of Education, school principal and supervisor support. Thirty-three percent of the participants in Phase One saw this as a barrier. Respondents reported that lack of support was a barrier to the use of ICT in the Saudi schools and that it was a complex issue that the teachers had no power to change. For example, respondents believed that their classrooms could be equipped with ICT tools by a personal donation if the Ministry was not able to provide support, but that it would be hard for them to use ICT when the school principal and supervisors also blocked the use of ICT in their classrooms (Teachers 9, 11 and 12).

Unfortunately, the lack of cooperation by the system and school-level support resulted in a number of respondents being hesitant to use ICT in the ID classroom. Two teachers who believed there was not enough support for teachers also felt there was a lack of cooperation with other stakeholders to encourage teachers to effectively use ICT (Teachers 4 and 10).

5.3.4.2 Other barriers

The last theme in this section is other barriers in the use of ICT. This is a combination of multiple barriers that were not classified as a main barrier due to the limited data obtained from the interviews. Nine respondents (70%) reported different examples of barriers that negatively impacted the use of ICT with students with ID in schools and classrooms. The following sections include three different barriers which are large class size, suitability of school buildings and personal barriers to use of ICT.

Large class size

Respondents reported that large number of students in one class was a barrier to the use of ICT in Saudi schools. For example, they believed that the maximum class size should be 7-8 students, but that it often exceeds 13 students, therefore, teachers failed to give themselves and the students with ID adequate time to prepare the lesson and the instructions for using ICT tools (Teacher 1, 2, 3 and 6). To compare these respondents with the quantitative data, 33% of the survey respondents identified large number of students in one classroom as a major barrier.

Suitability of school buildings

Another barrier was school building infrastructure, which was seen as either too old or not suitable for using ICT. Respondents noted that the Ministry of Education at times used buildings that were unsuitable for school purposes without a pre-investigation, and in these instances most of them were rented buildings. This meant that it was difficult to use ICT in classrooms which were not designed for the purpose of teaching students, particularly those with special needs. For instance, some respondents believed that it was not appropriate to accommodate the students with ID in these buildings and in some cases, it was too dangerous for them. In addition, the classrooms of such schools were too small to contain basic tools such as computers (Teacher 2, 3, 5 and 7). This was consistent with the quantitative findings, which reported that 53% of 307 respondents believed that school infrastructure and environment is not suitable for using ICT and considered it as an important barrier.

Personal barriers to use of ICT

Interestingly, four respondents considered that lack of enthusiasm, motivation and negative attitude towards the use of ICT among teachers, supervisors, and principals were important barriers (Teachers 3, 6, 9 and 10). This was found also in Phase One, which indicated that lack of interest and motivation to use ICT was selected as an important barrier by 34% of teachers. It was not clear if these barriers were related to other barriers identified in the qualitative data. However, respondents linked the negative attitude towards the use of ICT to the negative attitude towards the students' abilities (Teachers 12 and 13). They believed that the more negative attitude to use of ICT, the more negative attitude to the students' abilities.

To conclude, there were four main barriers that prevented teachers of students with ID from using ICT with their students. These were lack of ICT availability, lack of PD, lack of support, and other barriers in the use of ICT. In general, these barriers were similar to the quantitative findings. Most of the interview respondents (77%) reported that the lack of ICT availability was the major barrier to their use of ICT. Even though they mentioned many barriers that linked to this, most of them believed that the negative view to ID classes by the Ministry of Education and school principals was the most important reason for this barrier. The second barrier was lack of formal PD, selected by 70% of the participants, who also believed that this barrier caused teachers' lack of ICT knowledge and awareness. This was also consistent with the quantitative data where 57% of 307 respondents perceived that lack of PD and training was an important barrier. These teachers also highlighted issues related to the lack of PD such as lack of willingness among the teachers to complete PD and the lack of cooperation between stakeholders. In addition, 70% of interview respondents reported different examples of barriers such as the large number of students in one class and school buildings. More importantly, four teachers reported personal barriers such as a lack of enthusiasm, motivation and a negative attitude towards the use of ICT.

5.4 Chapter Summary

This chapter presented the qualitative data analysis collected during Phase Two of this study, which included two sections: sampling process and demographic characteristics of respondents, and analysis of interviews. In this phase, the data were collected by using semi-structured interviews conducted with 13 teachers, who taught students with ID in elementary, intermediate, high public schools and public institutions under the control of the Ministry of Education schools during the 2016-2017 school years in Riyadh region in

KSA. The majority of the teachers had a positive attitude to use ICT and had not received any formal PD courses in the use of ICT in the last five years.

The analysis of the interviews showed four themes emerged from the qualitative data, which are Teacher use of ICT, Pedagogies utilised by teachers of students with ID, Factors in the use of ICT, and Teachers' attitudes and Barriers in the use of ICT. The first theme provided a general information that related to the use of ICT by the teachers of ID, both personally and in the school environment. The second theme discussed to what extent the students of ID can by taught through the use of ICT in classrooms. In addition, this theme includes how ICT can be used as a tool or a strategy for students with ID, as opposed to the more traditional teaching strategies, and explores for what purpose ICT is used in the classroom. The third one, highlight the factors or enablers that help the teachers of ID to make successful use of ICT in their schools and classrooms as well as played a significant role in teachers' attitudes to the use of ICT. The last theme described the barriers that prevent the teachers of ID from using ICT with their students.

Chapter 6 DISCUSSION AND CONCLUSION

The present study was designed to (1) examine the use of ICT and attitudes towards ICT by Saudi Arabian teachers of students with ID, (2) explore the relationship between these variables in relation to teachers' beliefs (PU, PEU), PD and demographic information, by testing an adapted TAM model, and (3) investigate the barriers that impede teachers from using ICT in schools.

The study used a sequential mixed methods design with two phases: Phase One consisted of a questionnaire and Phase Two purposefully selected respondents to participate in interviews. The participants in the study were special education teachers who were qualified to teach students with ID in the Riyadh region in KSA. In Phase One, 394 special education teachers completed the QTAMID, while in Phase Two thirteen teachers were involved in the semi-structured interviews.

This chapter is divided into two sections. First, a discussion of the key findings that emerged from this research project in relation to previous empirical and theoretical literature. Second, a presentation of the strengths and limitations of the study, implications for practice and future research, as well as a conclusion.

6.1 Key Findings

How teachers use ICT in schools in Saudi Arabia is a complex problem that is yet to have an adequate solution, particularly in special education classrooms. Although studies in general education have attempted to explore the issues involved, none have looked closely at the teachers themselves and why they are not integrating ICT use in their pedagogical strategies. This study has concentrated on teacher use of ICT and their attitudes, with the surrounding factors that may influence how teachers respond to the Ministry of Education's push to integrate ICT devices into schools. In particular, given that there is no specific agenda for integrating ICT into special education classrooms in KSA, and more specifically for students with ID, this study has provided the opportunity for a systemic exploration of use of ICT in this context. The benefits of using ICT for students with ID are broad in their everyday lives to help them to be more independent, and so it is imperative to investigate how to bring these benefits into the classroom.

This mixed method study investigated teachers' attitudes, beliefs, the predictors of teacher use of ICT and the barriers to use followed by an in-depth exploration of how teachers utilised ICT both inside and outside the school environment and whether this use was linked to other factors and barriers. The key findings that emerged from the current study are discussed in relation to previous empirical research and to explanatory models. These findings draw together the analysis of the two phases of the study, the second phase complementing and providing more depth to the quantitative data. These key findings include:

1. Extent of ICT use by teachers of students with ID;
2. Teachers' attitudes and beliefs towards the use of ICT;
3. Factors predicting teachers' use of ICT and their attitudes;
4. Non-significant predictors of teachers' use of ICT and their attitudes; and
5. Barriers in the use of ICT.

6.1.1 Finding 1: Extent of ICT use by teacher of students with ID

Drawing on the quantitative and qualitative findings of the study, it is clear that there is a low usage of ICT by teachers of students with ID in KSA. This section draws on data from the QTAMID focused on the UICT scale and the ICT types used by teachers, the availability, and usage.

According to the quantitative results, 72.4% of teachers of students with ID were using ICT, however, they were using it at low or very low rates (63.4% of teachers). This finding of limited use of ICT is consistent with previous studies conducted in general and special education in different cities in KSA (Al-Rashed, 2002; Al Harbi, 2014; Alkahtani, 2013; Almaghlouth, 2008; Bingimlas, 2010; Oyaid, 2009; Rana et al., 2011).

The qualitative phase of the current study was conducted to elaborate the quantitative findings from the UICT scale in order to answer Research Question 1. The demographics of the Phase Two respondents can be found earlier (Tables 5.1 and 5.2). Respondents explained their limited use of ICT with a number of implementation barriers, for example, lack of ICT availability. Several reasons for using ICT with their students with ID were also identified. These examples included entertaining, increasing students' focus and attention to give them the chance to work independently, bridging the gap between the limitations of students with ID and required curriculum skills, and involving the students with ID in the teaching and learning process. These results were consistent with the work of Alfaraj and Kuyini (2014), who found that technology can be an entertaining way to motivate the children and by further studies (Florian & Hegarty, 2004; Martí & Mon, 2018) which indicated that ICT may help overcome the differences between students with and without disabilities by improving their developmental competencies. Furthermore, using ICT with students with ID facilitates their learning which helps them work independently (Bardhan, 2009; Lester, 2012; Retter et al., 2013; Ribeiro & Moreira, 2010). These results emphasised the importance of using ICT in the field of special education and particularly with students with ID, and to what extent ICT can be beneficial for them. In other words, these studies including the current study, provide evidence that ICT has the capability of improving the quality of the students' lives inside and outside schools.

Many examples of using ICT in schools and classrooms by teachers of students with ID have been discussed in the literature. Students with ID can benefit from ICT in order to gain basic skills in communication, leisure, functional math, time management, mobility and employment and in transition services (Achmadi et al., 2012; Al Redwan, 2013; Alnahdi, 2014; Burton et al., 2013; Chan et al., 2014; Green et al., 2011). The qualitative results of the present study indicated that teachers used ICT to improve, search for information, and teach basic academic skills such as reading, writing, science, social skills and arithmetic. This was supported by the work of (Hoang, 2015; Okolo & Diedrich, 2014; Smeets, 2005; Wood, 2015). As such, teachers of students with ID often have to use ICT, as these skills are prescribed in the curriculum.

In this study, teachers were also found to use ICT for PD, administration and personal use, which agreed with findings by others (CDW-G, 2006; Gajek, 2015; Li & Ni, 2011; Mia & Haque, 2013; Mwalongo, 2011; Salehi & Salehi, 2012; Shatri & Zylfiu, 2014). However, as a point of difference, in the present study teachers frequently mentioned that increasing communication and social skills were the most important purposes for using ICT with their students with ID. This finding is consistent with several studies reporting that the majority of the teachers used ICT with their students with disabilities to develop their students' social and communication skills (Okolo & Diedrich, 2014; Singh & Agarwal, 2013). Using ICT with students with ID to teach communication and social skills was seen as important because these students need these specific skills to become more independent and ICT can help deliver such skills in an easy and entertaining manner.

The quantitative findings of this study found that only 24.4% of 307 respondents believed that students with ID had the ability to be taught through ICT. This was explored further in the qualitative results which interrogated more deeply the perspectives of specific teachers who were not using ICT, those who saw using ICT was not beneficial for them or for their students with ID. These respondents explained that they perceived ICT as difficult to use, that the tools were too complicated, and they felt that lessons would not be understood by the students if ICT was used. One of these respondents said 'I don't believe that ICT can be beneficial for students with special needs' (Teacher 5). With regard to the non-users of ICT, Korte and Hüsing (2006) found that teachers not using ICT in the classroom viewed the use of ICT as tools with a limited value. These findings agreed with those of Tautkevičienė and Bulotaitė (2009), who found that ICT could not be used in educating for students with special needs, especially with students with multiple disability. More recently, Constantinescu (2015), found that teachers believed that assistive technology was not helpful in the learning process. Similarly, Jackson (2013) reported that, although teachers in the U.S. wanted to use technology in their classrooms, they believed that technology and, particularly computers, were not necessary to assist the students. Considerable work will need to be done to determine how teachers of students with ID view the abilities of their students and to what extent these views affect their level of ICT in the classroom.

Most of the participants interviewed in the current study acknowledged the benefits of teaching and learning by using ICT over traditional teaching strategies, although there was a gap between these ideals and what happened in practice. Even though teachers' pedagogical beliefs were not the focus of this study, the findings here indicated that teachers felt this might be an important factor which influenced the extent of their use of ICT in the classroom. Those respondents who were identified as having a low usage of ICT believed that using traditional strategies were the best way to teach students with ID. This was supported by Liu (2010) who found that the limitation of using ICT by teachers in Chinese kindergartens was due to the lack of integration of ICT into their pedagogical and technical teaching practices. In KSA, Bingimlas (2009) reported that the reason for lack of ICT use was because the teachers did not have the knowledge to run a device and they preferred traditional approaches to teach the whole classroom, rather than individual and group learning. This is consistent with the work of a number of Saudi studies that all found that teachers generally used ICT in a traditional way to deliver their lessons (Al Harbi, 2014; Alghamdi & Higgins, 2015; Oyaid, 2009). Al Harbi (2014) proposed the possible relationship that exists between teachers' pedagogy and their level of ICT use. Therefore, the current study suggests the need for additional research that examines how to increase applied pedagogies utilised by special education teachers in KSA as a way to increase ICT use for students with ID.

In exploring the extent of the use of ICT in schools, it is important to draw together the findings from both phases of the study on ICT types and availability for teaching students with ID. Phase 1 data clearly found that computers and projectors were the type of ICT most used by the teachers of ID, and this was clarified also in the interviews with teachers who had a high use of ICT. These are predominantly the type of ICT available for teachers to use in Saudi schools. This finding was consistent with Alfaraj and Kuyini (2014), who found that special schools for students with Down syndrome in KSA used different technologies but computers, iPads and projectors were the most frequently used with these students. In general education, Almaghlouth (2008) and Bingimlas (2010) also found that the digital projector was the most frequently used tool for Saudi science teachers, while, Alhawiti (2013) indicated that projectors were the most available hardware and software for Saudi teachers. It stands to reason that if teachers of ID do not have access to appropriate ICT to use for students with ID in the school environment, that they will not have a high usage of ICT. Funding to assist schools to purchase specific technologies which are personalized to the specific student needs is required in order to make the use of these technologies by teachers easier and more intuitive.

6.1.2 Finding 2: Teacher's attitudes and beliefs towards the use of ICT

This section captured the quantitative and qualitative findings focusing on teachers' attitudes and their beliefs (i.e. PU and PEU) towards the use of ICT with their students with ID, in order to answer Research Questions 2 and 3. The QTAMID focused on the A, PU and PEU scales, while the interview explored the reasons why teachers hold less positive attitudes towards the use of ICT with their students with ID. This approach is based on the methodology of this study, which considered teachers' attitudes as an imperative factor in the technology adoption and integration in schools.

6.1.2.1 Overall positive attitudes

The results of this study demonstrated that, on the whole, Saudi teachers of students with ID generally had a positive attitude to the use of ICT. This finding is consistent with a number of studies reported in the literature review, including specific Saudi studies that found that the majority of Saudi teachers had positive attitudes to the use of ICT (Al Sulaimani, 2010; Oyaid, 2009), and more general studies that were focused on using ICT devices as teaching tools (Al-Amri, 2011; Al-Rashed, 2002; Aldossry, 2011; Almuqayteeb, 2009; Alshumaimeri, 2008; Bakadam & Asiri, 2012; Khouj, 2011). Other studies also had consistent findings with the current study, indicating that teachers held positive attitudes towards the use of ICT in schools in different countries including Syria and Jordan (Al-Zaidiyeen et al., 2010; Albirini, 2006; Samak & Tawfik, 2006), in Oman (Jose et al., 2015; Mohamed, 2018), in Turkey (Cavas et al., 2009; Yüksel & Kavanoz, 2011), in China (Li & Ni, 2011) and in South Africa and Tanzania (Ndibalema, 2014; Rand & Andre, 2015). This is also consistent with several studies in the special education field, which indicated that the majority of special education teachers had a high positive attitude regarding the use of ICT with students with special needs (Beacham & McIntosh, 2014; Mohamed, 2018; Ogirima et al., 2017; Ribeiro et al., 2011; Tautkevičienė & Bulotaitė, 2009).

6.1.2.2 Reasons for a negative attitude

The following studies, with findings inconsistent with the current study, found that teachers had a negative attitude to the use of ICT in Saudi schools (Al-Oteawi, 2002; Al Harbi, 2014; Almaghlouth, 2008). As teachers held a less positive or negative attitude, many researchers investigated the reason for teachers to hold this type of attitude. For example, Li (2007) analysed teachers ‘attitudes to technology use and found that teachers held negative attitudes towards technology use in schools because the teachers may consider that teaching and learning without technology is better for various reasons such as time constraints and that students and teachers may be overwhelmed by the technologies. Another study emphasised the link between holding a negative attitude and perceiving barriers to use of ICT. Zhang and Aikman (2007) found that the teachers held negative attitudes towards technology because they had a lack of confidence and lack of

PD. Other Arabic studies found that teachers had a negative attitude towards using ICT due to insufficient PD courses (Al Sulaimani, 2010; Sadik, 2006). Based on these findings, negative attitude could be a result of other barriers that may or may not related to the teachers themselves. This was not supported by the quantitative finding of the current study. Respondents showed a generally more positive attitude to use of ICT and simultaneously had a lack of PD in the use of ICT.

In the qualitative phase of the study, interviews with respondents who were purposefully selected because they held a more negative attitude towards the use of ICT, uncovered valuable reasons why they were not using ICT in the classroom. One of the key themes which emerged was that teachers with negative attitudes towards ICT preferred using traditional strategies than strategies that integrated ICT. This was consistent with the work of Hennessy et al. (2005) and more specifically, Almaghlouth (2008), as the latter study was in the KSA context. However, these studies did not include special education teachers. These initial qualitative findings are an area to build on in the field of special education, and particularly ID, where specific devices are suggested to assist students with ID.

Teachers who revealed negative attitudes toward the use of ICT in teaching practices also had a lack of knowledge and skills about ICT (Al-Oteawi, 2002). In addition, Al Harbi (2014) reported that several participants revealed a negative attitude toward using ICT in teaching because suitable resources were not available. Themes which emerged from the current study solidified these barriers, finding that having a negative attitude toward using ICT was generally linked to multiple obstacles such as unavailability of ICT, lack of PD and knowledge of how to run ICT in the classroom. Also, surprisingly, special education teachers believed that students' abilities were not suitable for being taught by ICT in the classroom. Future research should therefore concentrate on the investigation of the relationship between teachers' negative attitudes and barriers to use of ICT in special education schools. In addition, how the teachers of ID view their students' abilities, in term of responding to ICT tools, is an interesting issue, which needs more investigation locally and internationally.

6.1.2.3 Positive beliefs towards use of ICT

The analysis of quantitative data indicated that teachers of ID had more positive PU than PEU towards the use of ICT with students with ID. This is consistent with studies in the U.S. (Nam et al., 2013; Porter & Donthu, 2006), in China (Teo et al., 2008) and in KSA (Al-Furaydi, 2013). However, interestingly, this finding is contrary to a number of Saudi studies, which found that the majority of their participants had more positive PEU and slightly more positive PU to the use of ICT (Binyamin et al., 2017; Seliaman & Al-Turki, 2012). The explanation for these different results may be related to the number of items used in the questionnaire and the modification that had been made to them in the previous Saudi studies. For instance, Al-Furaydi (2013) and Binyamin et al. (2017) adapted only five items to each belief (i.e. PU and PEU). In contrast, the present study used twenty items that represent PU and PEU from (Davis, 1993), which have been adjusted to meet the aims, sample and nature of the current study. Even though there is a disagreement about to what extent teachers' positive beliefs are attributed to PU and PEU, and whether one is likely to be higher than the other towards the use of ICT, all of these previous studies are consistent with the results of the current study in which the majority of teachers held a positive PU and PEU towards the use of ICT in both general and special education context.

6.1.3 Finding 3: Factors predicting teachers' use of ICT and their attitudes

The quantitative phase of the current study focused on the surrounding factors that may predict teachers' use of ICT and their attitude. This section draws on data from the selected factors in the QTAMID to answer Research Question 4. These factors include PU, PEU, PD, age, gender, highest academic qualification, type of school, years of experience, number of class periods per week, number of classes in school, region of school and number of students in teachers' classes. The analysis of the multiple regression model in this study showed that three of the previous twelve factors contributed significantly to the prediction of UICT, which were gender, lessons per week and PU. In contrast, only one of the previous factors, PU, significantly contributed to the prediction of A. These predictors have been played a significant role in teachers' use of ICT with students with ID and their attitude in KSA.

The findings of the multiple regression model agree with the literature, which emphasised the association between gender and teachers' use of ICT in schools (Akbulut, 2009; Cooper, 2011; Hohlfeld et al., 2013; Tondeur et al., 2008; Wong & Li, 2008; Wong & Atan, 2007). These studies indicated that gender determined how ICT was implemented in the classrooms and to what extent teachers used ICT in teaching practices. As gender was considered to be one of the most significant factors in the use of ICT, several studies reported that the frequent use of ICT in classrooms is more likely among male teachers than female teachers (Al-Ammari, 2004; Gil-Flores et al., 2017; Umar & Yusoff, 2014). In contrast, two Saudi studies found that female teachers used ICT more than male teachers (Al-Alwani, 2005; Wiseman et al., 2018). This was consistent with the finding of the current study, which found that female teachers were more likely to use ICT with their students of ID. The differences in the previous studies may be because the educational system in KSA is fully segregated based on gender. This is one of the most unique features of the educational context in KSA unlike other Muslim countries such as Malaysia, that segregate their system in specific grades and institutions.

As mentioned earlier, lessons per week was also found to be a predictor of UICT. This significant relationship was highlighted in KSA (Al-Alwani, 2005; Alsulaimani, 2012), in Libya (Emhamed & Krishnan, 2011), in Bangladesh (Khan et al., 2012) and in Australia (Neyland, 2011). All of these previous studies emphasised that heavy schedules and long tasks negatively impacted the use of ICT. However, in the current study there was a positive correlation between the UICT and lessons per week, which meant that the longer the teachers of ID taught their students, the more they would use ICT with them. This also indicates that teachers of students of ID take more time to prepare and use ICT with their students of ID. The review of the literature showed that there is little research about the impact of lessons per week in UICT. Realising the gap in the existing literature, more research is needed to examine the relationship between lessons per week and teachers' use of ICT. Therefore, further research should explore this area more deeply in order to address this gap.

In addition, the results of the current study reflect the findings of several studies, which found that UICT and A were predicted by PU and PEU by using TAM as a framework (Alharbi & Drew, 2014; Binyamin et al., 2017; Cox, 2003; Kusano et al., 2013; Li & Ni, 2011; Nair et al., 2012; Rand & Andre, 2015; Sabraz Nawaz et al., 2015; Teo et al., 2008). However, in the current study, PEU was not a predictor along with PU for both UICT and A. This finding is consistent with the results of several studies, which found that while PU was a good predictor of attitude to use ICT, PEU was not significantly related to teachers' attitudes to using ICT (Moses et al., 2011, 2013; Nam et al., 2013). An explanation of this result may be linked to the teachers' level of PD in the use of ICT. To illustrate, the current study showed a lack of PD courses among the teachers of ID as well as emphasising the urgent need for more PD courses from the Ministry of Education. Furthermore, the teachers reported that formal PD in the use of ICT in special education was the most frequent type of PD that was lacking. As a result, the teachers of ID felt that the use of ICT was not easy for them to use because they simply did not know how to adapt it and use it. In other words, due to the lack of PD in the use of ICT, particularly in special education, the teachers of ID perceived ICT as difficult tools to use in the classroom. This explanation was also consistent with work of (Al-Oteawi, 2002; Luan& Teo, 2009; Nair et al., 2012). As the rest of the selected factors did not contribute to the regression model to predict UICT and A. The next section discusses the non-significant predictors of UICT and A.

6.1.4 Finding 4: Non-significant predictors of teachers' use of ICT and their attitudes

Following the previous section that discussed the significant factors in the quantitative findings, this section focuses only on the non-significant predictors of teachers' use of ICT and their attitude. Findings from the quantitative data revealed that nine variables, namely age, highest academic qualification, type of school, years of experience, number of classes in school, region of school, number of students in teachers' classes, PEU and PD, had no significant relationship with teachers' use of ICT with their students with ID. This section explores these factors in relation to previous empirical research and to explanatory models in terms of using ICT in school settings.

Past studies which have investigated the association of the previous factors with teachers' use of ICT have been inconsistent. Generally, the literature shows that factors such as teaching experience, the grade that is taught, teachers' qualification, age, gender, number of students in teachers class, number of classes in schools and academic department had a significant relationship with teachers' use of ICT (Akbulut, 2009; Al-Alwani, 2005; Albugarni & Ahmed, 2015; Aldossry, 2011; Alharbi, 2012; Almuqayteeb, 2009; Aramide et al., 2015; Bozdogan & Rasit, 2014; Cooper, 2011; Hernández-Ramos, 2005; Jamieson-Proctor et al., 2006; Tondeur et al., 2008; Umar & Yusoff, 2014; Wiseman et al., 2018; Wong & Li, 2008). However, other studies found no significant relationship of these factors with teachers' use of ICT, which were consistent with the results of the current study. For example, they reported no significant relationship between age, gender, grade level taught, region of school (i.e. rural and urban areas), highest academic qualification, number of students in class, teaching experience and type of school (i.e. private and public schools or government or non-government schools) (Agbatogun, 2010; Flanagan et al., 2013; Gil-Flores et al., 2017; Gorder, 2008; Kusano et al., 2013; Menon, 2015; Mia & Haque, 2013; Smeets, 2005). The reason for these different results may be linked to a variety of factors such as differences of context, sample, methods and research procedures (Gil-Flores et al., 2017).

The lack of a significant association between PD and teachers' use of ICT in the present study is inconsistent with the literature. A number of studies have shown that the use of ICT was related to the level of PD (Cavas et al., 2009; Giordano, 2007; Jegede et al., 2007; Kahveci et al., 2011; Lau & Sim, 2008; Lavonen et al., 2006; Mishnick, 2017; Sa'ari et al., 2005; Samak & Tawfik, 2006). In other words, the use of ICT increases if teachers received a suitable PD program that aimed to increase their skills of technology use. The findings of the current study are not surprising because both the quantitative and qualitative data showed a general lack of PD courses and particularly in special education. On the other hand, the previous studies indicated that the majority of their participants perceived that they were provided with PD programs in ICT. However, these participants were general teachers not from an special education specialisation.

Early work by Davis (1993) reported that PU was the only belief that significantly correlated with the use of system by users. This was supported by Nam et al. (2013) who found that PU was the most important factor related to the use of assistive technology, while PEU had no significant relationship on the use of assistive technology. Even though findings from the previous studies are consistent with results of the current study, which showed the influence of PU and the lack of a significant association between PEU and use of ICT, both of these beliefs were found unlikely to be related to the use of ICT (Davis, 1985; Davis et al., 1989; Turner et al., 2010). To clarify, Turner et al. (2010) identified 79 relevant empirical studies in 73 relevant articles. The results showed that the only factor that was likely to be correlated with actual usage in TAM was intention to use. More investigation on teachers' beliefs would help us to establish a greater degree of accuracy on the acceptance of ICT in schools. The next section will explore the non- significant factors in relation to attitude towards the use of ICT.

The present study also showed that eleven variables, which included age, gender, highest academic qualification, type of school, years of experience, lesson per week, number of classes in school, region of school, number of students in teacher's classes, PEU and PD, had no significant association with teachers' attitudes to use of ICT with their students with ID. Regarding the association between age, gender and attitude to use of ICT, the literature review revealed contrasting findings. A number of studies indicated that teacher's age is considered to be a significant factor related to teacher attitudes (Cavas et al., 2009; Deniz, 2005; Elsaadani, 2013; Goktas, 2012; Jennings & Onwuegbuzie, 2001; Kusano et al., 2013; Luan et al., 2005; Samak & Tawfik, 2006; Scherer et al., 2015). However, other studies found similar results to the current study, in which age did not significantly predict teachers' attitudes to use of ICT (Agbatogun, 2010; Albirini, 2006; Spiegel, 2001; White Baker et al., 2007). In term of gender, several studies found gender to be a significant predictor of teacher's attitude (Goktas, 2012; Kusano et al., 2013; Venkatesh & Davis, 2000). Other studies reported similar results to the current study, which found that gender had no significant relationship with a teacher's attitude (Agbatogun, 2010; Albirini, 2006; Cai, 2017; Cavas et al., 2009; Elsaadani, 2013; Ogirima et al., 2017; Teo et al., 2015; White Baker et al., 2007).

The relationship between teaching experience and teachers' attitudes to use of ICT has been widely investigated. A growing body of literature showed the significant role a teacher's experience plays in shaping their attitude to use of ICT, which was inconsistent with the result of the current study (Ayub et al., 2015; Blackwell et al., 2014; Cavas et al., 2009; Karaca et al., 2013; Mac Callum & Jeffrey, 2014; Overmeyer, 2012; Russell et al., 2003; Sadik, 2006; Samak & Tawfik, 2006; Youngkyun et al., 2017). Several studies were also inconsistent with the current study in which they found highest academic qualification of the teachers was a significant factor in predicting teachers' attitudes to use of ICT (Albirini, 2006; Aramide et al., 2015; Samak & Tawfik, 2006). In order to explain the differences between the results of the current study with other studies, it is important to note that the studies outlined previously − that examined the effects of teacher age, gender, highest academic qualification and teaching experience on attitudes to use of ICT − did not involve teachers in the ID or special education field. Rather, they focused on other groups of teachers in only general education.

Region and type of school was not significantly related to attitude to use of ICT in the current study. This result was also found in the past literature (Almuqayteeb, 2009; Menon, 2015; Samak & Tawfik, 2006). Lessons per week, number of classes in schools and number of students in teacher's classes were also investigated (Al-Alwani, 2005;

Alsulaimani, 2012; An & Reigeluth, 2011; Emhamed & Krishnan, 2011). However, these previous studies did not investigate the relationship between these factors and teachers' attitudes to use of ICT. Instead, they treated them as obstacles that may cause a negative impact on use of ICT and their attitude. The lack of studies that explored the relationship between region, type of school, lessons per week, number of classes in schools and number of students in teacher's classes and teachers' attitudes may be related to the fact that some researchers omitted them in their studies because they had already considered them as non-significant factors (Gil-Flores et al., 2017). It should be noted from the above, however, that limited studies are available investigating the relationship between region, type of school, lessons per week, number of classes in school and number of students in teacher's classes with teachers' attitudes to the use of ICT. The lack of studies in this area motivated the present study to include them as independent factors.

The relationship between PD and teachers' attitudes to use of ICT has been globally investigated. There is general agreement that there is a positive relationship between PD or training and teachers' attitudes to use of ICT (Abuhmaid, 2011; Al Sulaimani, 2010; Alrasheedi, 2009; Cavas et al., 2009; Jegede et al., 2007; Kahveci et al., 2011; Lau & Sim, 2008; Mansour et al., 2013; Sa'ari et al., 2005; Samak & Tawfik, 2006). This result contradicts the result of the current study. An explanation of these differing results could be linked to the level of PD that the participant teachers received. For example, the previous studies indicated that the majority of participants received PD programmes, unlike the findings of the current study, which showed a general lack of PD courses, particularly in special education.

The absence of a significant correlation between PEU and teachers' attitudes in the present study was inconsistent with other studies. A number of studies have found that PEU was a significant predictor of teacher attitudes along with PU (Alharbi & Drew, 2014; Binyamin et al., 2017; Davis, 1993; Nair et al., 2012; Rand & Andre, 2015; Teo et al., 2008). On the other hand, other studies supported the results of the current study, which indicated no significant correlation between PEU and teachers' attitudes (Moses et al., 2011, 2013; Nam et al., 2013). This may be explained by the unique modification that was made to the TAM in the current study. For example, extending the TAM by adding selected factors, narrowing intention to use and treating attitude as a dependent variable may be a reason for this inconsistency. The next section explores the perceived barriers that teachers of students with ID felt limited their use of ICT.

6.1.5 Finding 5: Barriers in the use of ICT

Drawing on the quantitative and qualitative findings of the present study, it is clear that Saudi special education teachers have faced a number of barriers that have limited their use of ICT with students of ID in their schools. This section presents data from the QTAMID concentrated on the 'barrier in the use of ICT' scale and from interviews with selected participants where teachers expressed in more depth their perspectives regarding the barriers and the reasons that caused or produced them in the Saudi schools. In addition, this section will further discuss findings from the qualitative phase which focused on the enablers to the use of ICT rather than the barriers, and particularly focused on why respondents felt positively towards ICT use.

In general, the barriers identified as the most important in the quantitative results were similar to those found in the quantitative phase. To illustrate, the important barriers mentioned in the quantitative findings were lack of funds or providing ICT resource by the government, unavailability of ICT resources for teachers, lack of PD/training around using ICT in the ID field, school infrastructure and environment is not suitable for using

ICT and not enough technical support for ICT. Findings from the qualitative phase found that the four main barriers that impeded teachers from using ICT with their ID students were lack of ICT availability, lack of PD, lack of support and other barriers (which include large class size, suitability of school buildings and personal barriers to use of ICT). Surprisingly, an interesting barrier among the personal barriers to use of ICT was a negative attitude towards the use of ICT, which was not mentioned in the QTAMID.

In line with the current study, lack of funds or providing ICT resources by the government was the most important barrier to use of ICT, other studies have similar results including those in KSA (Al-Alwani, 2005; Al Gamdi & Samarji, 2016; Albugarni & Ahmed, 2015; Alsulaimani, 2012), in Oman, (Al-Senaidi et al., 2009), in Turkey (Goktas et al., 2009; Özdemir, 2017) and in U.S. (Vu, 2015). The reasons for considering this barrier as one of the largest challenges that limited teachers from using ICT in their schools is because without sufficient funding schools cannot provide ICT equipment (Albugarni & Ahmed, 2015; Budhedeo, 2016; Mumtaz, 2000). Further, Hew and Brush (2007) reported that it is difficult to motivate teachers to use ICT in their classrooms without adequate resourcing. As is evident from the current study, Saudi schools are reliant on funding from the Ministry of Education for technology. As the technology costs so much, teachers are not able to provide these items as part of their teaching resources, as they might with resources such as stationery or teacher-made resources. Therefore, many teachers avoided using ICT with their students of ID.

Evidence from analysis of both QTAMID and interviews suggests that the lack of access to ICT resources was a major limitation for the use of ICT with students with ID in Saudi schools. This finding was consistent with the work of many others (Al Gamdi & Samarji, 2016; Al Mulhim, 2014a; Al Sulaimani, 2010; Alsulaimani, 2012; Goktas et al., 2013; Jones, 2004; Oyaid, 2009; Vu, 2015). This barrier is usually linked to funding issues by the government or the school itself. In the qualitative phase, however, teachers pointed to another issue that created this barrier. They believed that the Ministry of Education in KSA viewed general education as more important than special education. Therefore, while Saudi schools have ICT devices only teachers in general education are allowed to use them. In addition, teachers of students with ID believed that the lack of equality between general education and special education in KSA was related to the undeveloped policies and legislation. As a result, they discussed the importance of establishing new and effective polices and legislation to enable and protect them in their use ICT with their students with ID. They also claimed that the students with ID should have the right to be taught the way they prefer, which is through ICT, so that the aims of teaching are more readily achieved. This was consistent with a number of studies which agreed that there is a lack of polices and legislation that support the use of ICT in Saudi schools (Al-Harbi, 2014; Al-Oteawi, 2002; Almadhour, 2010; Almalki & Williams, 2012; Alshmrany & Wilkinson, 2014; Balanskat et al., 2006; Hakami, 2013). Even though the current study indicated that the teacher of students with ID claimed that they were not allowed to access ICT tools, a few Saudi studies found that teachers in general education also faced a lack of access to ICT resources (Al Gamdi & Samarji, 2016; Al Harbi, 2014; Al Mulhim, 2014a; Al Sulaimani, 2010; Alsulaimani, 2012; Oyaid, 2009).

Another area in regard to barriers to use of ICT identified by respondents was the lack of PD in the use of ICT. Most of the QTAMID respondents (56%), and in the interviews (70%), believed that lack of PD was a major barrier to implementing ICT in their schools. Consistent with this finding, many Saudi studies found barriers such as the weakness of teacher training in the use of ICT, and generally a lack of PD in the use of ICT (Al-Moussa, 2004; Al-Oteawi, 2002; Al Mulhim, 2014b; Alabdulaziz, 2013; Albugarni & Ahmed, 2015; Alghamdi & Higgins, 2015; Alkahtani, 2017; Almaghlouth, 2008;

Bingimlas, 2010; Flanagan et al., 2013; Oyaid, 2009). A possible reason of this barrier was because Saudi universities do not pay great attention to PD for student teachers regarding the future use of ICT in schools (Al Mulhim, 2014b). Further, Al-Oteawi (2002) found that the reasons for not using ICT in classrooms by Saudi teachers is because of insufficient PD courses that offer instruction in basic use of ICT and internet skills. In the qualitative phase, however, teachers felt that this barrier was related to a lack of motivation among the teachers to work hard and do their best to develop their skills. They also abstained because of the lack of cooperation between the Ministry of Education and school principals - they were not able to attend these courses because the school principals would not allow them to leave school during school hours, meaning they were not supported to attend the PD courses sponsored by the Ministry of Education. Based on that finding, respondents suggested that receiving suitable PD is one of the enablers of having not only the knowledge to use ICT but also holding positive attitudes towards the use of ICT. This is consistent with the work of Nair and Das (2012 and Yüksel and Kavanoz (2011).

The literature review emphasised the importance of the content of PD or training courses by identifying whether training should concentrate on technical or pedagogical aspects in different countries. Several studies found a lack of teachers' integration between pedagogical and technical ICT skills in their teaching (Al Mulhim, 2014a; Ali, 2015; Liu, 2010). One of the respondents in Oyaid (2009, p.113) said: "The most important thing is training in how to use ICT in teaching, because general ICT skills can be obtained easily in a one-week training course, but the difficult bit is to use it in my teaching". Consequently, it could be argued that there is an urgent need for PD or training courses in ICT use that integrate technical and pedagogical aspects of technology (Al Mulhim, 2014b). However, the finding of the current study from both the QTAMID and interviews found that respondents believed that the PD courses should be focused on how to use ICT with students with ID and other type of disabilities. Unfortunately, the Saudi Ministry of Education does not give priority to this kind of PD, one respondent commented:

> *The Ministry of Education has established a new way to develop the teachers as practitioners of special education, which involves weekly training for all the education teachers in schools and institutions, and there is only a small part in it that helped them to use the technology. However, after reviewing the content of this part, the courses are either too simple or too hard. (Teacher 4)*

Another reason given for the low use of ICT by the participants in the current study was related to the infrastructure design. More than half of the participants (53%) in the QTAMID believed that school infrastructure and environment was not suitable for using ICT. This was consistent with several Saudi studies that found teachers faced the lack of a suitable place for using ICT such as a resource room or a laboratory fully equipped with the latest technologies (Albugarni & Ahmed, 2015; Almaghlouth, 2008). To be more specific, some of the school buildings are not appropriate for education because they are designed for other purposes. This position was supported by the current study which revealed that respondents in the qualitative phase noted that the Ministry of Education at times used buildings that were unsuitable for school purposes without a pre-investigation, and in these instances, most of them were rented buildings. This meant that it was difficult to use ICT in classrooms which were not designed for this purpose and particularly for students with ID. Furthermore, some respondents believed that it was not appropriate to accommodate students with ID in these buildings and in some cases, it was too dangerous for them. In addition, the classrooms of such schools were too small to contain basic tools such as computers. This was consistent with other Saudi studies in special education, in KSA (Alotaibi & Almalki, 2016; Rana et al., 2011) and in Turkey (Girgin et al., 2011).

Lack of technical support was another barrier found in the present study. Almost half of the Saudi special education teachers responded in the QTAMID that there was not enough technical support for ICT in their schools. This finding is reinforced by a growing body of literature that showed lack of technical support was a major barrier for teachers in schools in KSA (Abdulaziz, 2004; Al Gamdi & Samarji, 2016; Alabdulaziz & Higgins, 2016; Alhawiti, 2013; Almaghlouth, 2008), in Iran (Salehi & Salehi, 2012), in U.K. and the Netherlands (Korte & Hüsing, 2006), in U.S. (Agnew, 2011), in Canada (Sicilia, 2006) and in Turkey (Yildirim, 2007). Therefore, providing ICT in school environments without providing technical support may not lead to an effective use of the technologies.

Saudi studies reported that Saudi school principals play the main role in supporting ICT integration (Al Harbi, 2014; Ghamrawi, 2013). For instance, a supportive teaching environment cannot be created to encourage teachers to use ICT if school principals do not provide suitable support. Saudi schools require uniform support from leadership to implement the use of technology. Even though Saudi teachers have limited knowledge of technology use, it will be difficult to use technology without this support (Alenezi, 2017; Tondeur et al., 2010). This was found in the qualitative phase, which showed that respondents believed that their classrooms could be equipped with ICT tools by a personal donation from them if the Ministry of Education was not able to provide support, but that it would be difficult for them to use ICT when the school principal and supervisors also blocked the use of ICT in their classrooms. In addition, the lack of cooperation by the system and school-level support resulted in a number of respondents being hesitant to use ICT in the ID classroom. Findings from the qualitative phase emphasised that no one provided enough support for teachers or cooperated with other stakeholders to encourage teachers to effectively use ICT. This is consistent with a number of studies which found lack of teacher collaboration or support from other staff, such as school principals, were limiting teachers from using ICT (Means, 2010; Neyland, 2011).

Interestingly, respondents in the qualitative phase reported a number of personal barriers to use of ICT. For example, lack of enthusiasm, motivation and negative attitude towards the use of ICT among the school staff were found to be significant barriers. This is consistent with the finding of Rana et al. (2011), who showed that there has long been a lack of interest and motivation among Saudi special education teachers to use ICT in Saudi schools. More recently, Alabdulaziz and Higgins (2016), found that the major barrier that faced teachers was their negative attitudes and beliefs about teaching mathematics using technology. Generally, a number of studies have found that negative attitudes and beliefs have limited teachers from using ICT in KSA (Alabdulaziz & Higgins, 2016); in Iran (Salehi & Salehi, 2012), in Turkey (Goktas et al., 2009) and in U.S. (Ertmer et al., 1999).

In the current study, however, respondents linked the negative attitude towards the use of ICT to the negative attitude towards the students' abilities. They believed that the more negative attitude to use of ICT, the more negative was the attitude to students' ability to use it. This finding reflects the work of Singh and Agarwal (2013), who revealed that some barriers limit the benefit and use of ICT, such as the characteristics of students with ID. Student ability could be also one of the barriers that may impede the benefits from using ICT. The use of the Internet, for example, requires multiple steps and abilities in reading and writing. Therefore, language ability has been found to be a main barrier in the integration of ICT in the ID field (Nordbrock et al., 2004; Wong et al., 2004). This could be one of the barriers that limits the use of ICT for students with ID. These finding are also consistent with the findings of a recent study by Constantinescu (2015), who reported that student ability prevents special education teachers from using assistive technology in their classrooms. The study also found that the highest barrier selected by the teachers was that students with special needs often refused to use the technology. Further investigation and experimentation in this area is strongly recommended.

6.2 Strengths of the Study

There are a number of strengths in the current study which include empirical, theoretical, sampling and methodological contributions. Empirically, the present study is the first Saudi study that provides findings from well-designed implemented research that investigates teachers’ use of ICT and their attitudes in the ID field. Moreover, the study aimed to deeply understand the research problem by including multiple themes such as factors and barriers surrounding the use of ICT in special education setting and to what extent these themes influence teachers’ use of ICT and their attitudes. Therefore, the findings of the current study provide unique insights that may guide the efforts to effectively implement ICT in schools by understanding how teachers respond to ICT tools and how their attitudes are shaped in the special education field, locally and internationally. The contribution of the current study, based on a consideration of previous empirical work as well as original research, was to add to the limited literature on teachers’ use of ICT and their attitudes in the special education field, including ID, in the Middle East generally and in KSA, in particular.

Theoretically, this study provides additional empirical support by modifying and extending TAM as it extends its application to the use of ICT in ID classes and to a new population of Saudi special education teachers. This model also helped to narrow the empirical gap in the acceptance and use of ICT literature in the Saudi context because now this model can serve as a reference for teacher acceptance and use of ICT with a selection of variables that have not been used in any previous study. Finally, this study has the potential to inform on the use of ICT in special education, an area of crucial importance in view of the increasing roles of ICT in the teaching and learning process. Providing this information is essential for supporting the future of the use of the ICT in special education, and particularly in ID contexts.

Another strength in the current study is the sample size in both quantitative and qualitative phases, which is considered to be of sufficient size to create confidence in the reliability of the findings. More importantly, the study included male and female participants in these two phases – very few Saudi studies that investigated the use of ICT have done this (Al Harbi, 2014; Al Sulaimani, 2010; Bingimlas, 2010; Oyaid, 2009). This is because of the cultural challenges face by any researcher aiming to gather information from opposite gender schools. Including both genders in the current study provided a deeper understanding of the research problem and supported the interpretation of results. In addition, the teachers came from all types of public schools, which included elementary, intermediate and high schools, and public institutions. This study was conducted in the Riyadh region which includes the Riyadh district and the suburbs that lie outside the Riyadh district (Shaqraa, Afif, Al Zulfi, Hafar Al-Batin, Dawadmi, Wadi ad-Dawasir, Alkharj, Al-Hota and Al-Hariq, Al Majma'ah, Al-Quway'iyah, and Al-Ghat). This sampling helped gain an inclusive understanding of special education teachers’ attitudes, usage of ICT and the factors and barriers in the use of ICT from different perspectives and backgrounds.

The final strength is with the methodology that been followed in the current study. First, the findings have provided information in relation to the reliability and validity of QTAMID, which included the six scales used to assess the UICT, A, PU, PEU, PD and B. The content and construct validity and reliability of UICT, A, PU, PEU were supported by using EFA, Chronbach's alpha and a peer review from six specialist panel members, who held a PhD degree in special education, while PD and B were checked for content validity from the same panel members. Secondly, the current study used an explanatory sequential mixed methods design to enhance the interpretation of the results and develop a deep understanding about teachers' use of ICT with their students with ID and their attitudes towards it. Finally, the study used two platforms to gather information in Phase One by adapting two ways, online and hard copy-based questionnaires. This approach helped the researcher to maximise the number of participants and to capture those teachers who were reluctant to use ICT.

6.3 Limitations of the Study

Several limitations have been identified in the present study. For example, interviews with the female teachers were conducted by phone. For religious reasons, many activities of men and women in KSA are segregated. Therefore, the male researcher collected interview data face-to-face for males but had to rely on phone interviews for females. This limitation is commonly reported in Saudi studies that aim to investigate issues related to ICT in education environments across teacher gender (Al Harbi, 2014; Al Mulhim, 2014b; Bingimlas, 2010; Oyaid, 2009).

The current study took place in the Riyadh region. Even though this region included several districts and included approximately 900 teachers of ID, had it been feasible, it may have increased reliability and generalisability to explore other regions since there are approximately 4411 teachers in the ID field across KSA (Ministry of Education of Saudi Arabia, 2018b).

In addition, it was anticipated that 12 teachers would be selected from the respondents who completed the QTAMID to participate in Phase Two using stratified, purposeful, random sampling (McMillan & Schumacher, 2014). The intent was to use select three male and three female teachers from each attitude group to ensure a mix of teacher genders, which has been reported previously to be a factor in attitudes towards ICT (Gil-Flores et al., 2017; Kusano et al., 2013). Of the 396 who completed the QTAMID, 32 respondents indicated they would be interested in being interviewed. The researcher contacted the randomly selected participants but unfortunately many had changed their mind about being interviewed. Therefore, all 32 respondents were contacted to be interviewed. Of these 13 agreed to be interviewed, three with an identified less positive attitude towards rather than the desired six. Therefore, the views of the teachers with a less positive attitude were not equally represented as anticipated, even though they provided substantive responses.

Private schools were not asked to contribute to this study due to the differences in their support, roles, curriculum and environment. Obtaining permission from those private school principals would have delayed the study because this would have involved seeking permission from each private school and the researcher had limited time to collect the data.

Another limitation was that the component of Question 13 in QTAMID that asked for examples of ICT use had a large proportion of missing data (80%) (see Table 4.1). Due to the nature of this open-ended question, which required a written response, a high percentage of the participants did not respond. Therefore, this data were not used in the further analysis, a limitation of this research. However, in the qualitative phase, examples of ICT use were explored.

Lastly, the study did not include all the elements of TAM and or tested the relationship between them. To be more specific, intention to use has not been included within the adapted model of the current study. This factor was omitted because the study aimed to understand attitude and the motivation behind ICT use (see section 2.6.3 Conceptual Famework). Finally, the study utilised self-report questionnaires to gain information such as teacher UICT, and sometimes respondents overestimate their perceived use compared to their actual level of use. However, this limitation was been minimised by adding a second phase to support understanding the phenomena in a different and additional way.

6.4 Implications for Practice

Several implications for practice for the Saudi education administration can be determined from the findings of the present study. The following implications are mainly related to strategies for stakeholders to develop practices, polices, legislation and projects that support the implementation of ICT in special education and particularly ID field. As the study sheds light on how Saudi special education teachers were using ICT in their schools with respect to the related factors and barriers, these implications could support the Saudi plans, polices and projects that intend to increase the use of ICT in educational settings.

Teachers' attitudes and their beliefs toward the use of ICT with students with ID should be taken seriously. The current study showed that the special education teachers held positive attitudes and beliefs towards the use of ICT with their students with ID. They also demonstrated the benefits and advantages of using ICT for them and for the students and provided examples of how they used ICT inside and outside schools. Based on this evidence, the Ministry of Education, universities, administrators and special education teachers themselves need to acknowledge the positive desire and willingness to adapt and use ICT for students with ID. This could be taken on board by the Saudi Ministry of Education before applying and funding new projects and PD programmes that aim to increase the use of ICT in schools such as Tatweer by providing more targeted and informed polices that support the needs of these teachers.

An important finding was that teachers generally used ICT with their students with ID. However, they were using it at low or very low rates due to a number of implementation barriers, for example, lack of funds, lack of ICT resources, lack of technical support, lack of PD and lack of school infrastructure. This significant finding was found in previous studies in Saudi, which were conducted in general and special education in different cities in KSA (Al-Alwani, 2005; Al-Rashed, 2002; Al Harbi, 2014; Al Sulaimani, 2010; Alkahtani, 2013; Almaghlouth, 2008; Bingimlas, 2010; Oyaid, 2009; Rana et al., 2011).

An important finding of the current study was that respondents in both phases nominated lack of access to ICT resources as a great limitation for the use of ICT with students with ID and they linked it to the lack of policies and legislation that enable, protect and facilitate them in their use ICT in their schools. More importantly, they felt that they were not allowed to use ICT devices in schools to the same extent as other teachers in general education. This is because the Ministry of Education in KSA viewed general education as more important than special education. Even though the current study indicated that the teachers of students with ID claimed that they were not allowed to access ICT tools, a few Saudi studies found that teachers in general education also faced a lack of access to ICT resources (Al Gamdi & Samarji, 2016; Al Harbi, 2014; Al Mulhim, 2014a; Al Sulaimani, 2010; Alsulaimani, 2012; Oyaid, 2009). Based on that, the Ministry of Education should give more attention to all these barriers by taking quick actions such as searching for practical methods to help reduce these barrier to the use of ICT in Saudi schools, rather than developing new projects that are not supporting the implementation of ICT in schools.

The current study indicated that the formal PD courses in the general and educational use of ICT, which were provided by the Ministry of Education, are deficient; in particular, the use of ICT in special education. In fact, only a few teachers had undertaken formal PD courses in relation to the use of ICT in the current study. In addition, PD was also found as a significant factor in the qualitative findings, which emphasised the vital role of PD whether in teachers' attitudes or their use of ICT with their students with ID. Therefore, the Ministry of Education and the universities which provide pre-service and in-service teacher training, should take serious steps in developing teachers' knowledge and skills to implement ICT effectively. This can be done by organising and supporting PD courses with a special team in ICT integration, who can help to deliver the content of the PD courses to special education teachers professionally. Moreover, providing adequate and sufficient PD courses with flexible training hours that explain how ICT can be used to meet the need of the teachers, students, and lessons in a more continuous way.

Finally, building a supportive platform from all who engaged in the field of education including the teachers themselves to have the opportunities to share their knowledge and experience with teaching community. These implications could be easily adapted because the majority of teachers in the current study showed a high willingness to participate in PD courses and to take online modules of PD courses.

The findings also suggested that the Saudi teachers understand the benefits of using ICT and admire the usefulness of ICT with students with ID. In addition, the qualitative analysis revealed that teachers should receive PD courses that focus on the pedagogical aspects of using ICT with students with ID. Therefore, the Ministry of Education should encourage the Saudi teachers towards integrating ICT into their teaching practice with respect to the type of disability of each class or school. To accomplish this, PD courses should be extended to include the use of ICT in all special education categories. For example, develop PD courses that concentrate in how to use ICT with students with ID, and these courses must take into account the students' needs, skills and abilities. In this way, teachers will be able to use ICT inside classrooms to demonstrate their subject disciplines and to support the special needs of their students, in particular. The Ministry of Education also should provide a workshop that focuses on making ICT more accessible and easy to use with students with ID. These measures will help to raise the awareness and knowledge of the teachers so they can maximise the benefits of using ICT.

Another implication from the finding of the current study is that TAM could be an effective framework to guide the use of ICT in education settings, including special education. The quantitative results of the study reported that gender, lessons per week and PU were the predictors of the teachers' use of ICT while teachers' attitudes were only predicted by PU. This led to the model being adapted and extended, as a framework based on TAM provides an understanding about the relationships of these factors, and its role in promoting teachers use of ICT and shaping their attitude. For instance, the model of the present study indicated that the higher teachers' PU, the more they use ICT and hold a positive attitude towards ICT use. Based on that finding, the Ministry of Education, and all related administrations such as universities, should focus on demonstrating the usefulness of ICT in special education classes. This would help increase beginning teachers' use of ICT as well as shaping their positive attitude towards the use of ICT. They would then take this attitude into the schools when they gain employment. In this way, teachers would have better professional practice that ensures equal learning opportunities for all students with ID. It will also help the Ministry of Education to achieve its educational goals in this area, such as increasing the standards of implementing ICT in the Saudi schools. In addition, this model could benefit the Ministry of Education through understanding more factors before designing their future projects and polices to adapt and increase the use of ICT in all Saudi schools.

Finally, the findings revealed that there was a lack of polices in practicing teaching generally, and using ICT particularly, as suggested by many teachers in the current study. This was consistent with a number of other studies which agreed that there is a lack of polices and legislation that support the use of ICT in Saudi schools (Al-Harbi, 2014; Al-Oteawi, 2002; Almadhour, 2010; Almalki & Williams, 2012; Alshmrany & Wilkinson, 2014; Balanskat et al., 2006; Hakami, 2013). In addition, a fair treatment between the teachers in general and special education and clear polices that specified the roles of each teacher were requested too. This can be solved by combining the Ministry of Education efforts and resources to develop a supportive educational environment, legislation and polices that provides teachers with the required support to use of ICT with their students with ID. This step may allow the special education teachers to have more authority and freedom to manage, access and run ICT resources and, therefore, given the opportunity for them and their students to be benefit from using ICT.

6.5 Implications for Future Research

Several areas are recommended in the present study that can be explored in future research. The study sample was driven from one region (i.e. Riyadh region) in KSA and one specific field (i.e. intellectual disability). Therefore, future studies in multiple and different regions across KSA is needed in order to generalise the findings. In addition, investigating other types of disabilities in KSA such as autism and learning disability is also needed to assess the use of ICT in these fields. Exploring the use of ICT in the Saudi private schools is also required, and more importantly, a comparative study between these schools and public schools regarding technology integration, and the extent of using ICT among the teachers.

Future research should also concentrate on the investigation of the relationship between teachers' negative attitudes and barriers to use of ICT in special education schools. As the current study is consistent with the literature in this finding, which has only explored in general education, more investigation into special education schools is urgently needed. In addition, how the teachers of ID view their students' abilities, in terms of responding to ICT tools, is an identified issue in the present study, which needs more exploration locally and internationally. Consequently, this could be explored more by finding the factors that related to these views and to what extent these views increase or decrease the use of ICT in special education fields. In other words, more work will need to be done to determine how teachers of ID view the abilities of their students and to what extent these views affect their level of ICT use with them.

It should be noted from the current study, however, that limited studies are available on investigating the relationship between region, type of school, lessons per week, number of classes in school and number of students in teacher's classes with teachers' attitudes. The lack of studies in this area motivated the present study to include them as independent factors. Therefore, future research should investigate these factors more broadly.

Future research could further explore how ICT is integrated in classrooms. This could be done by including an observation in the qualitative phase to evaluate and describe how teachers use ICT with their students and which tools they used to deliver the lesson. In other words, future research may use observation as a third phase to compare the actual use of ICT by the teachers and also have a close look at the engagement between the teachers and the students of ID to explore when, why and in what ways ICT is being implemented in the classrooms. In addition, there is a need for further research that investigates two important sides related to the teachers' practices in their classrooms. First, an investigation of how the teachers of ID applied their pedagogies in their classroom by using ICT. Second, the association between their teaching practices, their level of ICT use in their classrooms, and their attitudes.

According to the findings of the current study, formal PD in lacking, therefore, an extensive analysis of the formal PD provided by the Ministry of Education is required. This should include all the PD programs in general, education and special education use of ICT. Future research should also explore how PD courses influence teachers' use of ICT and their attitudes by designing a training package for them. These packages could focus on one or more aspects that help to increase the use of ICT in Saudi schools.

Testing TAM and other models in technology acceptance models in special education field is necessary. Since there is a lack of adapting and testing technology acceptance models such as TAM in the Saudi educational context, there is a responsibility for more investigation to fill this gap (Alharbi, 2013a; Alshmrany & Wilkinson, 2017). A future study should be conducted to build and extend TAM by adding additional factors to gain a greater understanding of the phenomenon and explain a greater proportion of variance (Alharbi & Drew, 2014; Aljuaid et al., 2014; Attis, 2014; Colvin & Goh, 2005; Davis et al., 1989; Holden & Karsh, 2010; Nair & Das, 2012). Variables such as teachers' attitudes towards students with ID, teaching style, system quality and teacher workload are potential factors that could contribute to the growing body of knowledge in the field of ICT integration in schools, and particularly in the Arab region. In addition, more investigation on teachers' beliefs (i.e. PU and PEU) in the relation to teacher use of ICT in schools would help to establish a greater degree of accuracy on the acceptance and adaption of ICT in schools and fulfil the gap in knowledge in this area.

6.6 Conclusion

The current study took place in KSA, where teachers' use of ICT and their attitudes towards ICT use have not been explored by research in the ID field in KSA. As several Saudi studies have examined the use of ICT in general education, this mixed-method study was conducted to investigate Saudi special education teachers' attitudes towards the use of ICT and their use of ICT. More importantly, the influence of selected factors and barriers were also explored to gain a complete picture of teachers' attitudes and their use of ICT. Up till now, there has been no emphasis by the Ministry of Education on providing funding to address the specific needs of special education and the use of ICT by special education teachers to improve the abilities and skills of students with identified needs. This must be raised on the policy agenda, albeit as part of the broader issue of funding ICT projects that are achievable and are supported through expertise in providing infrastructure and support for Saudi schools.

The findings of this study in both phases revealed that the Saudi teachers of ID used ICT but at a low rate due to multiple barriers. These barriers included, lack of ICT availability, lack of PD courses, and lack of support. However, the teachers of ID showed a general positive attitude and positive belief towards the use of ICT with students with ID. This indicates that teachers are aware of the importance of changing their teaching pedagogies, so providing funding to assist in this process will result in many benefits to their students.

This study has identified areas where increased attention can be focused, for example, when considering the aspects that affect the teachers' use of ICT, the gender of the teacher and the amount of time they spend with the class (i.e. the number of lessons that are taught by the teacher per week) are important factors to take into account. This will be of interest to school administrators and leaders who are aiming to increase teachers' use of ICT in their classrooms. Other areas to focus on include the teachers' perceived usefulness of the ICT, and this can be instrumental in determining the types of professional learning that is offered for special education teachers, who at times feel they are being ignored in favour of general education. The teachers themselves have provided extensive feedback in this study on what type of PD they require, and how the PD should be specifically focused on how to use the specific tools necessary for students with ID to improve their access to learning within the classroom.

The significant findings of this study, particularly in relation to predicting teachers' attitudes and use of ICT, could be useful and beneficial for the Ministry of Education and Saudi universities in KSA when reviewing their projects, courses and polices in order to make the use of ICT in special education classes more accessible and effective. On the whole, this study has contributed to the growing body of knowledge in the field of special education technology and in ID field in the Middle East, and most particularly in KSA. Also, it has made a further contribution to technology acceptance and adaption models in general and to the TAM, in particular, by developing, testing and including new factors and populations.

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APPENDICES

Appendix 1 QTAMID

1.1 English Version

The University of Newcastle
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Callaghan NSW 2308
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Fax 02 49216939

Teacher's attitude to use of information communication technology (ICT) with students with intellectual disability in Saudi Arabian schools

Associate Professor Ian Dempsey (Principal Supervisor), Dr. Kylie Shaw (Co-Supervisor) and Ibraheem Alsawalem (Ph.D. researcher)

Introduction:

This questionnaire is about your attitude to the use ICT as a teacher of students with intellectual disability. There are no right or wrong answers and this questionnaire can be completed anonymously. If you wish to complete a short interview with the researcher, you can provide your contact details at the end of the questionnaire.

There are 6 sections of this survey questionnaire, Parts A, B, C, D, E and F.

Part A aims to collect basic demographic information about you.

Part B, your ICT use and the type of ICT.

Part C, your formal professional development regarding the use of ICT.

Part D, your attitude to use of ICT.

Part E, your beliefs to use of ICT.

Part F, your barriers that prevent you from using ICT.

Please allow approximately 25 minutes to complete all six sections.

Please begin at Part A

PART A

For all items, please tick each box that applies to you or your circumstance.

	Demographic information
1	In which region do you teach? □ Riyadh □ Outside Riyadh: (Shaqraa, Afif, Al Zulfi, Hafar Al-Batin, Dawadmi, Wadi ad-Dawasir, Al-Hota and Al-Hariq, Al Majma'ah, Al-Quway'iyah, and Al-Ghat).
2	What is your gender? □ Female □ Male
3	What is your age range? □ > 20 □ 20 – 24 □ 25 – 29 □ 30 – 34 □ 35 – 39 □ 40 – 44 □ 45 – 49 □ > 49
4	What is your highest academic qualification? □ Intermediate diploma □ Bachelor degree □ Higher diploma □ Master’s degree □ PhD
5	How many years have you worked as a teacher? □ 1-5 □ 6-10 □ 11-15 □ 16- 20 □ > 20
6	Which level of school do you work in? □ Elementary school □ Intermediate school □ High school □ institution
7	How many students with intellectual disability are in your class? □ 0-5 □ 5-10 □ > 10
8	How many classes’ periods you have per week? □ 1-9 □ 10-15 □ 16-20 □ > 20

9	How many classes for students with intellectual disability are in your school? □ 0 □ 1-3 □ 4-6 □ 7-9 □ > 9

PART B

Please indicate your current use of ICT in the school environment.

<table>
<tr><td></td><td colspan="5">Statement</td></tr>
<tr><td rowspan="3">10</td><td colspan="5">Do you use ICT with students with intellectual disability in school environment:</td></tr>
<tr><td colspan="3">o Yes</td><td colspan="2">o No</td></tr>
<tr><td colspan="5">If you don't use ICT at all in school environment, please go to question 13.</td></tr>
<tr><td rowspan="2">11</td><td colspan="5">On average, I use ICT in in school environment with students with intellectual disability (pick most accurate answer):</td></tr>
<tr><td>□ less than once each week</td><td>□ once each week</td><td>□ several times each week</td><td>□ once each day</td><td>□ several times each day</td></tr>
<tr><td>12</td><td colspan="5">I normally spend about ….. hours each week directly using ICT with students with intellectual disability in school environment.</td></tr>
</table>

13 For each of the devices below, please indicate the device provided by your school, their availability and how frequently it has been used by you for teaching students with intellectual disability in your class. Also, provide some example of how you use it with your students.
(If you don't use ICT at all, you don't need to answer this question)

Device	Type of availability			Frequency of use if its available			Example of how you use it with your students (separate question in survey monkey)
	Available in school	Available in class	Not available	Never	Sometimes	Always	
Computer or laptop							
LCD or DLP projector							
Printer or Scanner							

Video conference unit							
Interactive whiteboard (e.g. SMART Board)							
Smart Tablets (e.g. iPad, galaxy tab)							
Digital camera (still or video)							
MP3 player/iPod							
DVD player							
Loudspeakers							
smart device (e.g. IPhone, Galaxy, LG, Huawei, BlackBerry or any other brand)							
Internet							

PART C

This part of the survey questionnaire will ask about your formal professional development regarding the use of ICT. For all items, please tick each box that applies to you or your circumstance.

	Statement
14	Have you ever attended any formal professional development, training course, workshop, or seminar in the use of ICT with students with intellectual disability in the last 5 years: □ Yes If ''Yes'', please continue to answer question 15 □ No If ''No, please moved to answer question 17
15	Please specify the number of hours and/or days of training: - - - -hours - - - - days in the last 5 years
16	What type of formal professional development have you received? Please tick all that apply: □ The general use of ICT

	□ The educational use of ICT □ The use of ICT in special education
17	I would like to know more about how to use ICT to assist students with intellectual disability.
	□ Yes □ No □ Not sure
18	I would attend formal professional development sessions that would help me learn more about how to use ICT for students with intellectual disability.
	□ Yes □ No □ Not sure
19	I would use online modules or participate in webinars that would help me learn more about how to use ICT for students with intellectual disability
	□ Yes □ No □ Not sure

PART D

Please read each sentence below and identify your response.

	Statement							
20	The use of ICT with students who have intellectual disabilities is	Very Bad	Moderately Bad	Slightly Bad	Neutral	Slightly Good	Moderately Good	Very Good
		1	2	3	4	5	6	7
21	The use of ICT with students who have intellectual disabilities is	Very Foolish	Moderately Foolish	Slightly Foolish	Neutral	Slightly wise	Moderately wise	Very wise
		1	2	3	4	5	6	7
22	The use of ICT with students who have intellectual disabilities is	Very Unfavourable	Moderately Unfavourable	Slightly Unfavourable	Neutral	Slightly Favourable	Moderately Favourable	Very Favourable
		1	2	3	4	5	6	7
23	The use of ICT with students who have intellectual disabilities is	Very Harmful	Moderately Harmful	Slightly Harmful	Neutral	Slightly Beneficial	Moderately Beneficial	Very Beneficial
		1	2	3	4	5	6	7
24	The use of ICT with students who have intellectual disabilities is	Very Negative	Moderately Negative	Slightly Negative	Neutral	Slightly Positive	Moderately Positive	Very Positive
		1	2	3	4	5	6	7

PART E

Please respond to the following statements by circling the number that represents your level of agreement or disagreement.

No	Statement	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
25	Using ICT improves the quality of the work I do with students with intellectual disability in school environment.	1	2	3	4	5	6	7
26	Using ICT gives me greater control over my work with students with intellectual disability in school environment.	1	2	3	4	5	6	7
27	ICT enables me to accomplish tasks more quickly with students with intellectual disability in school environment.	1	2	3	4	5	6	7
28	ICT supports critical aspects of my job with students with intellectual disability in school environment.	1	2	3	4	5	6	7
29	Using ICT increases my productivity with students with intellectual disability in school environment.	1	2	3	4	5	6	7
30	Using ICT improves my job performance	1	2	3	4	5	6	7

	with students with intellectual disability in school environment.							
31	Using ICT allows me to accomplish more work with students with intellectual disability in school environment than would otherwise be possible.	1	2	3	4	5	6	7
32	Using ICT enhances my effectiveness on the job with students with intellectual disability in school environment.	1	2	3	4	5	6	7
33	Using ICT makes it easier to do my job with students with intellectual disability in school environment.	1	2	3	4	5	6	7
34	Overall, I find the ICT system useful in my job with students with intellectual disability in school environment.	1	2	3	4	5	6	7
35	I find the ICT system cumbersome to use with students with intellectual disability in school environment.	1	2	3	4	5	6	7
36	Learning to operate the ICT system with	1	2	3	4	5	6	7

	students with intellectual disability in school environment is easy for me.							
37	Interacting with the ICT system is often frustrating with students with intellectual disability in school environment.	1	2	3	4	5	6	7
38	I find it easy to get the ICT system to do what I want it to do with students with intellectual disability in school environment.	1	2	3	4	5	6	7
39	The ICT system is rigid and inflexible to interact with students with intellectual disability in school environment.	1	2	3	4	5	6	7
40	It is easy for me to remember how to perform tasks using the ICT system with students with intellectual disability in school environment.	1	2	3	4	5	6	7
41	Interacting with the ICT system requires a lot of mental effort with students with intellectual disability in school environment.	1	2	3	4	5	6	7
42	My interaction with the ICT	1	2	3	4	5	6	7

	system is clear and understandable with students with intellectual disability in school environment.							
43	I find it takes a lot of effort to become skilful at using ICT with students with intellectual disability in school environment.	1	2	3	4	5	6	7
44	Overall, I find the ICT system easy to use with students with intellectual disability in school environment.	1	2	3	4	5	6	7

PART F

This part of the survey questionnaire will ask specifically about the barriers that prevent you from using ICT with students with intellectual disability in school environment. For all items, please tick each number that applies to you or your circumstance.

	Statement	Not a barrier	Small barrier	Moderate barrier	Important barrier	Don't know/No opinion
45	Unavailability of ICT resources, for teachers.	1	2	3	4	5
46	School infrastructure and environment is not suitable for using ICT.	1	2	3	4	5
47	Difficult to access ICT in classes.	1	2	3	4	5
48	Lack of funds or providing ICT resource by the government.	1	2	3	4	5
49	Unclear policy regarding the use of ICT in schools.	1	2	3	4	5

50	Lack of plans to use ICT in schools.	1	2	3	4	5
51	ICT is not supported by school leadership, supervisor or policy.	1	2	3	4	5
52	Not enough technical support for ICT.	1	2	3	4	5
53	Lack of professional development/training around using ICT in intellectual disability field.	1	2	3	4	5
54	Lack of time to prepare lesson by using ICT.	1	2	3	4	5
55	Heavy load and long tasks	1	2	3	4	5
56	Lack of Arabic educational software.	1	2	3	4	5
57	Lack of suitable educational software for students with intellectual disability.	1	2	3	4	5
58	Difficult to use ICT into their curriculum.	1	2	3	4	5
59	Large number of students in one classroom.	1	2	3	4	5
60	Lack of students ability	1	2	3	4	5
61	Lack of interest and motivation to use ICT.	1	2	3	4	5
62	lack of awareness to use ICT	1	2	3	4	5

Thank you for participating in phase of this project, and you can submit now. If you would like to participate in phase two, please continue for providing your personal information in the right section.

In this phase the researcher will conduct an interview for 20 minutes to talk about your attitude to use ICT with students with intellectual disability, so please add your information below:

Name:

School:

School address:

Mobile:

Email:

1.2 Arabic Version

لساكوين ةعماج

ةيلكاةيبرتلا

زكرما ةيبرتلا ةصاخلودرااست اةقاعلا

هاتف +961249216282

ازعا يئا نيملعمل

واالمعلت االاسلم مكيلعور ةمح

اللهوهتاكرب

ا مكل ركشداشملل مكلوخر ةلحرمل يثحب يف ةكاوتكدلراة ونعبان وم :ا فـقا وحذ نيملعملادختسام اينقتت االمولعملت والااصتلات عم (ICT)الاطلب ذوي ا ةقاعلاادم يف ةيركفلراس ا ةكلمملا ةيبرعلاوعسلددهي .ةيف هذا ا ديدحت ىلع ثحبلورشح وما فـقا نيملعملودقتعما وحذ مهتادختسام اينقتت االمولعملت والااصتلات ةفاضلاابا ىل ةفرعماوعلا لما ىلع دعاست يتلد مءهذه اوملا فـقإايباجيً او ايبلسً . االحيسد اضيول ا ثحبلارعتلف ةيفيك ىلع ادختسام يملعم

ا ةيبرتلاذهل ةيركفله االينقتلت و ديدحتاه ماوعلا قئا نم مهعنمت يتلادختسا اهمودمى ارابتطومب اها فـقا.نيملعمل

هذا ادهتسيد ثحبلف ا نيملعملا يف نيصصختملا ةقاعلاادم عيمج يف ةيركفلارس واعمه ةقطنم داايرلض ووضااهيد و عيمجااشملر مهيدل نيكاايخلر يفااشملر . اهمدع نم ةكإامكل االجتي نل ةنابتسلاوز ٥٢ د نم ةقيقو تقااشملرك ةياهن يف .ااشملل نكمي ةنابتسلارك نم هتانايب ليجستا لجااشملر يف ةكا ةلحرملا نم ةيناثلا ثحبلو ةلباقم نمضتت دملة ٢٠-٥٢ دوح ثيدحلل ةقيقل وما فـقااجت نيملعمله ادختسام اينقتت االمولعملت والااصتلات .ااسملهي يف ةم ا ربع ثحبلا ىلع ةباجلإهذه ادج ةمهم ةنابتسلااًديم دعاست جئاتن قيقحتل ان ا ةقاعلاا يف ةيركفلا ةكلمملا ةيبرعل اوعسلدةي

ىلعاوطتلر والاراقتء ةيعون .ا ببستن نل ةلئسلأاي ازاعج او اياخم ط كل ةلمتحم رواالمولعملت ا ةصلختسمل نماايبتسلان دختستن لم ا يف لاارغاض ةيملعووس اهيلء علطي نلى ا ثحابلوا ىلع نيفرشملا . ثحبلواحد يفل رشن

جئاتنهذا اوس ثحبلف متيا ةيرس ىلع ةظفاحملاالمولعملت ا.ةيصخشل

هذه اوتحت ةنابتسلاي ةتس ىلعأاسقم :يلاتلاك ةحضوم

ا مسقلاالاول اامولعم :ت

ةيصخشا مسقلا : يناثلادختسااينقتل كمت اامولعملت

والااصتلات ا مسقلا : ثلاثلا ريوطتلا يـنهملوادتلربـي

ا مسقلارلاوم : عبا كفقااجته ادختسام اينقتت اامولعملت

والااصتلات ا مسقلادقتعم : سماخلا وحذ كتادختسام اينقتت اامولعملت

والااصتلات ا مسقلااسلدس :اوعلا قئا قيعت يتلادختسااينقتلكمت اامولعملت

والااصتلات

نم ديزملااسفتسلار كنكمياوتلا عم لصا ىلع ثحابلااوجلال ر : مق٠٥٠٣١٨٦٨٥٨

الايميل: ibraheem.alsawalem@uon.edu.au

الباحث : إبراهيم محمد ناصر السويلم

اراشدات :

دصقيااينقتب ثحابلت اامولعملت والااصتلات :ا بساحلا يلآو ةيقبازهجلاة ا ةيمقرلا نكمي يتلأن لثم هبلصتت
المعباطلت واريماكلات والمحساملت ا ةيئوضلوازهجلاة ا ةيحوللواشاشت ارعلض وربا جما بساحلا يلآا ةفلتخمل
واربلا جما ةيميلعتلوا طئاسولادعتملدة واكبشت ا بساحلا يلآوا تنرتنلإوا نكمي يتلادختسااعيمج اهمًةيلمع يف
ا ميلعتلوا ملعتل.

ا مسقل

الاول اامولعملت

اةيصخشل

١-ااجرلء ديدحتا ةقطنملااهبلمعت يتل • اايرلض • رقشاء • فيفع • ايفلزل
٢-ااجرلء ون ديدحتع اسنجل •

٣-االجرلء كتئف ديدحتاةيرمعل
٢٠-٢٤ ا لق
نيرشع نم
•

٢٥-٢٩

• ٤٤-٠٤
٤-االجرلء ديدحتاوتسملى االكالأديمي • دولب مطسوتم • كب
٥دع مكـد ونسات يف كتربخاالجملل ايميلعتل • ٥-١ • ٠١-٦ •
٦-االجرلء ةئف ديدحتادملر ةسااهبلمعت يتل • ادتبايئ •
٧دع مكـد االطلب ذوي ا ةقاعلاا ةيركفلاوتملا نيدجاوقتنيذلم دتبركلصف يف مهسي • ٥-٠ •
٨دع مكـد ا صحلادتلر ةيسيادتب فـلكملر اهسيأايعوبسً كبلاطل ذوي ا ةقاعلااةيركفل • ٩-١ • ٥١-٠١
٩دع مكـد وصفل ذوي ا ةقاعلاا ةيركفلاوجوملدة ايلاحًدم يف ركتسد • دجوي لا • ٣-١ • ٦-٤

ا مسقل

ا يناثلهذا اوتسم ةفرعمل صحخم مسقلى ادختساابينقتل كمت االمولعملت والااصتلات عمالاطلب نمذوى

اةقاعلا
اةيركفل

أروتسم ديدحتوجى ادختسا كماابينقتل يلاحلت االمولعملت والااصتلات يفا ةئيبلادملر: ةيسد

٠١-هدختستلم ابنقتت االمولعملت والااصتلات عمالاطلب ذوي ا ةقاعلاا يف ةيركفلا ةئيبلادملرةيسد

- معز
- (لاتستخدمن تكن ملم هذه التقنيات ابيانهن، أر وجاوسللا هجوتلال ر مقة٣١)

١١ يفـا طسوتملا، انادختسم اينقتت امولعملت والاتصالات يفا ةثيبلادملر مع ةيسالاطلب ذوي ا ةقاعلاالةيركفل (ا رتخا رثكا:)كبسانت ةباج

- ارم نمـل قة وا لك دحاوبسع •
رمة واحدة أ   • ايعوبس
رمات ديدعة أايعوبس
- رمقويـلك م
- دعةرم اتايموي

٢١ اةـدع اوحـيضقااساد ...... يلت لك يفاوبسع يفادختسام اينقتت امولعملت والاتصالات عمالاطلب ذوي ا ةقاعلاا يفـ ةيركفلا ةثيبلادملرةيس

٣١ ـالجراء ديدحتاز ةهجلأة ا رفوتملوا عم كلبةنم ةمدختسملاالطلب ذوي ا ةقاعلاا يف ةيركفلا ةثيبلادملرعة يس حيضوتذاتر ركذب كلل ةيعوب ىلعدة ذادختسلاام:

المهجاز	وذع ارفوتلا			ادختسلاام			اثمل ىلعادختسلاام
	ادملرة سةرفوتم	ا لصفلرفوتم	ريغ ايئاهنرفوتم	لاادختسم	االنايحـ	دائمـًا	
ا رتوبيمكلاومحملا رتوبيمكلا يبتكملا							
ةشاشارعلض (اربلو)رتكجـ /داوشـ ةات							
ا ةعباطلاو حسامل ايئوضل							
دارئة ةينويزفلت							
اوبسلرة ةايكذلا							
ةات يسكلااجب ..ا) خلـ ازهجلأة ا) ةيكذلاي ابل /							
ريماكا رةيمة							
اي بود / MP3							
اهجز دي يفدي DVD / player							
اعامست ربكم /ات وصت							

							/ يسكلااجهواوي ..ا)خلهوا فـتذ (ةيكاي وفن /
							إتـنرتن
							اخرى ...

ا مسقل

ا ثلاثلا ريوطتلا ىنهمل

وادتلربـ

هذا ازجلء ةفرعمل صصخمآراوح لكئل ا ريوطتلا يهملوادتلر صخي اميف بيادختسام اينقتت امولعملت والااصتلات عملاطلب ذوي ا ةقاعلاا يف ةيركفلا ةئيبلادملرةيس

٤١-ھ قبسد لان دتر لكشبـتبر ىلع يمسادختسام اينقتت امولعملت والااصتلات عملاطلب ذوي ا ةقاعلاةيركفل يفاونسـ سمخلات اةيضامل

- معن
- (لاااجرلء اوسلل هجوتلال ر مق٧١)

٥١دح لاضفـد دعد اعاسلت واايلام ا يتلأ يف اهتممتهذا ادتلر بيالاخ يمسرلل اونسـ سمخلات اةيضامل

اعاسلت ...

الأيام ....

٦١ امـهوذ وع ادتلر بيا يمسرلاذلي لاخ هيلع تلصحل اونسـ سمخلات ا (ةيضامل‌اجرلء) بسانتي ام لك ديدحت

- ادختسلاام المعلماينقتلا ت امولعملت والااصتلات
- ادختسلاام اوبرتليانيقتلا ت امولعملت والااصتلات
- ادختسلاام اوبرتليانيقتلا ت امولعملت والااصتلات اجم يفل ا ةيبرتلاةصاخل

٧١ -اود ان ارعف ا نع رثكادختسام اينقتت امولعملت والااصتلات دعاسملة الاطلب ذوي ا ةقاعلاةيركفل

- معن
- لا
- دكأتم تسلا

٨١-اود اوصحلل ىلعدورات دتر ةيبيو ةيفيك ملعت يف يندعاست ينهم ريوطتادختسام اينقتت امولعملت

- معذ
- لا
- دكأتم تسلا

٩١ -اود ان ادختسام ا تنرتنلاوامنذج الأووح ملعتلل نيلانل ةيفيكادختسام اينقتت امولعملت والااصتلات عم
الاطلب ذوي ا ةقاعلاةيركفلا

- معذ
- لا
- دكأتم تسلاً

ا مسقل

ارلا عبهذا امجت كفقوم ةفرعمل صحفم مسقله ادختسام اينقتت امولعملت والااصتلات يفا ةئيبل

ادملرةيس

المجرلء رقاءة ابعلكرة و ديدحتا ةباجلإاهل ةبسانمل

٢٠ -ادختسام عم الاطلب والااصتلات امولعملت اينقتت بتعير ةيركفلا	اتممز	دج ديجا	ديج	دياحم	يسدع ايل ام دح	يسدع	يسدع دجاً
٢١ -ادختسام عم الاطلب والااصتلات امولعملت اينقتت بتعير ةيركفلا	ينلاقع دجاً	ينلاقع	ينلاقعايل ام دح	دياحم	قع ينلا ريغ	قع ينلاا يل ريغ ام دح	قع ينلا ريغ دجاً

٢٢-ادختسام عمـ الاطلب والااصتلات اامولعملت اينقتت بتعير اةيركفل	دج بسانماً	بسانمـ	بسانمایل امـ دحـ	دياحمـ	انمـ بسا ىل ريغ امـ دحـ	انمـ بسـ ريغ	ريغ دج بسانماً

٣٢-ادختسام عم الاطلب والاصتلات امولعملت اينقتت بتعي ر اةيركفل	دج ديفماً	ديفم	ام دح ديفم اىلـ	دياحم	ا دح ىلـ ريغ ام ديفم	ديفم ريغ	ديفم ريغ دجاً
٤٢-ادختسام عم الاطلب والاصتلات امولعملت اينقتت بتعي ر اةيركفل	ادج يباجياً	ايباجي	ا يباجيا ىلـ ام دح	دياحم	الجي يبا ىلـ ريغ ام دح	الجي يب ريغ	ريغ ادج يباجياً

<u>ا مسقل</u>

<u>إ سماخلهذا ادقتعم ةفرعمل صحصخم مسقلاوحـ كتل ادختسام اينقتت امولعملت والاصتلات عمالاطلب</u>

<u>ذوي اةقاعلا</u>
<u>ا يفـ ةيركفلا ةئيبلادملرةيسـ</u>

المجرلء ديدحتا ةباجلإا نمـ لكـ ىلع ةبسانملاابعلرات اةيلاتل

المبعلرات	دشبة أواف	أواقف	أوا قفاىلـ ام دح	دياحم	ا ام دح ىلـ ريغ	وم ريغاقف	وم ريغاقف دشبة
وجـ نمدة عم يلمع والاصتلات اينقت نسحتت امولعملت ٥٢- ادختسام ا ةئيبل ادملر ةيسا ةقاعلا							

ا ىلع رثك ينحنمة يلمع رطيسة والااصتلات اينقتت المولعملت							

							ا ةئيبلادملر ةيسـ ا ةقاعلاا ةيركفل عمـ يفالاطلب ذوي
							نمـ يننكمت إاجنز والااصتلات اينقتت اامولعملت ٧٢-ادختسام ا ةئيبلادملر ةيسـ ا ةقاعلاا ةيركفل عمـ يفالاطلب
							ا يفـ ةيركفل ا ةئيبلذوي ا عمـ يلمـع ةقاعلا الاطلبوجـ ا بـذ يفـ ةمـهم والااصتلات اينقتـ مـعدتت اامولعملت ٨٢-
							والااصتلات اينقتـ نسحتت اامولعملت ٩٢- ادختسام الاطلب ذوي إ عمـ يتيجاتنـ وتسمـ نمى
							ادملر ةيسـ ا ةقاعلاا ةيركفل عمـ يفالاطلب ذويوتسمـ نمـ ى أدا يئوالااصتلات اينقتـ نسحتت اامولعملت ٠٣-
							ذوي ا ةقاعلإا عمـ ربكـ الاطلباجنأبـ يلـ ز لمـعوالااصتلات اينقتـ حمستت اامولعملت ١٣- ادختسام ا يفـ ةيركفلاةئيبل
							الاطلب ذوي يلمـع ةيلاعف عموالااصتلات زعيزاينقتـ ت اامولعملت ٢٣-

							ا ةئيبلادملر ةيس ا ةقاعلا
							ادملر ةيس ا ةقاعلاا ةيركفل عم يفالاطلب ذوي لكشب يلمع ا ربكوالااصتلات اينقتل لهستت امولعملت ٣٣-
							الاطلب ذوي يدجا عم يلمع يف والااصتلات ديفمةاينقت ت امولعملت ٤٣- اع لكشبم أدج ئيبلادملر ةيس
							ادختسام اينقتت ٥٣- ا دجان ا ةئيبل ادملر ةيسا ةقاعلا ا عم يف ةيركفل الاطلب ذوي
							ادختسام اينقتت ٦٣- ملعت الاطلب ذوي والااصتلات عماامولعملت ل ةبسنلاب لهس
							ا ةئيبل ادملر ةيسا ةقاعلا ا عم يف ةيركفل الاطلب ذوي والااصتلات دقعم اينقتت امولعملت
							دبوري عم الاطلب والااصتلات امولعملت ان وقتم اينقتت ٨٣ نم- الهسل ا يف ةيركفل ا ةئيبلذوي
							امولعملت - ٩٣ اينقتت عم ةنرماالاطلب

ا يفـ ةيركفل ا ةئيبلذوي اةقاعلا							
أ ذيفنت ةيفيك ركذت ٤٠ نمـا لهسل أن ختساب دام ابنقتت المهلم الاطلب ذوي والااصتلات							
والااصتلات ابنقتت امولعملت ١٤- اعمـلعافتل الاطلب ذوي ا دهجلااذلهيذ بلطتيعم انمـريثكل							
والااصتلات ابنقتت امولعملت ٢٤- عمـيلعافت للب ذوي وا حضـ ووبهفمم عمـ							
ا يفـ ةيركفلا ةئيبل ذوي ا ةقاعلا والااصتلات عمـ ابنقتت امولعملتامـ هـ ر يفادختسام نمـ ا حبصلأ دهجل ٣٤ بلطتيـاريثكل							
الاطلب ذوي ادختسلاام عمـ والااصتلات ابنقتـ ةلهست امولعملت ٤٤- اعـلكشبم ادجـ ئيبلادملر ةيسد							

ا مسقل

االسلدس هذا اؤسلل صخم مسقلال اقوعمـ نعت ادختساابنقتل كمت امولعملت والااصتلات عماالطلب

ذوي اةقاعلا
اةيركفل

المجرلء ديدحتا ةباجلإا نم لك ىلع ةبسانملاابعلرات اةيلاتل

لاارعف	ريبك قئاع	طسوتم قئاع	طيسب قئاع	قئاع تسيل	اابعلرات
					والااصتلات اينقتت املولعملت ٤٥- دعم رفوت ملارس
					دختسلاام اينقتت تسيل ةبسانما ةيتحتل دمللارس ٤٦- ا ةئيبلوااةينبل والااصتلا
					اوصفلل ادلرا ةيسد والااصتلات يف اينقتت املولعملت ٧٤ ةبوعصـ
					لبقوزارة ا ميلعتل والااصتلات نم اينقتت املولعملت
					والااصتلات يف اينقتت املولعملت ةسايسادختسام ٩٤دعـم ووضح
					والااصتلات اينقتيفت املولعملت طظخ دختسلاام ٠٥- دعم ووجد
					املولعملت ١٥- اينقتت دمتعمة دلى إدارة والااصتلات ريغ يف
					اينقتت املولعملت ليغشت ةعباتمل ا يف ينفل ادملارس ٢٥-

					اجمل ا ةقاعلا والااصتلات يف اينقتت امولعملتوحل ادختسام ا ينهمل وادتلر بي٣٥- ايغب اريوطتل
					والااصتلات ةينقت امولعملت ادلرس دختسابام دذع
					٥٥رثكـة الهملم ادلرا ةيسد واصحل
					ا ةغللاب ةحاتمل ا ةينقتل ا ةيميلعتل٦٥- ةلقاربلاجم
					ذوي ا ةقاعلإ ا ةبسانمل لاطللب ا ةينقتل ا ةيميلعتل٧٥- ةلقاربلاجم
					ا جهنملادلرا يسد والااصتلات يف اينقتت امولعملت ٨٥-
					الاطلب ذوي ٩٥-زايدة دعد ا فـصلاولا دحـ
					ذوي ادة ةقاعلارات الاطلب ٠٦- اافخنض
					ادختسام اينقتت ا ملعمل ةيفيكب١٦- دعم ةفرعم والااصتلا
					والااصتلات اينقتت امولعملت ا ملعمل يفادختسام ٢٦-
					دختسلاا م اينقتت ادلا عف دلى ا ملعمل الاهامتم

الااصتلا ت					
والااصتلات اينقتت ااموﻟعملت ادختساب ملعملام					

ركشا اشم ىلع لايزجر يف كتكا ةلحرملاالاو نم ىلا ثحبلو مكناكمإبا ىلع طغضلإاهذء ، و يف
احل راشملاب مكتبغر يف ةكا ةلحرملا نم ةيناثلا ثحبلأر وجاركتلم نم ةعباتم ىلع طغضلااب لجو يف مكتانايب عضد
امسقل
ا.اهل صصخمل

يفهذه ا متيسة ةلحرملإرجاء دمل كعم ةلباقمة نع ديزت لا ٠٢ دوحـ ثيدحلل ةقيقل وما وحنـ كفقادختسام اينقتت ااموﻟعملت والااصتلات عملااطلب ذوي ا ةقاعلإاذل ةيركفلا مكنم وجرنا ركتلم زتبوانايبلاب انديت ا ةيلاتلوركشا

ا: مسلا

ادملر: ةس

ونعان ادملر: ةس

اوجلاال:

ا: ليميلا

Appendix 2 Permission to use QTAMID scales

Re: Attutide Scale Adaptation

Icek Aizen <aizen@umass.edu>

Mon 8/08/2016 11:52 PM

To:Ibraheem Alsawalem <Ibraheem.Alsawalem@uon.edu.au>;

The theory of planned behavior is in the public domain. No permission is needed to use the theory in research, to construct a TPB questionnaire, or to include an ORIGINAL drawing of the model in a thesis, dissertation, presentation, poster, article, or book. If you would like to reproduce a published drawing of the model, you need to get permission from the publisher who holds the copyright. You may use the drawing on my website (http://people.umass.edu/aizen/tpb.diag.html) for non-commercial purposes, including publication in a journal article, so long as you retain the copyright notice.

Best regards,

Icek Ajzen
Professor Emeritus
University of Massachusetts - Amherst
http://www.people.umass.edu/aizen

Ibraheem Alsawalem Sunday, August 07, 2016 20:19

Dear Dr. Ajzen,

My name is Ibraheem Alsawalem, and I am a doctoral candidate at the university of Newcastle in Australia. My research topic is "Teacher's attitude to use of information communication technology (ICT) with students with intellectual disability in Saudi Arabian schools". I would like your permission to use and adapt the scale items of your instrument to fit my study. In order to check the psychometric properties of the scales, exploratory factor analysis (EFA) and Chronbach's alpha will be used. Further, the content

Re: Interest in Professional Development

Cindy Okolo <okolo@msu.edu>

Tue 9/08/2016 12:22 AM

To:Ibraheem Alsawalem <Ibraheem.Alsawalem@uon.edu.au>; jeff.diedrich@gmail.com <jeff.diedrich@gmail.com>;

Thanks for your interest in our work. You are welcome to use any questions you wish. Best wishes with your research.

Cynthia Okolo, PhD
Professor
Counseling, Educational Psychology, and Special Education
620 Farm Lane, College of Education
Michigan State University 48824
Phone: 517-355-1871
Fax: 517-353-6393
President, Technology and Media Division of CEC, tamcec.org
Consulting Editor, Journal of Teacher Education, jte.sagepub.com

On 8/7/16 8:47 PM, Ibraheem Alsawalem wrote:

> Dear Cynthia M. Okolo and Jeff Diedrich
> My name is Ibraheem Alsawalem, and I am a doctoral candidate at the university of Newcastle in Australia. My research topic is "Teacher's attitude to use of information communication technology (ICT) with students with intellectual disability in Saudi Arabian schools". I would like your permission to use and adapt the scale items of your instrument to fit my study, which are:
> 1. I would like to know more about how to use technology to assist students with disabilities.
> 2. I would attend professional development sessions that would help me learn more about how to use technology for students with disabilities.
> 3. I would use online modules or participate in webinars that would help me learn more about how to use technology for students with disabilities.
>
> In order to check the psychometric properties of the scales, exploratory factor analysis (EFA) and Chronbach's alpha will be used. Further, the content

Appendix 3: Interview Guide

3.1 English Version

Semi-structured interview with a teacher to investigate teachers' attitudes, beliefs and the barriers that prevent special education teachers to use ICT with students with intellectual disability.

Core Questions

1. What do you know about the use of information communication technology (ICT) in special education or intellectual disability field?
2. What experience have you had with the use of ICT in the intellectual disability field?
3. Do you think the student's abilities with intellectual disability prevent you from using ICT with them in school environment? How?
4. Explain why you use or not use ICT with students with intellectual disability?
5. Can you explain your attitude to the use of ICT with students with intellectual disability and why you think this way?
6. To what extent, ICT is useful and ease to use for teachers with students with intellectual disability?
7. Has formal professional development assisted your use of ICT in educational settings? How?
8. What are the barriers that prevent you from using ICT with students with ID? Why?
9. What are the enablers that help you to use ICT with students with ID?
10. What support do you receive and need to use ICT with students with intellectual disability? Why?
11. Do you have suggestions to improve the use of ICT with students with ID? Explain?

3.2 Arabic Version

١ام -ذا رعتف نعادختسام اينقتت امولعملت والااصتلات اجم يفل اةيبرتل
ا ةصاخلأو اجم يفل ا ةقاعلإا ىلع ةيركفلو هجاديدحتل؟
٢ ام -ه ياربخلات ا صخي اميف اهكلتمت يتلادختسام ةينقتامولعملت والااصتلات
اجم يفل ا ةقاعلإاديدحت ةيركفلا؟
٣ -ه دقتعت لان دقرات الاطلب ذوي ا ةقاعلإا نم مهعنمت ةيركفلاافتسلادة نم
اينقتت امولعملت والااصتلات يفا ةئيبلادملر ةيسد؟ ارشح ذليصفتلاب كلذ؟
٤ -ارشح املذا دختستم أو دختست لام اينقتت امولعملت والااصتلات عملاطلب
ذوي ا ةقاعلإاةيركفلا؟
٥ -ه نكمم لأن اجت كفقوم حضوته ادختسام اينقتت امولعملت والااصتلات عم
الاطلب ذوي ا ةقاعلاا ةيركفلو امه يأابسب ذكلا؟
٦ -ا ىلأي دمى اينقتت امولعملت والااصتلات ديفمة و ةلهسادختسلاام
نيملعملاجم يف نيصصختملل ا ةقاعلإا ةيركفلا؟ ارشح ذ كلا؟
٧ -ه لادلورات ادتلر ةيبيوا ريوطتلادعاست ينهملك ىلعادختسام اينقتت
امولعملت والااصتلات عملاطلب ذوي ا ةقاعلاا يف ةيركفلا ةئيبلادملر ةيسد؟
ارشح ذ كلا؟
٨ ام -ه يااقوعملت ا نم كعنمت يتلادختسام اينقتت امولعملت والااصتلات عم
الاطلب ذوي ا ةقاعلاا ةيركفلا؟ واملذا ؟
٩ ام -ه ياوعلا لمادعاست يتلك ىلعادختسام اينقتت امولعملت والااصتلات عم
الاطلب ذوي ا ةقاعلإا ةيركفلا؟
٠١ ام -هوذ وع ا معدلاذلي اقلتته واذلي أ نم هجاتحت اضيا لجادختسام اينقتت
امولعملت والااصتلات عملاطلب ذوي ا ةقاعلإا ةيركفلا؟ واملذا ؟
١١ -ه كيدل لارتقااحت ريوطت يف دعاستادختسام اينقتت امولعملت
والااصتلات عملاطلب ذوي ا ةقاعلاا ةيركفلا؟ أ يطعأ ةلثم؟

Appendix 4 Human Research Ethics Documents

4.1 Information Statement for Ministry of Education

Dr Kylie Shaw
School of Education
The University of Newcastle
University Drive
Callaghan NSW 2308
T: +61 2 49686712 or 49216007
Email: kylie.shaw@newcastle.edu.au

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Information Statement for the Ministry of Education:

Teacher's attitude to use of information communication technology (ICT) with students with intellectual disability

You are invited to participate in the research project identified above which is being conducted by Ibraheem Alsawalem (Ph.D. researcher), under the supervision of Dr Kylie Shaw and Associate Professor Ian Dempsey from the School of Education at the University of Newcastle, Australia.

Why is the research being done?

The research will investigate teachers' attitude to the use of information communication technology (ICT) with students with intellectual disability in Saudi Arabian schools. This study has the following focal objectives:

- To explore teachers' use of ICT with students with intellectual disability in Saudi Arabian schools.

- To investigate teachers' attitude to use of ICT with students with intellectual disability in Saudi Arabian schools.

- To examine teachers' beliefs of the educational use of ICT with students with intellectual disability in Saudi Arabian schools.

- To identify the predictors of the educational use of and attitudes to use of ICT by teachers of students with students with intellectual disability in Saudi Arabian schools.

- To identify the barriers to the educational use of ICT with students with intellectual disability in Saudi Arabian schools.

Who can participate in the research?

The population of this study will be Saudi Special Education Teachers, who are qualified to teach students with intellectual disability in public elementary, intermediate, high school and institutions in the Riyadh region, Saudi Arabia. Teachers who work in private schools are not eligible to participate in this study.

What would you be asked to do?

If you agree to participate, you will be asked for permission to conduct this study in Riyadh region, Saudi Arabia. The participants will be from Riyadh region, which contain Riyadh, Shaqraa, Afif, Al Zulfi, Hafar Al-Batin, Dawadmi, Wadi ad-Dawasir, Al-Hota and Al-Hariq, Al Majma'ah, Al-Quway'iyah, and Al-Ghat. We would greatly appreciate your cooperation in enabling the collection of data from elementary, intermediate, high schools and institutions. If authorization is granted, you will be asked to distribute the documents (including School Principal Participant Information Statement and consent form, Teacher Participant Information Statement and a hard copy of the survey) to the 63 Principals of schools and institutions that provide intellectual disability classes.

If schools agree to participate, the Principal of the school will arrange for a school administrator to email teachers the invitation to participate in the study. Teachers can opt to complete the online survey or request a hard copy of the survey from the administrator. For those Teachers who complete a hard copy of the survey, there will be a box provided at the school where they can leave their survey anonymously. Additionally, teachers will be asked to indicate at the end of the survey if they wish to participate in phase two, which is an audio-taped interview about their attitude to use of ICT with students with intellectual disability. A section of the questionnaire will allow them to provide their contact details if they would like to participate in an interview, which will be removed so it is not stored with the survey data.

What choice do you have?

Participation in this research is entirely your choice. If you agree for your region to participate in this study, only those schools and teachers who give their informed consent will be included in the project. Whether or not you decide to participate, your decision will not disadvantage you.

What would the Ministry of Education be asked to do?

If you agree to participate, schools in your region will be invited to participate in the study. Teachers in these schools, who are qualified to teach students with intellectual disabilities, will be asked to a questionnaire which will explore their attitude to use of information communication technology (ICT) with students with intellectual disability in Saudi Arabia schools. The questionnaire will be provided in Arabic language.

Twelve participant teachers, who complete the survey and agree to be interviewed, will be asked to make contact with the researcher to schedule a time to complete an interview. The questions of the interview will be provided to the teacher before the interview, along with an information statement and consent form also in Arabic language. The interview will be recorded and transcribed by the researcher. Participants have the right to review and edit the transcript of their response.

How much time will it take?

The questionnaire should take no longer than 25 minutes to complete. The interview should take about 30 minutes.

***What are the risks and benefits of participating*?**

We cannot promise you any direct benefit from participating in this research but you will be contributing to research that may help to improve the use of ICT in the intellectual disability field. This project will not involve any potential risks, physical or psychosocial harm for participants.

How will your teacher's privacy be protected?

Completed questionnaires will be anonymous, unless the teachers provide their details for participation in an interview. Participant contact information will be separated from hard-copy questionnaires and destroyed once this information is converted to electronic format. All of the information collected by the researcher, whether in the questionnaires or in the interview, will be secured in password-protected computers. Survey Monkey will be used as the survey platform. All paper-based materials collected in Saudi Arabia which contain identifying information about participants (i.e. consent forms, completed questionnaires, de-identified interview transcripts) will be secured by the student researcher until they are transported by the researcher to Australia. Once in Australia, all these documents will be kept in a secure cabinet at the Principal Supervisor's office at the University of Newcastle and stored for a minimum of 5 years. The only access to this information will be by the researcher and his supervisors, or as required by law.

How will the information collected be used?

The results will be reported in research project reports and in Mr Ibraheem Alsawalem's PhD thesis. It may be presented at conferences and in professional journals. The Ministry can request a summary of the results of the research from the researchers by indicating the request on the consent form.

What do you need to do to participate?

Please read this Information Statement and be sure you understand its contents before you consent to participate. If there is anything you do not understand, or you have questions, contact the researcher.

Further information

If you would like further information, please contact the researcher Ibraheem Alsawalem by email: Ibraheem.Alsawalem@newcastle.edu.au

Signature:

Ibraheem Alsawalem Researcher	Assoc. Prof. Ian Dempsey Supervisor	Dr Kylie Shaw Supervisor

Thank you for considering this invitation. Your participation is greatly valued.

Complaints about this research

This project has been approved by the University's Human Research Ethics Committee, Approval No. H-2016-235. Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, Australia, telephone +61 2 49216333, email: Human-Ethics@newcastle.edu.au. Local contact for complaints in Saudi Arabia, the Ministry of Education, Riyadh, Saudi Arabia: Mohammed Suliaman Phone: +96614779571, Fax +96614741165.

4.2 Information Statement for School Principals

Dr Kylie Shaw
School of Education
The University of Newcastle
University Drive
Callaghan NSW 2308
R: HC50, Hunter Building
T: +61 2 49686712 or 49216007
Email: kylie.shaw@newcastle.edu.au

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Information Statement for School Principals:

Teacher's attitude to use of information communication technology (ICT) with students with intellectual disability in Saudi Arabia schools

You are invited to participate in the research project identified above which is being conducted by Ibraheem Alsawalem (Ph.D. researcher), under the supervision of Associate Professor Ian Dempsey and Dr Kylie Shaw from the School of Education at the University of Newcastle, Australia.

Why is the research being done?

The research will investigate teachers' attitude to use of information communication technology (ICT) with students with intellectual disability in Saudi Arabian schools. This study has the following focal objectives:

- To explore teachers' use of ICT with students with intellectual disability in Saudi Arabian schools.
- To investigate teachers' attitude to use of ICT with students with intellectual disability in Saudi Arabian schools.
- To examine teachers' beliefs of the educational use of ICT with students with intellectual disability in Saudi Arabian schools
- To identify the predictors of the educational use of and attitudes to use of ICT by teachers of students with students with intellectual disability in Saudi Arabian schools.
- To identify the barriers to the educational use of ICT with students with intellectual disability in Saudi Arabian schools.

Who can participate in the research?

The population of this study will be Saudi Special Education Teachers, who are qualified to teach students with intellectual disability in public elementary, intermediate, high school and institutions in the Riyadh region, Saudi Arabia. Teachers who work in private schools are not eligible to participate in this study.

What would you be asked to do?

If you agree to participate, you will be asked to identify an administrator in your school to distribute an email to Teachers in your school/institution who are qualified to teach students with intellectual disability, which will include the Teacher Participant Information Statement with a link to the survey and, if requested, a hard copy of the survey. A hard copy of the survey has been provided for those without access to a network application. For those Teachers who complete a hard copy of the survey, we would ask the administrator to provide a collection box so Teachers can leave their survey anonymously. If selected, teachers may also be involved in interviews will be conducted in your schools during school hours, so your consent is also required.

What choice do you have?

Participation in this research is entirely your choice. If you agree for your school to participate in this study, only those teachers who give their informed consent will be included in the project. Whether or not you decide to participate, your decision will not disadvantage you.

What would teachers be asked to do?

If you agree to participate, teachers who are qualified to teach students with intellectual disability will be invited to participate in the study and will be asked to respond to a questionnaire which will explore their attitude to use of information communication technology (ICT) with students with intellectual disability. The survey will be provided in Arabic language. If selected, teachers who complete the survey and agree to be interviewed, will also be asked to make contact with the researcher to schedule a time to complete an interview. The questions of the interview will be provided to the teacher before the interview, along with an information statement and consent form also in Arabic language. The interview will be recorded and transcribed by the researcher. All participants have the opportunity to review and edit the transcript of their response.

How much time will it take?

The surveys should take no longer than 25 minutes. The interview should take about 30 minutes.

What are the risks and benefits of participating?

We cannot promise you any direct benefit from participating in this research but you will be contributing to research that may help to improve the use of ICT in the intellectual disability field. This project will not involve any potential risks, physical or psychosocial harm for participants.

How will your teacher's privacy be protected?

Completed surveys will be anonymous, unless the teachers provide their details for participation in an interview. Participant contact information will be separated from hard-copy surveys and destroyed once this information is converted to electronic format. All of the information collected by the researcher, whether in the surveys or in the interview, will be secured in password-protected computers. Survey Monkey will be used as the survey platform. All paper-based materials collected in Saudi Arabia which contain identifying information about participants (i.e. consent forms, completed surveys, de-identified interview transcripts) will be secured by the student researcher until they are transported by the researcher to Australia. Once in Australia, all these documents will be kept in a secure cabinet at the Principal Supervisor's office at the University of Newcastle and stored for a minimum of 5 years. The only access to this information will be by the researcher and his supervisors, or as required by law.

How will the information collected be used?

The results will be reported in research project reports and in Mr Ibraheem Alsawalem's PhD thesis, and may be presented at conferences and in professional journals.

What do you need to do to participate?

Please read this Information Statement and be sure you understand its contents before you consent to participate. If you would like to participate, please sign the attached consent form, and return it via the collection box provided. If there is anything you do not understand, or you have questions, contact the researcher.

Further information

If you would like further information please contact the researcher Ibraheem Alsawalem by the email: Ibraheem.Alsawalem@newcastle.edu.au

Signature

Ibraheem Alsawalem	Assoc. Prof. Ian Dempsey	Dr Kylie Shaw
Ph.D. researcher	Supervisor	Supervisor

Thank you for considering this invitation. Your participation is greatly valued.

Complaints about this research

This project has been approved by the University's Human Research Ethics Committee, Approval No. H-2016-0235. Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, Australia, telephone +61 2 49216333, email: Human-Ethics@newcastle.edu.au. Local contact for complaints in Saudi Arabia, the Ministry of Education, Riyadh, Saudi Arabia: Mohammed Suliaman Phone: +96614779571, Fax +96614741165.

4.3 Information Statement for Teachers

Dr Kylie Shaw
School of Education
The University of Newcastle
University Drive
Callaghan NSW 2308
T: +61 2 49686712 or 49216007
Email: kylie.shaw@newcastle.edu.au

THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

Information Statement for survey and interview for teachers of students with Intellectual Disability:

Teacher's attitude to use of information communication technology (ICT) with students with intellectual disability in Saudi Arabian schools

You are invited to participate in the research project identified above which is being conducted by Ibraheem Alsawalem (Ph.D. researcher), under the supervision of Associate Professor Ian Dempsey and Dr Kylie Shaw from the School of Education at the University of Newcastle, Australia.

Why is the research being done?

The research will investigate teachers' attitude to use of information communication technology (ICT) with students with intellectual disability in Saudi Arabian schools. This study has the following focal objectives:

- To explore teachers' use of ICT with students with intellectual disability in Saudi Arabian schools.

- To investigate teachers' attitude to use of ICT with students with intellectual disability in Saudi Arabian schools.

- To examine teachers' beliefs of the educational use of ICT with students with intellectual disability in Saudi Arabian schools

- To identify the predictors of the educational use of and attitudes to use of ICT by teachers of students with students with intellectual disability in Saudi Arabian schools.

- To identify the barriers to the educational use of ICT with students with intellectual disability in Saudi Arabian schools.

Who can participate in the research?

The population of this study will be Saudi Special Education Teachers who are qualified to teach students with intellectual disability in public elementary, intermediate, high school and institutions in the Riyadh region, Saudi Arabia. Teachers who work in private schools are not eligible to participate in this study.

What would you be asked to do?

If you agree to participate, you will be asked to complete either the link of the survey (preferred) or a hard copy questionnaire about your attitude to use of ICT with students with intellectual disability in Phase One of the study. For those teachers who complete a hard copy of the survey, there will be a box provided at the school where you can leave your survey anonymously. A section of the questionnaire will allow you to provide your contact details if you would like to participate in an interview, which will be removed so you are not identified and it is not stored with the survey data.

Phase Two: If you agree and are selected for an interview, you will be asked to arrange a suitable time during school hours to be interviewed by the researcher face to face if you a male teacher or via telephone if you a female teacher. The interview questions will be provided before the interview and will be in Arabic language. The interview will be recorded and transcribed by the researcher and you will have the right to review and edit the transcript of your response.

What choice do you have?

Participation in this research is entirely your choice. Only those teachers who give their informed consent will be included in the project. Whether or not you decide to participate, your decision will not disadvantage you.

How much time will it take?

The questionnaires should take no longer than 25 minutes to complete. If you complete the link of the survey, you will need to complete it in one visit. The interview should take about 30 minutes.

***What are the risks and benefits of participating*?**

We cannot promise you any direct benefit from participating in this research but you will be contributing to research that may help to improve the use of information communicating technology in intellectual disability field. This project will not involve any potential risks, physical or psychosocial harm for participants

How will your privacy be protected?

Completed questionnaires will be anonymous, unless you provide your details for participation in an interview. Participant contact information will be separated from hard-copy questionnaires and destroyed once this information is converted to electronic format. All of the information collected by the researcher, whether in the questionnaires or in the interview, will be secured in password-protected computers. Survey Monkey will be used as the online survey platform. All paper-based materials collected in Saudi Arabia which contain identifying information about participants (i.e. consent forms, completed questionnaires, de-identified interview transcripts) will be secured by the student researcher until they are transported by the researcher to Australia. Once in Australia, all these documents will be kept in a secure cabinet at the principal supervisor’s office at the University of Newcastle and stored for a minimum of 5 years. The only access to this information will be by the researcher and his supervisors, or as required by law.

How will the information collected be used?

The results will be reported in research project reports and in Mr Ibraheem Alsawalem's PhD thesis, and may be presented at conferences and in professional journals. A summary of results will be available to those interested. For those who complete the hard copy, the consent form will include a section to request the summary. For those who complete the online survey, the researcher will provide a link to the project website.

What do you need to do to participate?

Please read this Information Statement and be sure you understand its contents before you consent to participate. Please click on the link to complete the online survey or complete a hard-copy and place it in box that provided by your school. If there is anything you do not understand, or you have questions, contact the researcher. Completion of the survey will constitute consent and as the survey is anonymous, you will not be able to withdraw this information once the survey is submitted.

The link to the online survey

If you are interested, you can go directly to the survey through this link:

(The link will be provided later due to time and cost required to translate it into Arabic for this study, the researcher proposes only to translate and provide it once they have been approved by ethics.)

Further information

If you would like further information, please contact the researcher Ibraheem Alsawalem by the email: Ibraheem.Alsawalem@newcastle.edu.au

Signature

Ibraheem Alsawalem	Assoc. Prof. Ian Dempsey	Dr Kylie Shaw
Ph.D. researcher	Supervisor	Supervisor

Thank you for considering this invitation. Your participation is greatly valued.

Complaints about this research

This project has been approved by the University's Human Research Ethics Committee, Approval No. H-2016-0235. Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, Australia, telephone +61 2 49216333, email: Human-Ethics@newcastle.edu.au.

Local contact for complaints in Saudi Arabia, the Ministry of Education, Riyadh, Saudi Arabia: Mohammed Suliaman Phone: +96614779571, Fax +96614741165.

4.4 Consent Form for Ministry of Education

Dr Kylie Shaw
School of Education
The University of Newcastle
University Drive
Callaghan NSW 2308
R: HC50, Hunter Building
T: +61 2 49686712 or 49216007
Email: kylie.shaw@newcastle.edu.au

THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

Consent Form for the Ministry of Education:

Teacher's attitude to of use of information communication technology (ICT) with students with intellectual disability in Saudi Arabian schools

I agree that schools and institutions, that provide classes for students with intellectual disability, can participate in the above research project and give my consent freely.

I consent to:

- Give permission to conduct this study in Riyadh region, Saudi Arabia and access the schools and institutions that provide intellectual disability classes in Riyadh region.
- Distribute the attached email, including the Principal information statement and consent forms to all the 60 schools and three institutions that provide intellectual disability classes in Riyadh region.

I have had the opportunity to have questions answered to my satisfaction.

Name: …………………………………………

Position: ……………………………………….

Signature: ………………………………………..

Date:……………….

I ask for a summary of the research findings to be sent to me: Yes / No

If yes, please give a contact email address:

…………………………………………………………………….

4.5 Consent Form for School Principals

Dr Kylie Shaw
School of Education
The University of Newcastle
University Drive
Callaghan NSW 2308
T: +61 2 49686712 or 49216007
Email: kylie.shaw@newcastle.edu.au

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Consent Form for School Principals:

Teacher's attitude to of use of information communication technology (ICT) with students with intellectual disability in Saudi Arabian schools

I agree for my school to participate in this study. I understand that I will be asked to contact teachers, who are qualified to teach intellectual disability, to participate in the above research project.

I understand that:

The project will be conducted as described in the Information Statement, a copy of which I have retained.

The school can withdraw from the study at any time and do not have to give any reason for withdrawing

The researcher will have access to the school with my permission during school hours and conduct an interviews with teachers who consent to participate.

I will nominate a school administrator to distribute the email and information to teachers and provide a collection box at the school so any hard copy surveys can be returned anonymously

I will not have access to data collected from this study

I have had the opportunity to have questions answered to my satisfaction.

Name: …………………………………………

Position: ……………………………………….

Signature: ………………………………………..

Date:……………….

I ask for a summary of the research findings to be sent to me: Yes / No

If yes, please give a contact email address:

…………………………………………………………………….

4.6 Consent Form for Teachers (Phase 2)

Dr Kylie Shaw
School of Education
The University of Newcastle
University Drive
Callaghan NSW 2308
T: +61 2 49686712 or 49216007
Email: kylie.shaw@newcastle.edu.au

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Consent Form for the Interview (Phase Two): Teachers of Intellectual Disability:

Teacher's attitude to of use of information communication technology (ICT) with students with intellectual disability (ID) in Saudi Arabian schools

I agree to participate in the Phase Two of above research project and give my consent freely.

I understand that:

- The project will be conducted as described in the Information Statement, a copy of which I have retained.
- I can withdraw from the project at any time and do not have to give any reason for withdrawing.
- My personal information will remain confidential to the researchers except as required by the law.
- The interview will be scheduled during school hours with consideration of my gender in provision of an appropriate interviewer
- The interview will be audio-recorded and transcribed by the researcher. I will have an opportunity to review and edit the transcript of the interview

I have had the opportunity to have questions answered to my satisfaction.

Name: …………………………………………

Position: ……………………………………….

Signature: ………………………………………..

Date:……………….

I ask for a summary of the research findings to be sent to me: Yes / No

If yes, please give a contact email address:

………………………………………………………………….

4.7 Ethics Approval

HUMAN RESEARCH ETHICS COMMITTEE

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Notification of Expedited Approval

To Chief Investigator or Project Supervisor:	**Doctor Kylie Shaw**
Cc Co-investigators / Research Students:	**Mr Ibraheem Alsawalem** **Conjoint Associate Professor Ian Dempsey**
Re Protocol:	**Teachers' Attitudes to Use of Information Communication Technology (ICT) with Students with Intellectual Disability in Saudi Arabian Schools**
Date:	**09-Aug-2016**
Reference No:	**H-2016-0235**
Date of Initial Approval:	**09-Aug-2016**

Thank you for your **Response to Conditional Approval (minor amendments)** submission to the Human Research Ethics Committee (HREC) seeking approval in relation to the above protocol.

Your submission was considered under **Expedited** review by the Ethics Administrator.

I am pleased to advise that the decision on your submission is **Approved** effective **09-Aug-2016**.

In approving this protocol, the Human Research Ethics Committee (HREC) is of the opinion that the project complies with the provisions contained in the National Statement on Ethical Conduct in Human Research, 2007, and the requirements within this University relating to human research.

Approval will remain valid subject to the submission, and satisfactory assessment, of annual progress reports. *If the approval of an External HREC has been "noted" the approval period is as determined by that HREC.*

The full Committee will be asked to ratify this decision at its next scheduled meeting. A formal *Certificate of Approval* will be available upon request. Your approval number is **H-2016-0235**.

If the research requires the use of an Information Statement, ensure this number is inserted at the relevant point in the Complaints paragraph prior to distribution to potential participants You may then proceed with the research.

Conditions of Approval

This approval has been granted subject to you complying with the requirements for *Monitoring of Progress*, *Reporting of Adverse Events*, and *Variations to the Approved Protocol* as detailed below.

PLEASE NOTE:
In the case where the HREC has "noted" the approval of an External HREC, progress reports and reports of adverse events are to be submitted to the External HREC only. In the case of Variations to the approved protocol, or a Renewal of approval, you will apply to the External HREC for approval in the first instance and then Register that approval with the University's HREC.

- ***Monitoring of Progress***

Other than above, the University is obliged to monitor the progress of research projects involving human participants to ensure that they are conducted according to the protocol as approved by the HREC. A progress report is required on an annual basis. Continuation of your HREC approval for this project is conditional upon receipt, and satisfactory assessment, of annual progress reports. You will be advised when a report is due.

- ***Reporting of Adverse Events***

1. It is the responsibility of the person **first named on this Approval Advice** to report adverse events.
2. Adverse events, however minor, must be recorded by the investigator as observed by the investigator or as volunteered by a participant in the research. Full details are to be documented, whether or not the investigator, or his/her deputies, consider the event to be related to the research substance or procedure.
3. Serious or unforeseen adverse events that occur during the research or within six (6) months of completion of the research, must be reported by the person first named on the Approval Advice to the (HREC) by way of the Adverse Event Report form (via RIMS at https://rims.newcastle.edu.au/login.asp) within 72 hours of the occurrence of the event or the investigator receiving advice of the event.
4. Serious adverse events are defined as:
    - Causing death, life threatening or serious disability.
    - Causing or prolonging hospitalisation.
    - Overdoses, cancers, congenital abnormalities, tissue damage, whether or not they are judged to be caused by the investigational agent or procedure.
    - Causing psycho-social and/or financial harm. This covers everything from perceived invasion of privacy, breach of confidentiality, or the diminution of social reputation, to the creation of psychological fears and trauma.
    - Any other event which might affect the continued ethical acceptability of the project.

5. Reports of adverse events must include:
    - Participant's study identification number;
    - date of birth;
    - date of entry into the study;
    - treatment arm (if applicable);
    - date of event;
    - details of event;
    - the investigator's opinion as to whether the event is related to the research procedures; and
    - action taken in response to the event.

6. Adverse events which do not fall within the definition of serious or unexpected, including those reported from other sites involved in the research, are to be reported in detail at the time of the annual progress report to the HREC.

- ***Variations to approved protocol***

If you wish to change, or deviate from, the approved protocol, you will need to submit an *Application for Variation to Approved Human Research* (via RIMS at https://rims.newcastle.edu.au/login.asp). Variations may include, but are not limited to, changes or additions to investigators, study design, study population, number of participants, methods of recruitment, or participant information/consent documentation. **Variations must be approved by the (HREC) before they are implemented** except when Registering an approval of a variation from an external HREC which has been designated the lead HREC, in which case you may proceed as soon as you receive an acknowledgement of your Registration.

Linkage of ethics approval to a new Grant

HREC approvals cannot be assigned to a new grant or award (ie those that were not identified on the application for ethics approval) without confirmation of the approval from the Human Research Ethics Officer on behalf of the HREC.

Best wishes for a successful project.

Professor Allyson Holbrook
Chair, Human Research Ethics Committee

For communications and enquiries:
Human Research Ethics Administration

Research Services
Research Integrity Unit
NIER, Block C
The University of Newcastle
Callaghan NSW 2308
T +61 2 492 17894
Human-Ethics@newcastle.edu.au

RIMS website - https://RIMS.newcastle.edu.au/login.asp

Linked University of Newcastle administered funding:

Funding body	Funding project title	First named investigator	Grant Ref

Appendix 5 Permission from the Saudi Ministry of Education

ROYAL EMBASSY OF SAUDI ARABIA
CULTURAL ATTACHÉ OFFICE
CANBERRA

سفارة المملكة العربية السعودية
مكتب الملحقية الثقافية
كانبرا
إفادة تسهيل مهمة

1437/08/05 هـ الموافق 2016/05/12م

<u>إلى من يهمه الأمر</u>

يفيد مكتب الملحق الثقافي في سفارة المملكة العربية السعودية في أستراليا بأن المبتعث **إبراهيم محمد ناصر السويلم**، (رقم الهوية الوطنية **1065401216**) مبتعث من جامعة حائل لدراسة دكتوراه في تخصص التعليم لذوي الإحتياجات الخاصة بجامعة نيوكاسل - استراليا ، وهو متواجد حالياً في مقر البعثة، وقد بدأ الصرف على المبتعث من تاريخ 1435/04/10هـ الموافق 2014/02/10م ، وستنتهي بعثته في تاريخ 1439/04/10هـ الموافق 2017/12/28م.

ونظرًا لحاجة المبتعث للقيام برحلة علمية لجمع معلومات متعلقة برسالة **الدكتوراة من المملكة ولتوصية المشرف الأكاديمي للمبتعث في الجامعة بذلك؛** نأمل من الجهات ذات العلاقة التكرم بمساعدة المبتعث المشار إليه أعلاه وتسهيل مهمته في جمع المعلومات المطلوبة لأغراض البحث العلمي.

هذه المعلومات صحيحة حسب بيانات نظام الشؤون الدراسية في التاريخ المحدد أعلاه، وبناءً على طلب المبتعث تم منحه هذه الإفادة.

والله الموفق.

الملحق الثقافي
بسفارة المملكة العربية السعودية في كانبرا

د. عبدالعزيز بن عبدالله بن طالب

Canberra
Royal Embassy of Saudi Arabia
Cultural Attache Office
سفارة المملكة العربية السعودية
مكتب الملحقية الثقافية
كانبرا

Ref No:.........................., Date:........................, Attachments........ ....المرفقات.........................., التاريخ............................., الرقم

Tel: +61 2 62693170 Fax: +61 2 62325978 P.O. BOX 1206, DICKSON , ACT, 2602, AUSTRALIA

www.sacm.org.au

المملكة العربية السعودية وزارة التعليم الإدارة العامة للتعليم بمنطقة الرياض إدارة التخطيط والتطوير	وزارة التعليم Ministry of Education	الرقم : التاريخ : المرفقات :

إفـــادة

اسم الدارس	السجل المدني
إبراهيم بن محمد ناصر السويلم	١٠٦٥٤٠١٢١٦

السلام عليكم ورحمة الله وبركاته ويعد :

تلبية لطلب الدارس الموضحة بياناته أعلاه ، فإنه لا مانع لدى إدارة التخطيط والتطوير بالإدارة العامة للتعليم بمنطقة الرياض من تطبيق دراسته في مدينة الرياض بعنوان: (مواقف المعلمين نحو استخدام تقنيات المعلومات والاتصالات (ICT) مع الطلاب ذوي الإعاقة الفكرية في مدارس المملكة العربية السعودية).

وزارة التعليم
إدارة التخطيط والتطوير

مدير إدارة التخطيط والتطوير

سعود بن راشد آل عبداللطيف

المملكة العربية السعودية
وزارة التعليم
٢٨٠
الإدارة العامة للتعليم بمنطقة الرياض
إدارة التخطيط والتطوير

وزارة التعليم
Ministry of Education

الرقم : ....
التاريخ : ٤/٣/١٤٣٨ هـ
المرفقات : ١/١٢/٢٠١٦م

(إفـــادة)

الموضوع: انتهاء مهمة باحث (مرحلة علمية)

اسم الباحث	ابراهيم بن محمد ناصر السويلم
كلية /الجامعة	نيوكاسل - استراليا
رقم وتاريخ خطاب تسهيل مهمة البحث	٣٧١٧٤٦٦٦٦ وتاريخ ١٤٣٧/١١/٢٩ هـ
عنوان الدراسة	(مواقف المعلمين نحو استخدام تقنيات المعلومات والاتصالات (ICT) مع الطلاب ذوي الاعاقة الفكرية في مدارس المملكة العربية السعودية)

بناءً على تعميم معالي وزير التربية والتعليم رقم ٦١٠/٥٥ وتاريخ ١٤١٦/٩/١٧هـ بشأن تفويض الإدارات العامة للتربية والتعليم بإصدار خطابات السماح للباحثين بإجراء البحوث والدراسات وتسهيل مهامهم ، وحيث تقدم إلينا الباحث (الموضحة بياناته أعلاه) بطلب إجراء دراسته والتي بدأت من تاريخ رفع خطاب تسهيل المهمة من إدارة التخطيط والتطوير وحتى تاريخ ١٤٣٨/٢/٢٩ هـ ، وعليه نفيدكم أن الباحث قد أنهى كافة إجراءات الدراسة وتطبيق الأداة في مجال البحث على عينة من (٣١٢ معلم) التابعة لإدارة التعليم في منطقة الرياض التعليمية ، وبناءً على طلبة تم منحه الإفادة.

شاكرين طيب تعاونكم .

إدارة التخطيط والتطوير

ص/ قسم الدراسات والبحوث

وزارة التعليم
إدارة التخطيط والتطوير

Appendix 6 Search Strategies

Keywords: (use of ICT OR use of technology) AND (Saudi Arabia OR education OR special education OR intellectual disability OR schools OR classrooms OR teachers). (Attitude OR perception OR perceptive) AND (teachers OR special education teachers OR Saudi teachers) AND (use of ICT OR use of technology OR technology acceptance model OR TAM). (Beliefs OR perceived usefulness PU OR perceived ease of use PEU) AND (use of ICT OR use of technology OR technology acceptance model OR TAM) AND (schools OR education OR special education OR Saudi Arabia). (Factors OR professional development PD OR gender OR age OR gender OR qualification OR type of school OR experience OR number of class and students OR region of school) AND (use of ICT OR use of technology) AND (Saudi Arabia OR education OR technology acceptance model OR TAM). (Barriers OR obstacles OR hinders OR challenges) AND (use of ICT OR use of technology OR Saudi Arabia).